

# Carbon-14 ( $^{14}\text{C}$ ) dating

For very old human remains

Carbon is basis of all life on Earth



Carbon-12



Stable



Carbon-13



Stable



Carbon-14



Unstable



Radioactive

# Carbon-14 ( $^{14}\text{C}$ ) dating

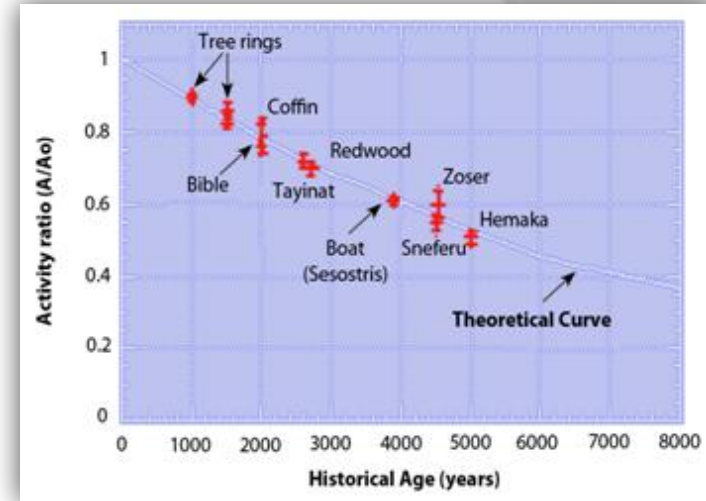
Radioactive atoms  
decay at a fixed rate



