Fossils & Fossilization

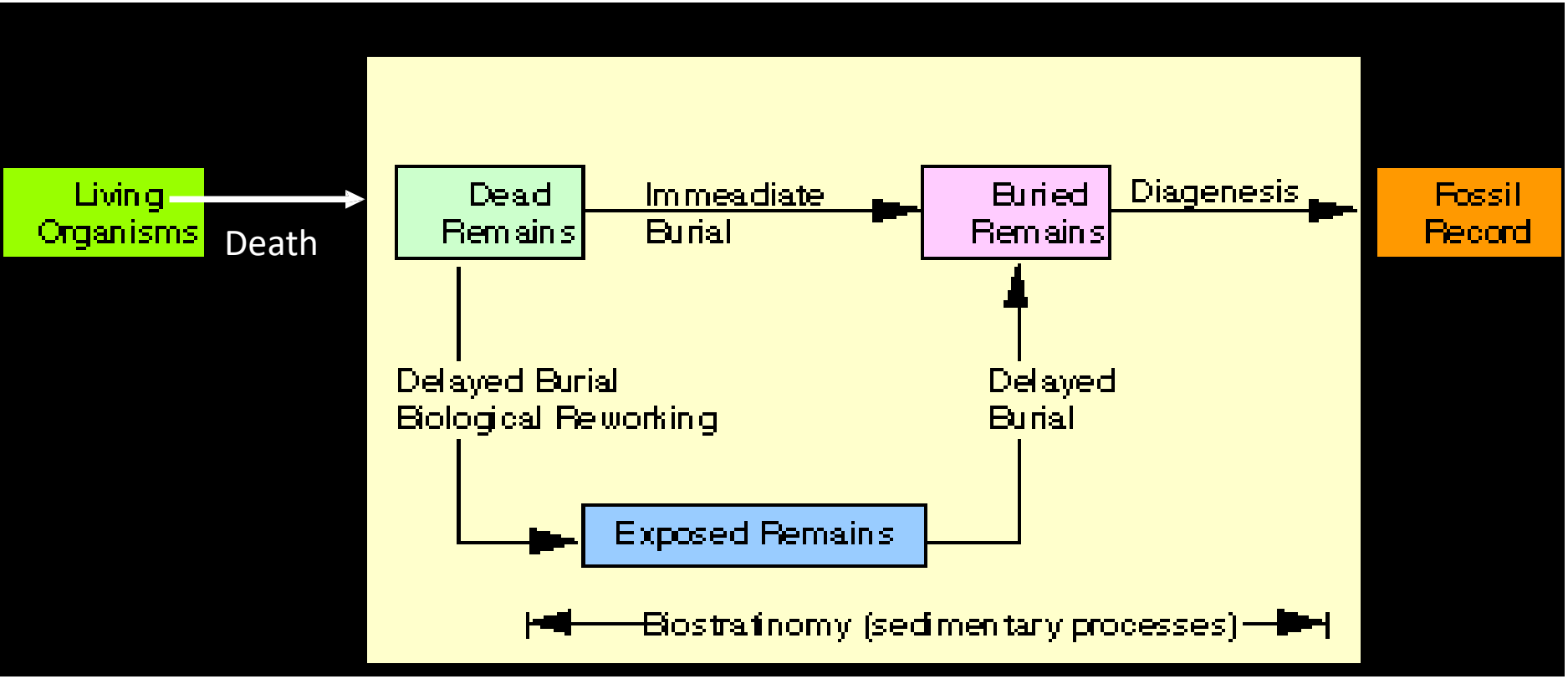
Fossil

- the remains or impression of a prehistoric plant or animal embedded in rock and preserved in petrified form

- **I. Possess hard parts**
- **II. Get buried**
- **III. Become preserved over the long term**
  - *Permineralization* - petrification, precipitation of minerals in skeletal pores.
  - *Recrystalization*- mineral reorganization of shell material, destroys original microstructure.
  - *Replacement*- substitution of a mineral substance, simultaneous substitution-Pyrite, Calcite, Dolomite, Iron Oxides, Silica
  - *Carbonization* - thin film of carbon residue due to volatilization of H_2,O_2, N_2

    Molding and casting - Negative impressions and positive images in sediment.
- **IV. Avoid dissolution**
- **V. Become exposed over the long term. Tectonic uplift**
- **VI. Get discovered**

