

# Unit 1

CS

## British/Irish Geology

### Geological history and history of geology

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Robert Spence, Angewandte Sprachwissenschaft, Universität des Saarlandes

1.1



Figure 1: William Smith (1769 – 1839), Father of English Geology (Source: Wikipedia)

1.2

#### Princess Diana's favourite hymn

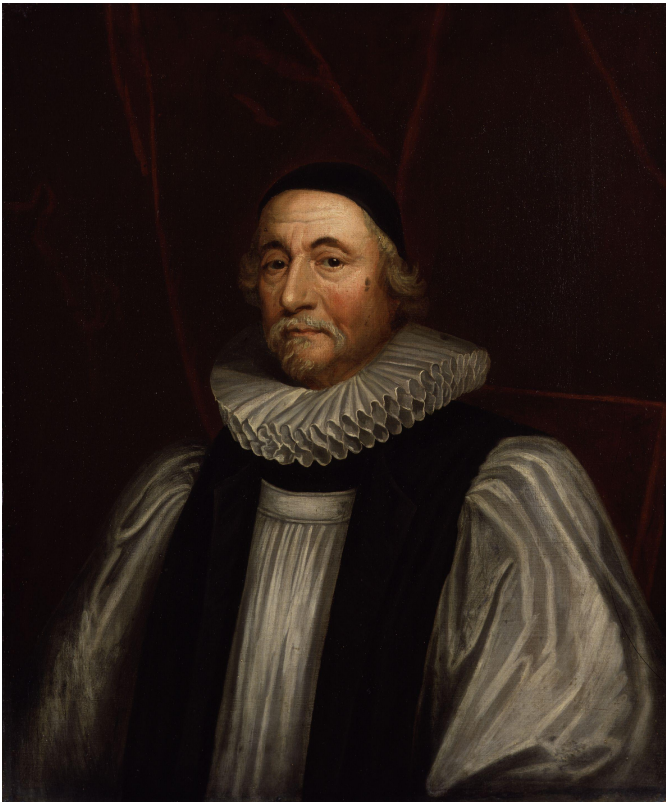
- What's this got to with geology??
- Lyrics: I vow to thee my country (see handout)
- Music: Hymn tune adapted from Gustav Holst's suite *The Planets*
- ... each movement represents a different planet; this one is Jupiter
- Are there any words in the text you don't know?
- <http://www.youtube.com/watch?v=KHh8isGtB6w>

1.3

# 1 Expanding the timescale

## 1.1 Overcoming Ussher's chronology

### Overcoming Ussher's chronology



Source: Wikipedia

1.4

### Overcoming Ussher's chronology

- James Ussher (1581 – 1656)
- Believed Earth (and Universe) were ca. 6000 years old: [http://en.wikipedia.org/wiki/Ussher\\_chronology](http://en.wikipedia.org/wiki/Ussher_chronology)
- Even Isaac Newton (1643 – 1727) believed this
- By end of nineteenth century: millions of years old
- By end of twentieth century: billions of years old