Measure half-life



Half-life of  $^{14}\text{C}$   
= 5568 years



$^{14}\text{C}$  decay graph

# Carbon-14 ( $^{14}\text{C}$ ) dating

Assume constant amount of  $^{14}\text{C}$



Produced by bombardment of atmosphere by cosmic rays

$^{14}\text{C}$  absorbed by plants



Goes through food chain

Measure amount of  $^{14}\text{C}$  and back calculate

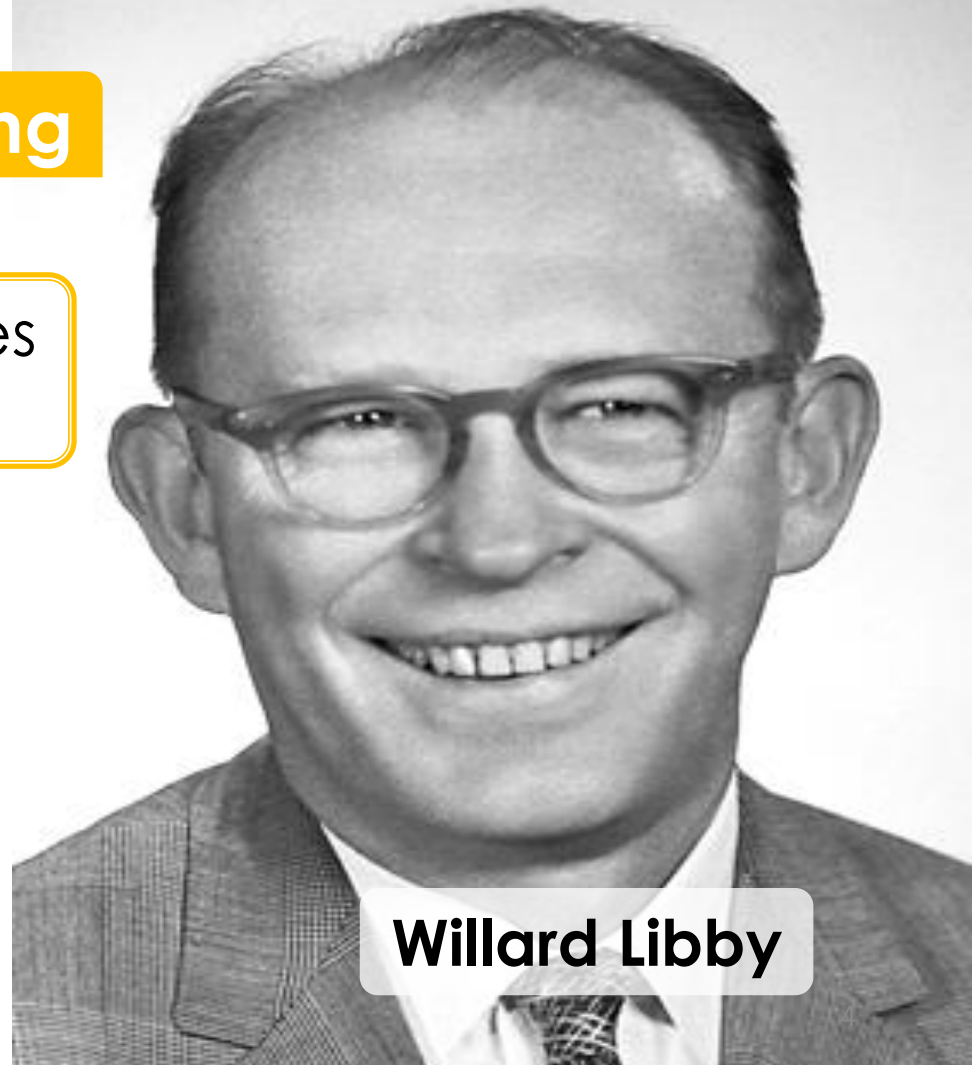
# Carbon-14 ( $^{14}\text{C}$ ) dating

Radioactive decay does not stop with death

Willard Frank Libby



Nobel Prize 1960



**Willard Libby**

## Limitations of $^{14}\text{C}$ dating

Not accurate for <400 years old



Amount of  $^{14}\text{C}$  decay too small

Amount of  $^{14}\text{C}$  no longer constant



Atmospheric atom bomb testing in 1950s

# **Atmospheric atom bomb testing**

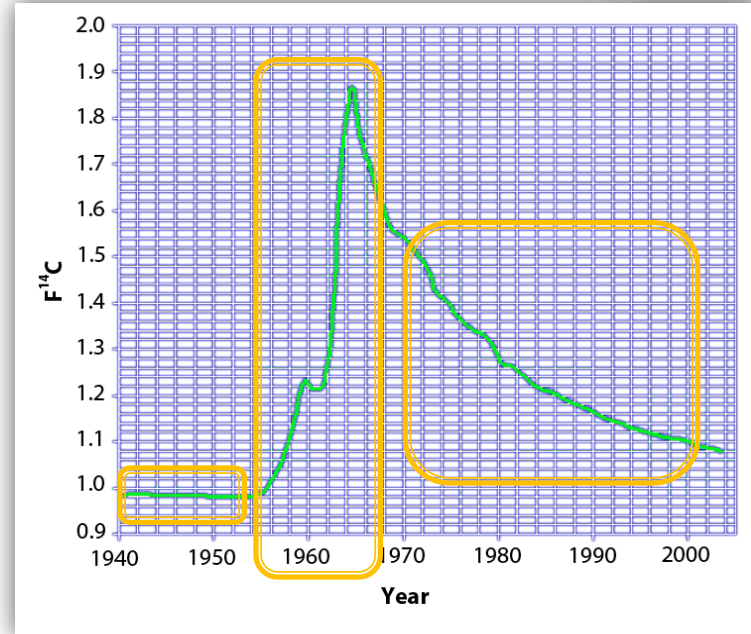


# Limitations of $^{14}\text{C}$ dating

Steady  $^{14}\text{C}$  levels

Spike in  $^{14}\text{C}$  levels

$^{14}\text{C}$  levels take very long to drop back





*Peter Reyn-Bardt*



The background image shows a vast, flat landscape of a moss, likely a peat bog. The ground is dark brown and appears wet, with some patches of green vegetation. In the distance, there is a line of trees under a blue sky with scattered white clouds.

**1960**

Peter Reyn-Bardt suspected of murdering wife

Not enough evidence to prosecute

Body buried in Lindow Moss?

**Lindow Moss**



# Lindow Moss

A photograph of a peat bog landscape. In the foreground, a dark, wet peat path leads towards the right. To the left of the path is a small, shallow pool of water reflecting the sky. The middle ground is a vast, flat bog with patches of green vegetation and dark peat. In the background, a dense line of trees marks the horizon under a bright, cloudy sky.

Peat bog

Peat traditionally dried and used for fuel

**Lindow Moss**



1983

Skull fragment with tissue found

Brain tissue



Recent

Reyn-Bardt confessed



Convicted

**Lindow Moss**

# Body in the bog

$^{14}\text{C}$  dating at Oxford University



Fragment about **2000** years old



Not Reyn-Bardt's wife

How did tissue survive for 2000 years?



