University of New England

GIRT

Gathering Information via Recreational and Technical

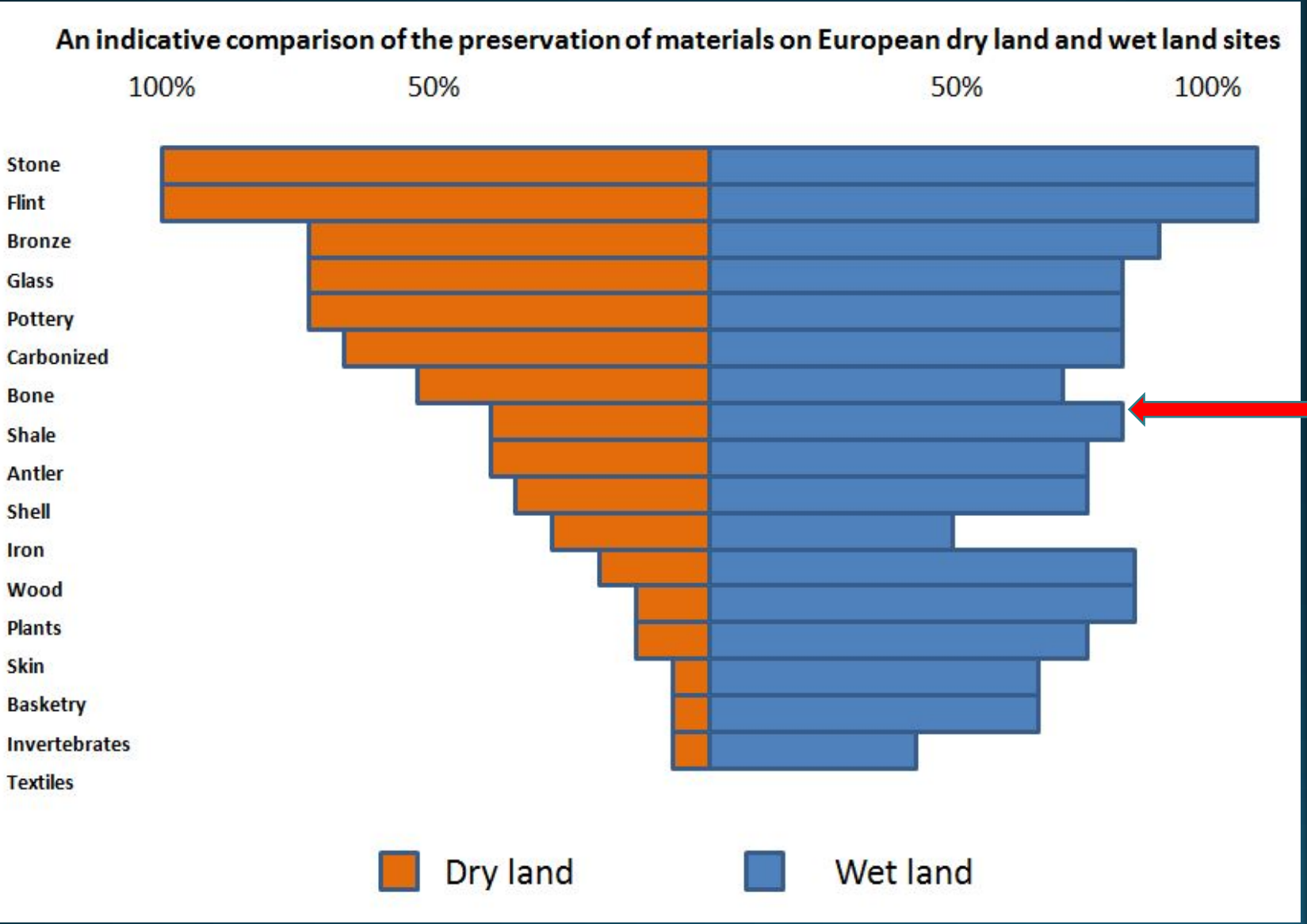
Scientific Divers

'Our land is girt by sea', so dive into an ocean full of history!

threats to underwater cultural heritage

- The marine environment's ability to preserve organic materials
- Factors of preservation
- Factors of deterioration
- The 4 main types of threats

Dry versus wet sites for organic preservation



Shipwrecks have greater potential than land sites to preserve organic remains.

They offer a bigger window into our past!