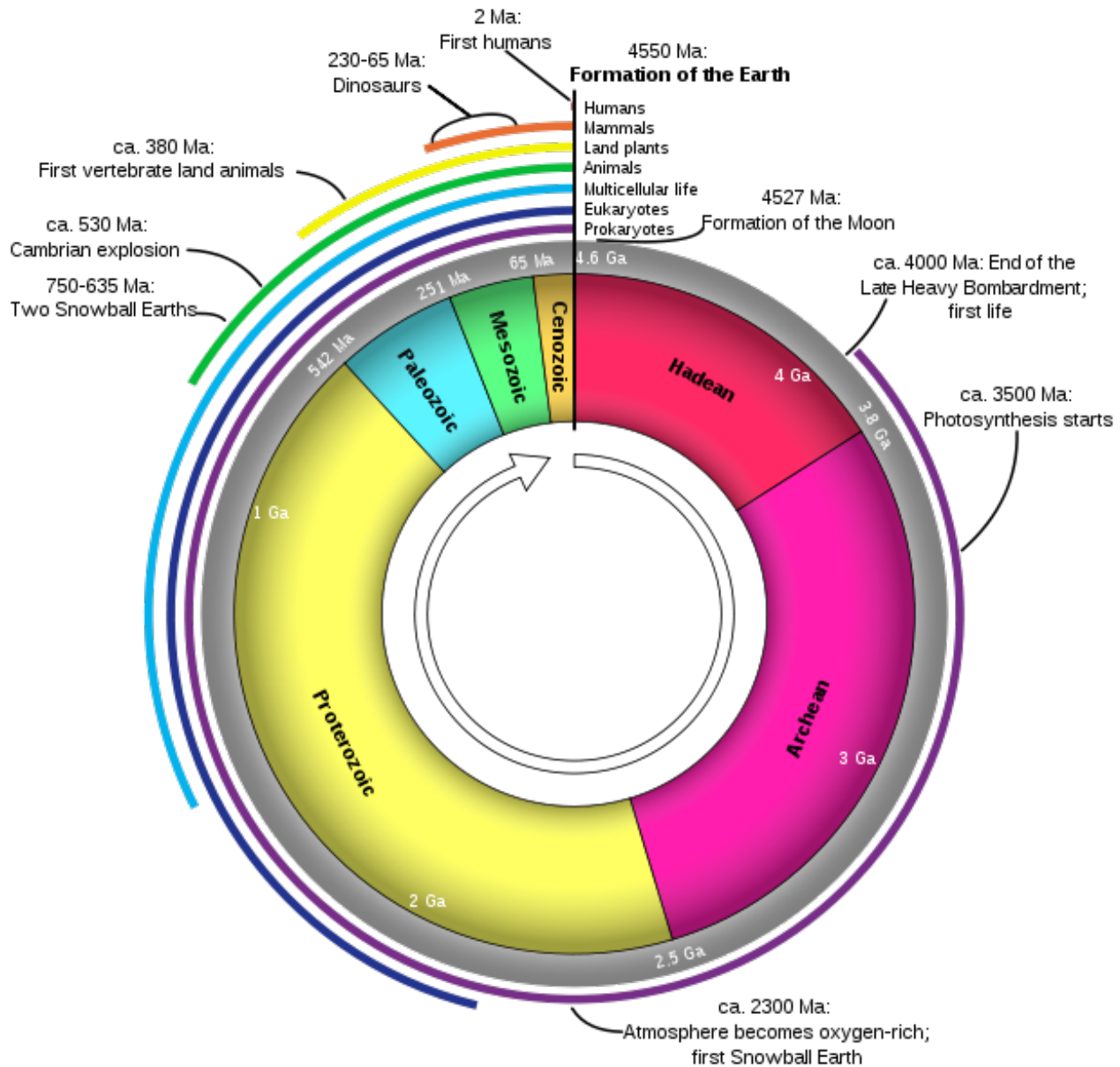
1.5

## 1.2 Linear, spiral, logarithmic scales

### Linear, spiral, logarithmic scales

- Linear scale: humbling, but difficult to fit
- Spiral scale: easier to fit on page (see next slide)
- Logarithmic scale: requires rethinking (see handout)

1.6



Source: Wikipedia

### 1.3 Modern chronology

#### Modern chronology

- Universe formed  $13.798 \pm 0.037$  Ga (=BYA, billion years ago)
- Earth formed  $4.54 \pm 0.05$  Ga
- Life formed 3.7 Ga or earlier
- Three transitions of unknown improbability:
- $\rightarrow$  (1)  $\rightarrow$  alive  $\rightarrow$  (2)  $\rightarrow$  eukaryotic  $\rightarrow$  (3)  $\rightarrow$  conscious
- (Szostak) (Margulis) (Edelman)
- (1) <http://tinyurl.com/cdk007abiogenesisnew>
- (2) <http://tinyurl.com/eukaryotic1>
- (3) <http://www.youtube.com/watch?v=Lp3LEGcHsPo>
- Cosmic Evolution: From Big Bang to Humankind <http://tinyurl.com/cosmicevolution>
- 4 billion years of evolution in 8 minutes: <http://tinyurl.com/sagan-in-8-new> or: <http://tinyurl.com/sagansearch>



## 2 Geological history

### 2.1 Geological periods

#### Geological periods (1)

- An Australian mnemonic:
- Cans Of Spinach
- Do Cause Popeye
- To Jump Carefully
- Through Queensland
- Now join the names on your sheet