## Body in the bog

Compression of  
vegetation in swamp

Vegetable matter breakdown

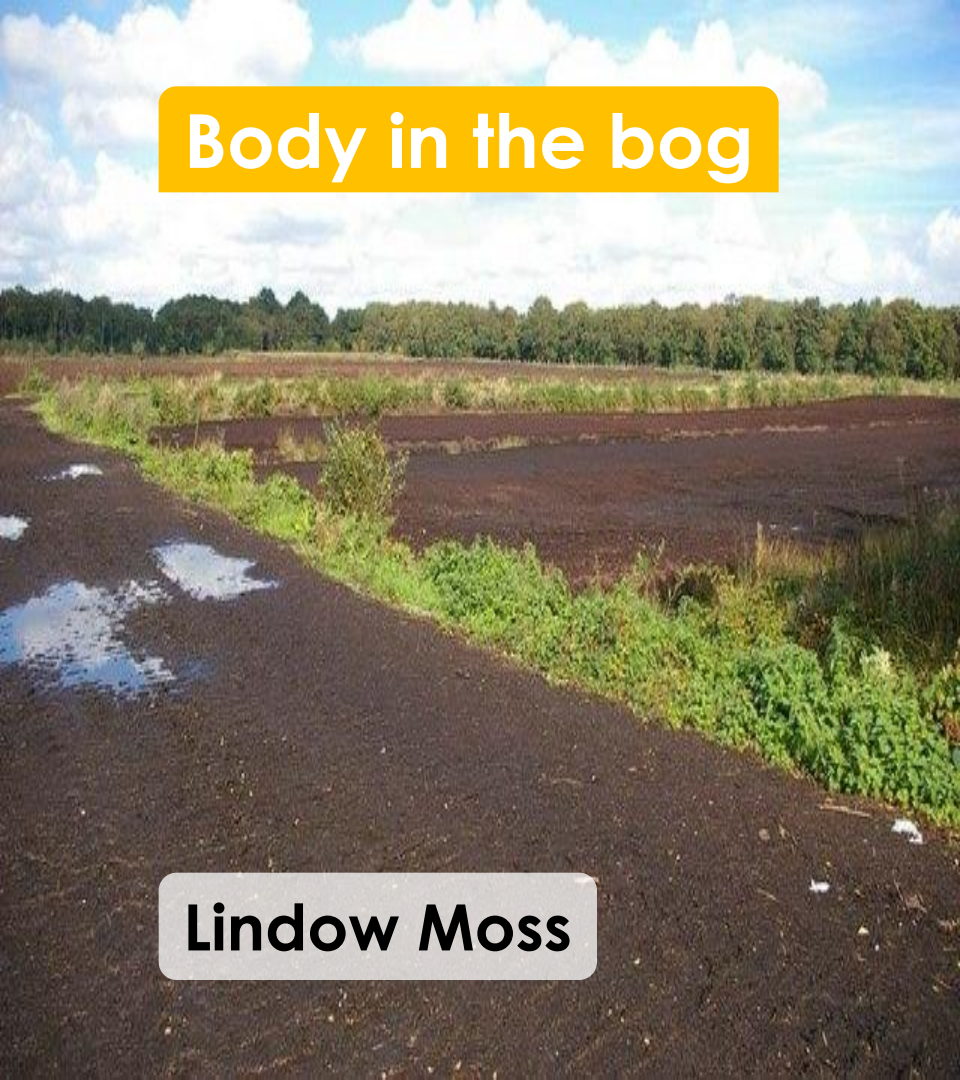


Release chemicals

Acidic and antibacterial



# Body in the bog



**Lindow Moss**



**Dartmoor**



# SHERLOCK HOLMES!

---

*"The Hound of the Baskervilles,"*

ANOTHER ADVENTURE OF

# Sherlock Holmes

BY

A. CONAN DOYLE.

---

*THIS Adventure of the great Detective, whose reappearance has so long been hoped for, will be found equal, if not superior, in vivid and thrilling interest to the best of those which first made his name celebrated all over the world.*

---

"The Hound of the Baskervilles"

COMMENCES IN

THE STRAND MAGAZINE

For AUGUST, 1901,

AND IS CONTINUED

FOR SEVERAL MONTHS.



# Body in the bog

20 000 archaeological sites



Including graves

No human remains

**Dartmoor**

# Body in the bog

Bodies found in Northern Europe peat bogs



Date back 2000 years



Celts



Human sacrifice  
dumped in bog

A wide-angle photograph of a Dartmoor landscape. The foreground is a grassy hillside. In the middle ground, there are rolling green hills with patches of trees and small settlements. The background shows distant hills under a blue sky with scattered white clouds.

**Dartmoor**





**Grauballe Man, Denmark**

# The Bog People

Bodies very well preserved



Peat cutters would assume it was a murder



**Parts of Grauballe Man**



# The Bog People



Lindow Man, Pete Marsh, Pete Bog

Struck on the head, throat cut, strangled, drowned



Human sacrifice

Now in British Museum

**Lindow Man**