Factors of preservation

Depth of burial and stability of overburden material is vital to preservation

Long-term organic and metal preservation depends on the maintenance of a stable physical and chemical burial environment characterised by anoxic, reducing, near neutral pH conditions with low levels of organic matter and minimal biological activity

The Australian Historic Shipwreck Preservation Project (AHSPP)
- Excavation and Monitoring Programme Report 2012-2015,p70

Factors of deterioration in maritime archaeological material

The susceptibility of a material to deterioration varies according to the nature of the material and its immersion environment.

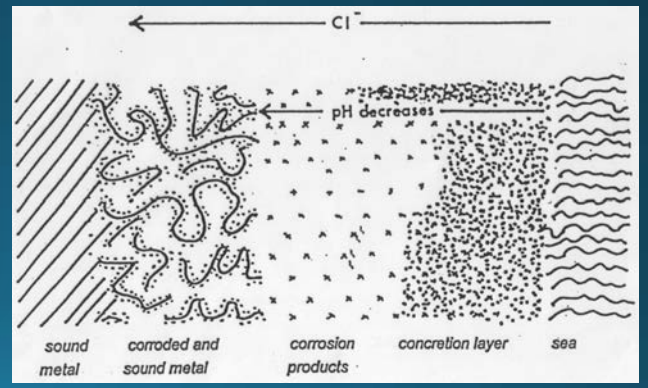
Key factors include:

- Material composition
- Water composition (oxygen and mineral content)
- Extent of water movement
- Composition of the burial environment
- Depth of burial or submersion
- Temperature
- Development of encrustation
- Position and relationship to other materials
- Period of immersion

threats to underwater cultural heritage

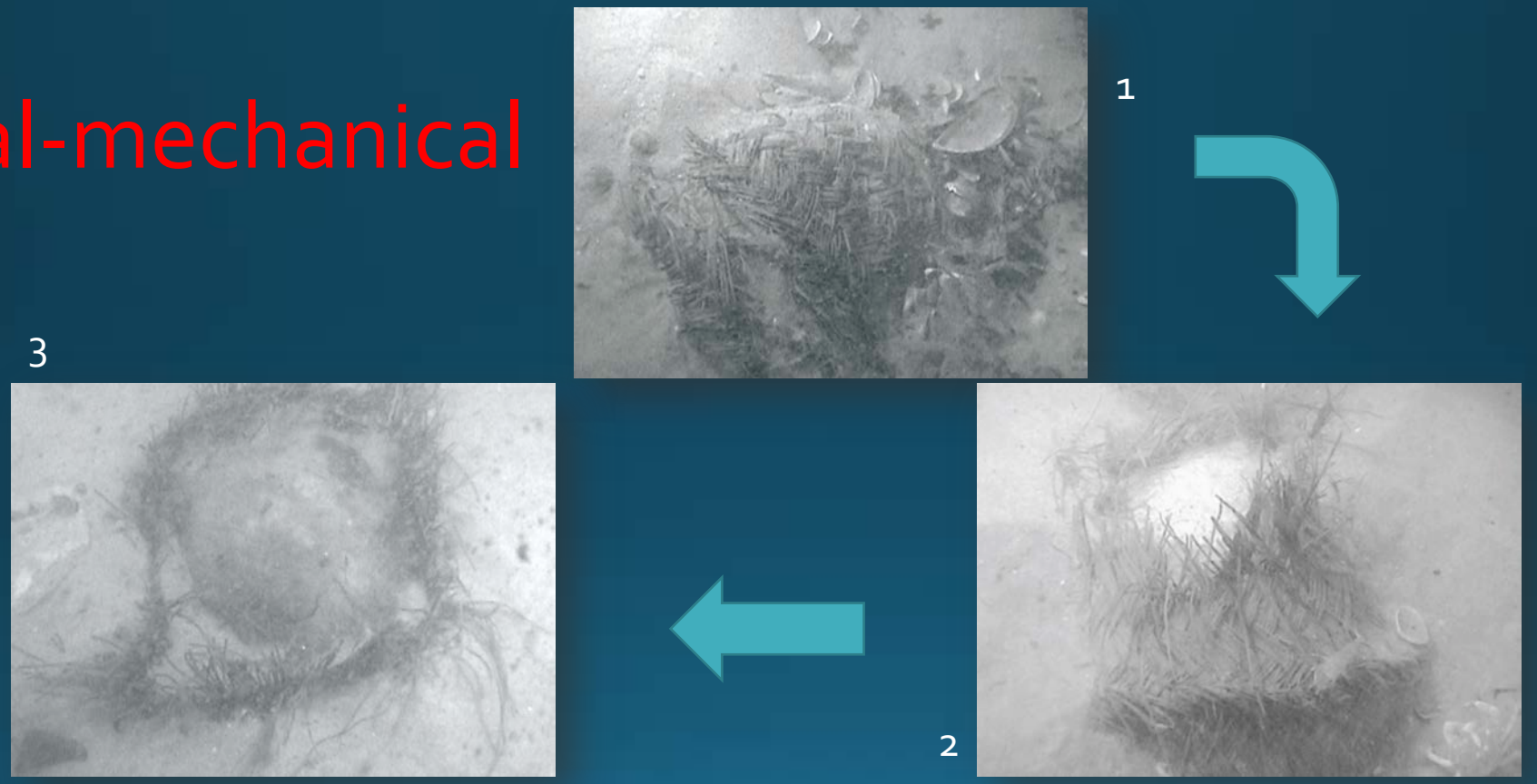
Some of the primary threats to underwater archaeological heritage are:

1. Physical-mechanical
2. Biological
3. Chemical
4. Human



threats to underwater cultural heritage

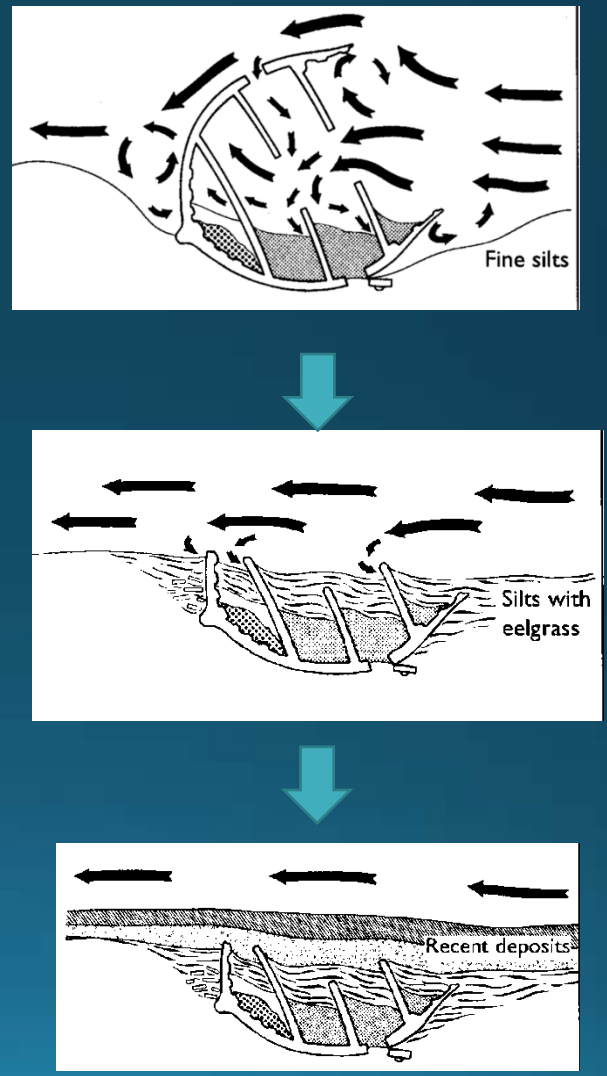
1 - Physical-mechanical



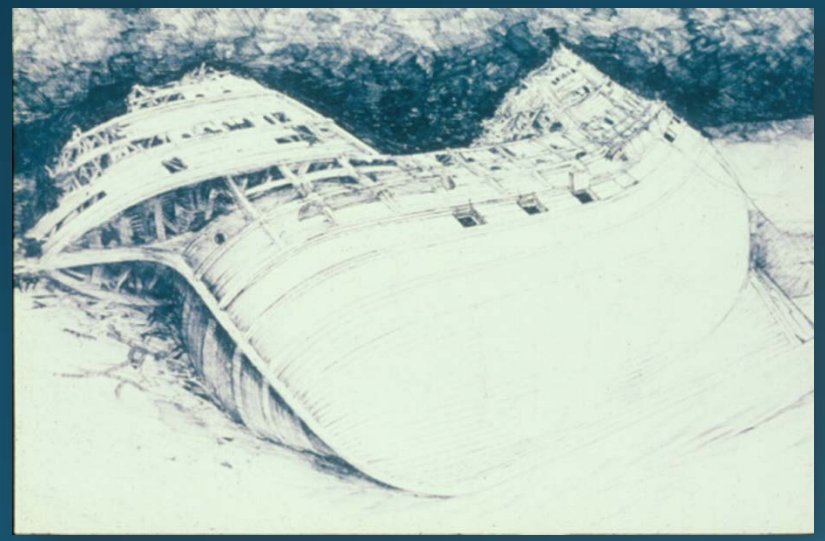
Mechanical deterioration of a basket around an Iberian jar (BZN 10 wreck, the Netherlands). Within a few hours, due to the abrasive effects of currents caused by the tidal flow, the basket disappears. © RCE

Physical-mechanical threats

- Erosion and abrasion by currents, tidal movements or changes in water circulation.