## Geological periods (2)

- C \_\_\_\_\_ O \_\_\_\_\_ S \_\_\_\_\_
- \_\_\_\_\_
- D \_\_\_\_\_ C \_\_\_\_\_ P \_\_\_\_\_
- \_\_\_\_\_
- T \_\_\_\_\_ J \_\_\_\_\_ C \_\_\_\_\_
- \_\_\_\_\_
- T \_\_\_\_\_ Q \_\_\_\_\_

1.11

## 2.2 Britain from the Pre-Cambrian to today

### Britain from the Pre-Cambrian to today

- Deep time: extract 1 from Attenborough documentary: <http://tinyurl.com/cdattol> (25:30)
- Movement of continents: extract 2 from Attenborough documentary: <http://tinyurl.com/cdattol> (38:50 to 41:30) and Cassiopeia Project video: <http://tinyurl.com/palaeoearth>
- Closures, openings, orogenies
- NW vs SE of Ireland/Britain
- northward movement and collision: see extract from Iain Stewart documentary: <http://tinyurl.com/menofrock2new> (at 54:00)
- geological resources formed along the way: coal, oil/gas, chalk, clay, ...
- [http://www.discoveringfossils.co.uk/how\\_britain\\_formed.htm](http://www.discoveringfossils.co.uk/how_britain_formed.htm)

1.12

## 2.3 Geology of Britain and Ireland

### Geology of Britain and Ireland

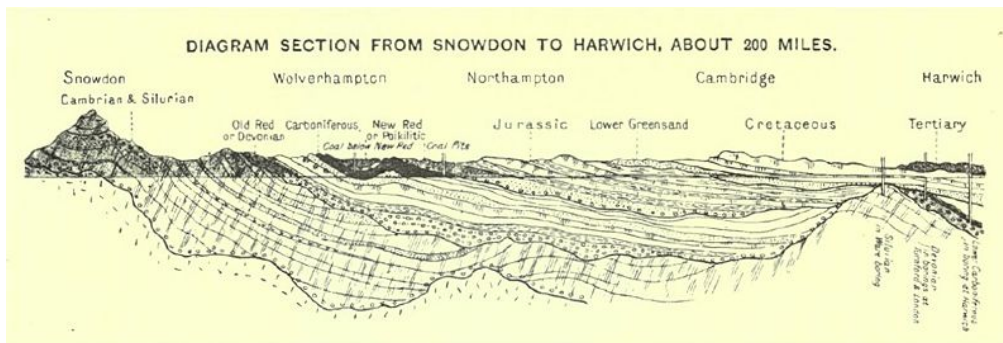


Figure 2: Cross-section of Britain from Snowdon to Harwich

See also the beginning of next week's lecture, and the map at the end of this lecture.

1.13

## 3 History of geology

### 3.1 James Hutton

James Hutton



Source: Wikipedia

1.14

#### James Hutton

- 1726 – 1797
- “The father of geology”
- Surface of earth has been reformed many times
- Deep time: “no vestige of a beginning,–no prospect of an end”
- “Plutonism” (interior of earth is hot; this leads to reforming of surface)
- Opposed to “Neptunists” (Great Flood theory proponents)
- “Gradualism” (many small changes over time add up to a big change)
- [http://en.wikipedia.org/wiki/James\\_Hutton](http://en.wikipedia.org/wiki/James_Hutton)

1.15

## 3.2 Charles Lyell

Charles Lyell



Source: Wikipedia

1.16

### Charles Lyell

- 1797 – 1875
- Foremost geologist of his day
- Friend of Charles Darwin
- Uniformitarianism (same laws operating at all times)
- [http://en.wikipedia.org/wiki/Charles\\_Lyell](http://en.wikipedia.org/wiki/Charles_Lyell)

1.17

### 3.3 William Smith

#### William Smith



Source: Wikipedia

1.18

#### William Smith

- 1769 – 1839
- Father of English Geology; “Strata” Smith
- where to dig for coal?
- first geological map (see next slide)
- [http://en.wikipedia.org/wiki/William\\_Smith\\_\(geologist\)](http://en.wikipedia.org/wiki/William_Smith_(geologist))

1.19



## William Smith's map

Source: Wikimedia Commons



Figure 3: William Smith's geological map

(What are the black bits?)