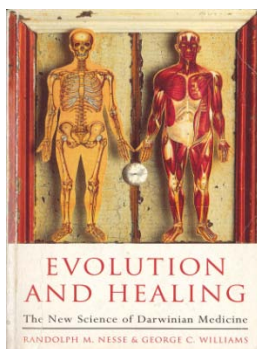


## What is Evolutionary Medicine?

- > Evolutionary Medicine involves using evolutionary biology to address the problems of medicine
- > Some areas of medicine have had an evolutionary basis for a long time:
  - > Infectious diseases
  - > Genetics
- > The new focus of Evolutionary Medicine is on the adaptive significance of the human body that makes it vulnerable to diseases:
  - > Physiology centres around adaptive functions
  - > Anatomy is based on evolution
- > New areas:
  - > Nutrition
  - > Pharmacology
  - > Cancer
  - > Developmental biology



## Is Evolutionary Medicine different to the Bio-medical perspective?

- > Bio-medical perspective:
  - > Focuses on proximate mechanisms
  - > How the body works
  - > How it goes wrong
- > Evolutionary Medicine perspective:
  - > Focuses on why is the body the way it is?
  - > Why does it fail the way it fails?

## History of Evolutionary Medicine

- > As a discipline Evolutionary medicine is new
- > First book focusing on Evolutionary Medicine:
  - > *Evolution and Healing: The New Science of Darwinian Medicine* (above)
- > In 2005 "Evolution in Action" was *Science's* breakthrough of the year
- > 2008/9 three Evolutionary Medicine edited volumes were published
- > One was the first medical textbook
- > The field has a much longer history as a science

*"A theory founded upon nature, that should bind together the scattered facts of medical knowledge, and converge into one point of view the laws of organic life, would thus on many accounts contribute to the interest of society. It would capacitate men of moderate abilities to practice the art of healing with real advantage to the public; it would enable everyone of literary acquirements to distinguish the genuine disciplines of medicine from the boastful effrontery, or of wily address; and would teach mankind in some important situations the knowledge of themselves"*

Erasmus Darwin (1731-1802) Charles Darwin's Grandfather

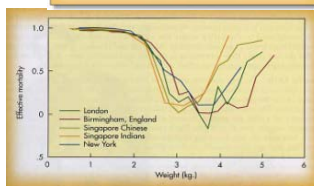
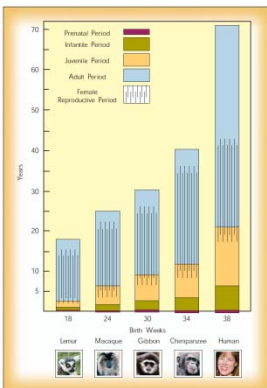


## Current Evolutionary Units in the School of Medical Sciences

- > Anatomy and physiology units are currently delivered with a basic understanding of evolution that underlies important concepts in human physiology such as homeostasis
- > One specialist first year unit focuses on humans, their evolution and how the environment (ecology) impacts upon us
- > Human Evolution and Ecology (SCH1132)

## Human Evolution and Ecology (SCH1132)

- > This broad engaging unit brings the many exciting topics on human origins and behaviour together
- > Students are given an excellent basis to build upon and it is hoped the Evolutionary Medicine units will tap this potential
- > Topics covered include:
  1. Understanding how evolution works
  2. The amazing diversity in the Primate Order
  3. How we currently think humans evolved
- > Controversies:
  - > Creationism
  - > The evolution of hominid bipedality
  - > *Homo floresiensis* (new fossil - Hobbit)
  - > Were they a distinct human ancestor?
  - > Wading man



## Unit Content: The Challenging Questions these Evolutionary Medicine Units will Address

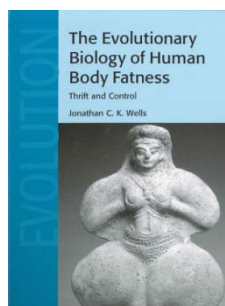
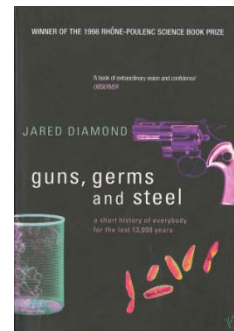
- > Two Evolutionary Medicine units (one undergraduate and one postgraduate) are currently being developed in the School of Medical Sciences
- > As Evolutionary Medicine is applying evolutionary theory to improve our understanding of current clinical medical problems – The questions most applicable to the perspective provide exciting insights into our biology and health

## Where did the infectious diseases that cause epidemics come from and where are they going?

- > Infectious disease epidemics are much more dangerous to human populations than any war
- > The "Spanish Influenza" killed 20 million people (1918-1920)
- > The "Black Death" killed 1 in 3 Europeans approximately 25 million people (1347-1352)

*"Naturally, we're disposed to think about diseases just from our own point of view: what can we do to save ourselves and to kill the microbes? Let's stamp out the scoundrels, and never mind what their motives are! In life in general, though, one has to understand the enemy in order to beat him, that's especially true in medicine"*

Jared Diamond *Guns, Germs and Steel* (pp. 197-198)



## How is antibiotic resistance driving the evolution of diseases?

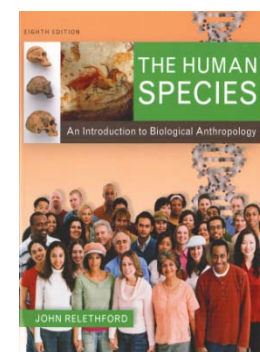
- > In the 1960s it was felt antibiotics would rid humans of infectious diseases
- > Unfortunately, this was not the case and some pathogens have evolved in response to antibiotics
- > The misuse and overuse of antibiotics mean some bacteria (such as those that cause tuberculosis) are evolving and developing antibiotic resistance
- > Can we manipulate this evolution to produce less virulent diseases?

## Why do humans have fat? Why has it got out of control?

- > Originally fatness in humans evolved to support physiology throughout a seasonal year
- > Now obesity is in epidemic proportions
- > How much of this obesity is simply our reactions to our current environment?

## Be proud of your skin colour: Biological Significance of Skin Pigmentation

- > Human skin pigmentation is an adaptation to the synthesis of vitamin D in response to UVB radiation
- > People in high UV areas have darker pigments
- > People in low UV areas have lighter pigments
- > Now we move around the globe – What consequences does that have for our health?



## Why is the human brain so large? Can it really be due to gossip?

- > Many authors have suggested the human brain is large compared to other animals because it is an adaptation that made it easier to hunt or control factual information (intelligence)
- > It may have evolved from the use of language to make friends in large groups (gossip)
- > Replacing the grooming of non-human primates

## Evolutionary Public Health Consortium

- > In 2011 an Evolutionary Public Health consortium was developed centered in the UK
- > Participating in this consortium will ensure internationally recognised teaching, learning & research
- > The aims are to:
  1. Devise a curriculum for public health physicians; doctors studying public health, health promoters; doctors, and students
  2. Develop research applications for applying evolutionary perspectives to public health
- > Consortium members come from:
  - > Edith Cowan University
  - > University of East London
  - > Newcastle University
  - > University of Westminster
  - > University College London
  - > Oxford University

