Chapter 1

Origins of Exercise
Physiology: Foundations for the Field of Study

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Objectives

1. Outline Galen’s contributions to health and scientific hygiene.

2. Discuss the beginnings of the development of exercise physiology in the US.

3. Discuss the contributions of George Wells Fitz to the evolution of the academic field of exercise physiology.

4. List some major contributions of Nordic scientists to the field of exercise physiology.

5. Outline the course of study for the first academic 4-year program in the US from the Department of Anatomy, Physiology, and Physical Training at Harvard University.
Objectives

6. Describe the creation of the Harvard Fatigue Laboratory, its major scientists, and its contributions to the field of exercise physiology.

7. Describe the different jobs of an exercise physiologist.

8. Discuss the role of social networking, and how these would relate to an exercise physiologist.

9. List two of the most prominent exercise physiology professional organizations.
Exercise Physiology

- Consists of three distinct components as an academic discipline:
  1. Body of knowledge built on facts and theories derived from research
  2. Formal course of study in institutions of higher learning
  3. Professional preparation of practitioners and future investigators and leaders in the field
- Emerged from the influences of several traditional fields, primarily anatomy, physiology, and medicine
Origins of Exercise Physiology

- The origins of exercise physiology begin with the influential Greek physicians of antiquity
  - Herodicus, Father of Sports Medicine
  - Hippocrates, Founder of Medicine
  - Galen, Surgeon to the Gladiators
Galen (131–201 AD)

- Galen emerged as the most well-known and influential physician that ever lived.
- Taught and practiced 7 “laws of health”:
  - Breathing fresh air, eating proper foods, drinking the right beverages, exercising, getting adequate sleep, having a daily bowel movement, and controlling one’s emotions.
- Introduced the concept of “Polisarkia”
Growth in the United States

- **Before 1800**, there were 39 first-edition American-authored medical books and one medical journal.

- **By 1850**, medical journals increased to 117.
  - Hot topics: Nutrition and dieting, exercise, how to best develop overall fitness, training exercises for recreation and preparation for sport, and personal health and hygiene.

- **Mid-19th century**: Medical school graduates began to assume positions of leadership in academia and allied medical sciences.
Austin Flint, Jr., MD

- American physician-physiologist (1812-86) who contributed significantly to the burgeoning literature in physiology.

- Fostered the belief among 19th century American physical education teachers that muscular exercise should be taught from a strong foundation of science and experimentation.
Edward Hitchcock and E. Hitchcock, Jr.

- Pioneered the American sports science movement
- Hitchcock was first to statistically record basic anthropometric data on a large group of subjects on a yearly basis.
- Hitchcock’s coauthored an anatomy and physiology textbook geared to college physical education.
- From 1861 to 1888, Hitchcock, Jr. measured all students enrolled at Amherst College for 6 measures of segmental height, 23 girths, 6 breadths, 8 lengths, 8 indices of muscular strength, lung capacity, and pilosity.
George Wells Fitz, MD
1860-1934

- Physician and pioneer exercise physiology researcher
- Helped establish the *Department of Anatomy, Physiology, and Physical Training* at Harvard University in 1891
- Developed the first formal exercise physiology laboratory where students investigated the effects of exercise on cardiorespiratory function, including muscular fatigue, metabolism, and nervous system functions
Harvard’s Department of Anatomy, Physiology, and Physical Training

- Harvard’s new physical education major and exercise physiology research laboratory focused on three objectives:

  1. **Prepare students**, with or without subsequent training in medicine, to become directors of gymnasia or instructors in physical training

  2. **Provide general knowledge** about the science of exercise, including systematic training to maintain health and fitness

  3. Provide suitable academic preparation to enter **medical school**
Exercise Studies in Research Journals

• In 1898, three articles on physical activity appeared in the first volume of the *American Journal of Physiology*.

• *Journal of Applied Physiology* contained the classic paper by J.M. Tanner on ratio expressions of physiological data with reference to body size and function.

  
  – Aimed to integrate both medical and physiological aspects of sports medicine and exercise science
  
  – Changed in 1980 to *Medicine and Science in Sports and Exercise*
First Textbook in Exercise Physiology

- Debate exists over what was the first textbook in exercise physiology.

- To deserve such historical recognition, a textbook should:
  - Provide sound **scientific rationale** for major concepts
  - Provide **summary information** (based on experimentation) about important prior research in a particular topic area
  - Provide sufficient “factual” information about a topic area to give it **academic legitimacy**
First Textbook in Exercise Physiology (Cont.)

- Possible candidates:
  - Andrew Combe, 1843, *The Principles of Physiology Applied to the Preservation of Health, and to the Improvement of Physical and Mental Education*
  - E. Hitchcock and E. Hitchcock, Jr. 1860, *Elementary Anatomy and Physiology for Colleges, Academies, and Other Schools*
  - George Kolb, 1893, *Physiology of Sport*
Harvard Fatigue Laboratory

- Founded in 1927
- Legitimized exercise physiology as an important area of research and study
- Established by Lawrence J. Henderson, M.D., Harvard chemist and professor of biochemistry
- David Bruce Dill, a Stanford Ph.D. in physical chemistry, became the first and only scientific director of the Laboratory
Nordic Connection

• Danish influence
  – Johannes Lindhard
  – August Krogh

• Swedish influence
  – Per Henrik Ling
  – Per-Olof Åstrand

• Norwegian and Finnish influence
  – Lars A. Hermansen
  – Martti Karvonen
Exercise Physiology, the World Wide Web, and Online Social Networking

- Publications of applied and basic exercise physiology research have increased as the field expands into different areas.

- The World Wide Web and online social networking offer unique growth potential for information dissemination in this field.
Organizations

- **The American Association for the Advancement of Physical Education (AAAPE) now the American Physical Education Association**
  - Formed in 1885
  - First professional organization in the US to include topics related to exercise physiology
  - Predated American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD)

- **American College of Sports Medicine (ACSM)**
  - More than 20,000 members in 75 countries
  - Largest professional organization for exercise testing and fitness programming in the world.
What Do Exercise Physiologists Do?

- Some use their research skills primarily in colleges, universities, private industry settings.
- Others are employed in health, fitness, and rehabilitation centers.
- Others serve as educators, personal trainers, managers, and entrepreneurs in the health and fitness industry.
ACSM Certifications

- **Health and Fitness Track**
  - Exercise Leader, Health/Fitness Instructor, and Health/Fitness Director

- **Clinical Track**
  - Exercise Test Technologist, Preventive/Rehabilitative Exercise Specialist, and Preventive/Rehabilitative Program Director
The End