Artist's impression of the Mary Rose, after 50 years on the seabed



Physical-mechanical threats

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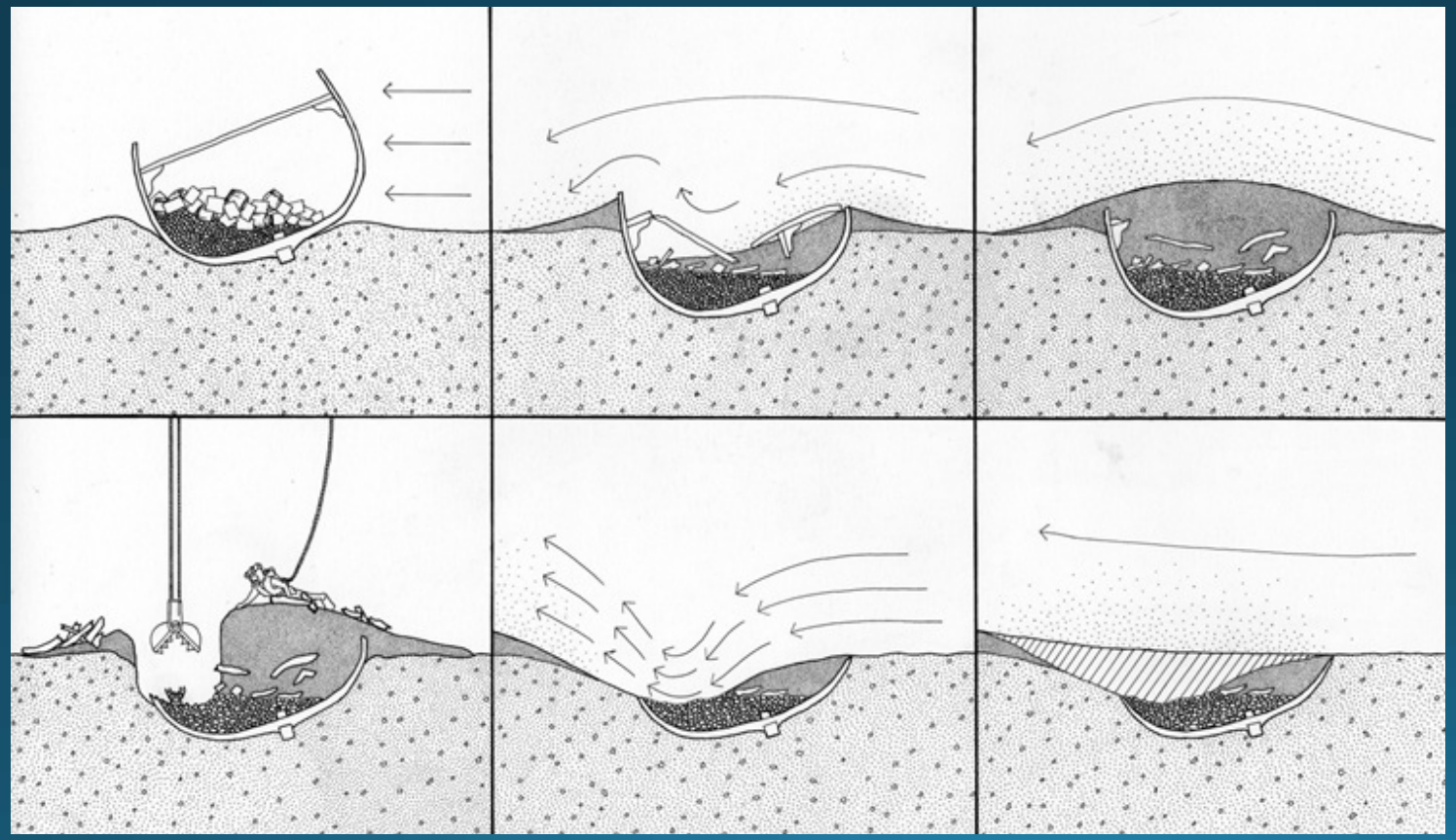
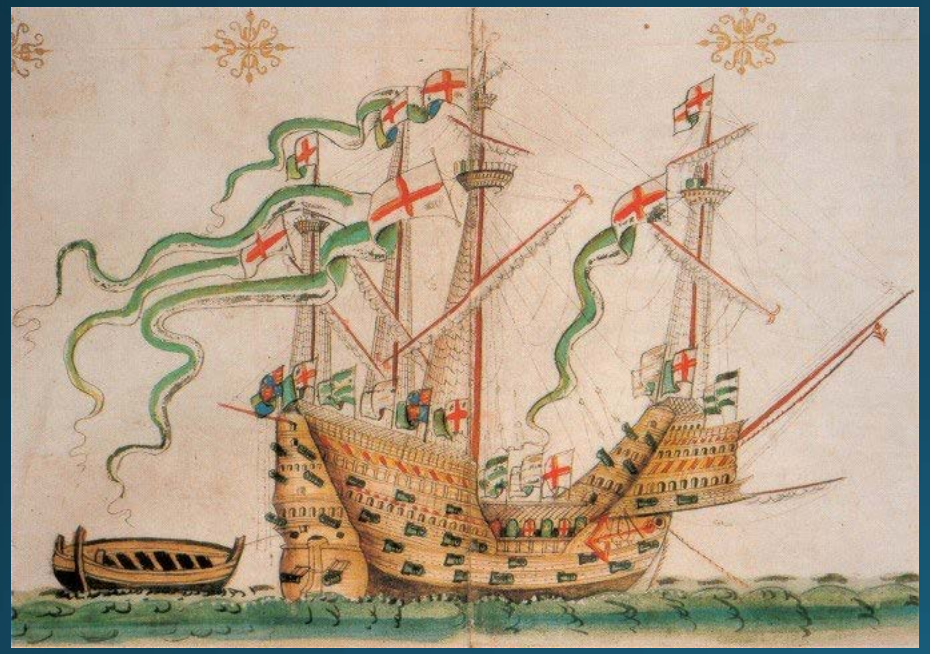
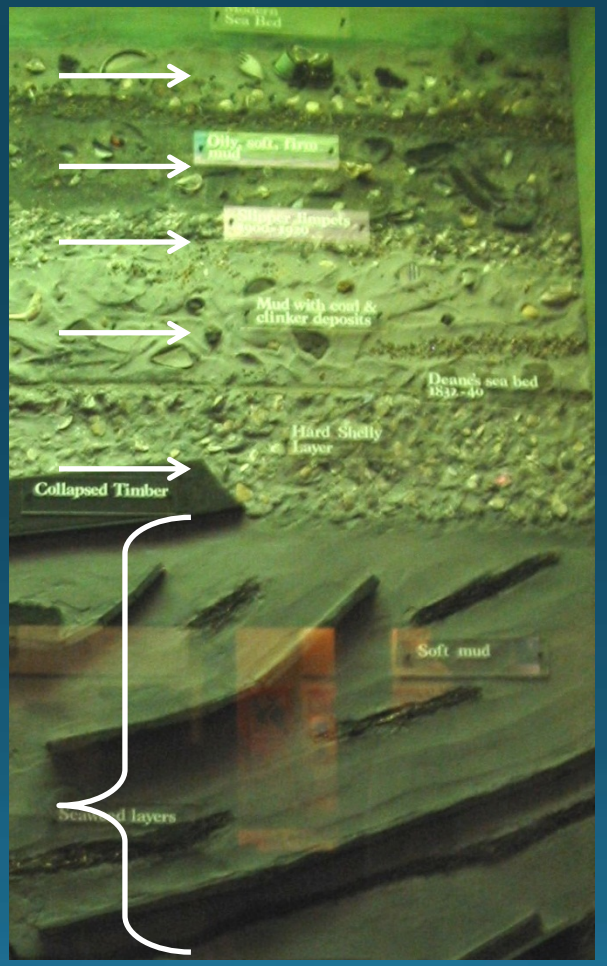


This natural action creates the site's stratigraphy such as the *Mary Rose* example seen below

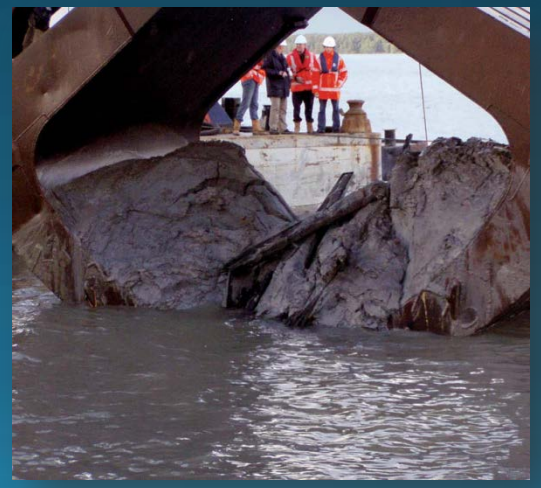




* 21st century deposits
* 1880 *Crepidula fornicata*, Layer of coal & clinker
* Deane's seabed in 1835
* Layer of hard shells
* 1545 Henry VIII's seabed

Physical-mechanical threats

- Mechanical deterioration due to **dredging,** fishing or anchoring.



Photos - Jeffrey

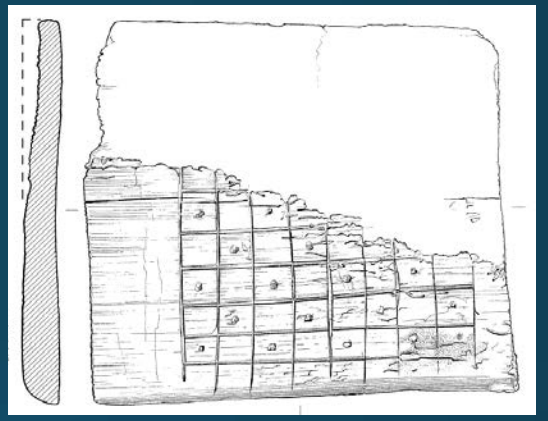
Natural coastal erosion

2 - Biological Threats

- The biological threats to *in situ* underwater sites are, for the most part, **dependent on the presence of oxygen**.

Examples of biological deterioration (in decreasing order of severity) include:

- Marine Borers (especially Teredo navalis or shipworm)
- Fungi
- Bacteria



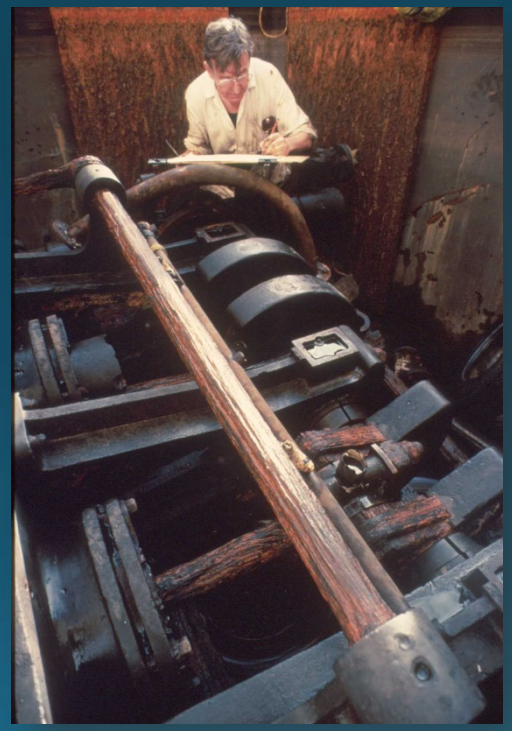
A gaming board recovered from the *Mary Rose* 1545

3 - Chemical Threats

Corrosion products on artefacts

- Concretions are made up primarily of calcium carbonate that occurs naturally in the sea, that precipitates onto artefacts with shell and sand forming a natural 'concrete'.

Xantho engine, WA Maritime Museum



Before (left) after conservation (centre) type of engine (right)

Metals react with one another - electrolysis

Nobel scale

Wrought iron

Cast iron

Lead

Zinc

Pewter

Tin

Copper

Bronze

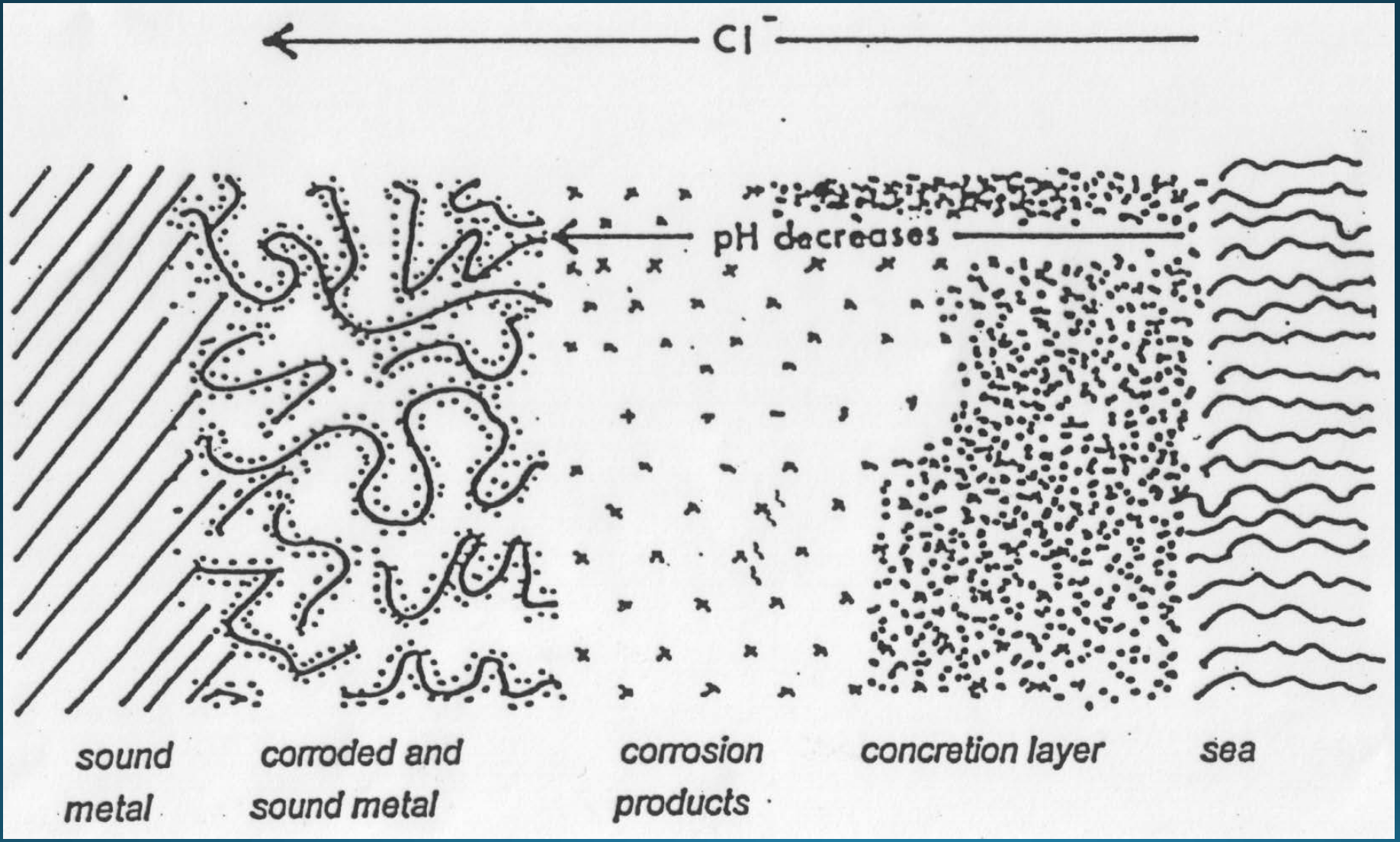
Silver

Gold

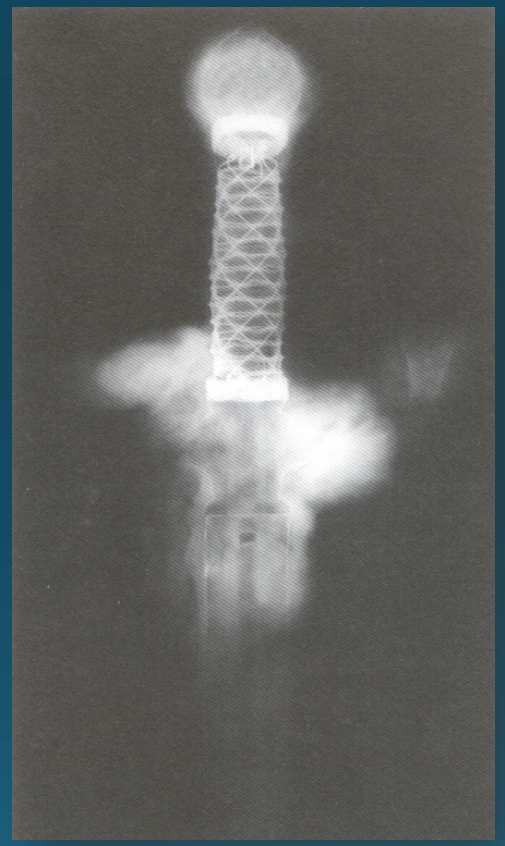
Reactivity

Electrolysis: Sea-water is a very good electrolyte & Galvanic action occurs when dissimilar metals are in direct contact

Metals - concretions



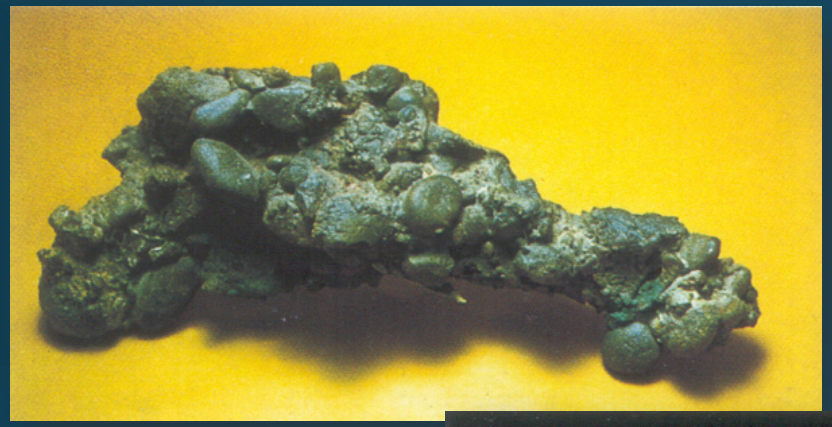
Chemical reactions - concretions

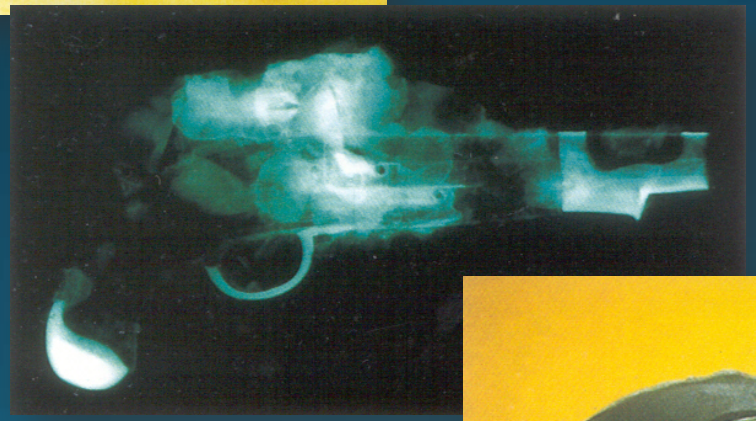


X-Ray

Conserved and restored

Chemical reactions - concretions





X-Ray

Conserved and restored

4 - Human threats

- Treasure hunting
  - Poor diving practice and hand fanning
    - Fishing
      - Dredging e.g. mineral extraction
        - Large development works, e.g. wind farms
          - Pollution
            - Ship movements
              - Archaeology
                - Anchoring

Near shore and off shore development

Offshore developments – wind farms

Port development

Dredging

Sites are threatened by construction activities more often near the coast or in or around ports

Dredging - fishing / anchoring

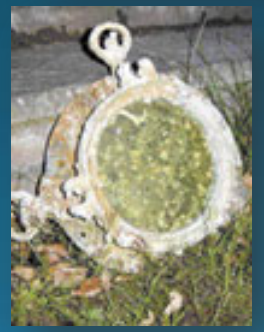
- Damage caused by dredging or mineral extraction, fishing and anchors.

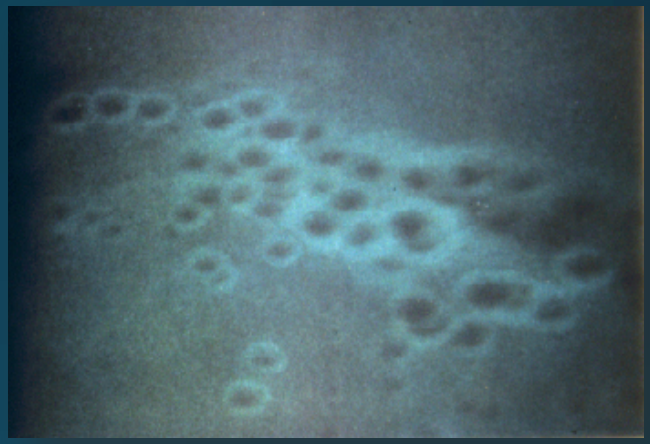
An anchor chain stretched across the 1867 wreck of the *Zanoni* (Adelaide University Dive Club: Jun Zhang)

Poor buoyancy control and hand fanning

Salvage and treasure hunting

Australian National Maritime Museum
HMAS Perth (I)





Excavation using ‘prop wash’

References

- **Training Manual** for the UNESCO Foundation Course on the Protection and Management of Underwater Cultural Heritage in Asia and the Pacific

- Acknowledgements
- Chris Underwood, Martijn Manders, Vicki Richards

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Scientific Divers

DIVE INTO AN OCEAN FULL OF HISTORY

Supported by:

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une University of New England

This project has been approved by the Human Research Ethics Committee of the University of New England