Diagenesis the change of sediments or existing sedimentary rocks into a different sedimentary rock during and after rock formation

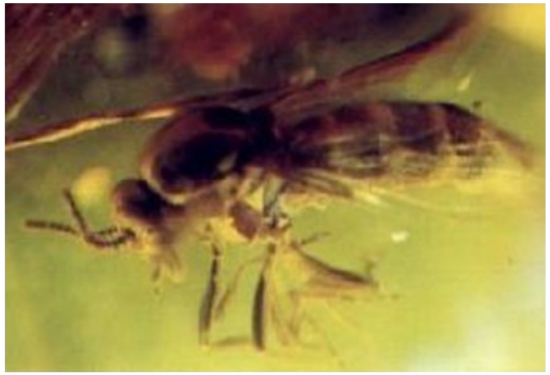


Types of Fossils

Original remains

- These are fossils that contain the original parts of the actual organism.
- Bones
- Entire body
- Teeth


Bird Bones in Tar
La Brea Tar Pits, CA



Molds

- Fossil that forms when an organism decays or dissolves and leaves a cavity in the rock.

  Skeletons are frequently found completely dissolved away by ground waters, leaving molds (negative impressions) of their internal or external surfaces in the sediments enclosing them.


External Mold
1 cm
Internal Mold

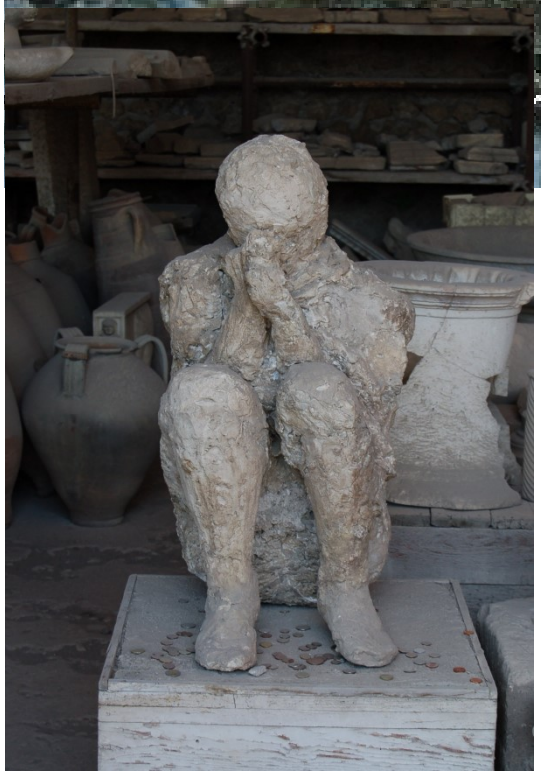
Casts

- Fossil that forms when a mold fills with sediment and then hardens into rock.

  Casts are formed when sediment or mineral precipitates fill these molds. A cast is a positive image identical in symmetry to the original.

As a general rule, if a shell has been dissolved away it most likely have a mold


mela Gore, 2005




Pamela Gore, 1998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Trace Fossils

- Tracks, trails and borings: imprints, burrows or tubes made by organisms are common.
- Coprolites are fossil excreta.
- Gastroliths: smooth rounded pebbles found in the stomachs of dinosaurs, an aid to digestion.
- Artifacts: stone tools or weapons of humanoids


Pamela Gore 1996


Pamela Gore 1988
PENTAX


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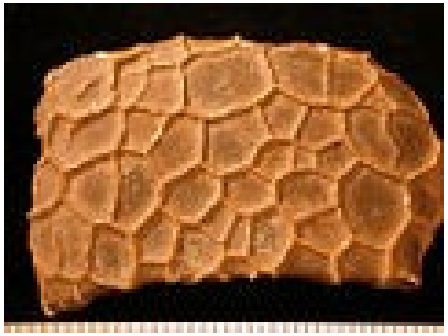
Pseudofossils

- Pseudofossils are inorganic objects, markings, or impressions that might be mistaken for fossils.
- some types of mineral deposits can mimic lifeforms by forming what appear to be organized structures.
- One common example is when manganese oxides crystallize with a characteristic treelike or dendritic pattern along a rock fracture.

Manganese Dendrite (crystal) on a limestone bedding plane from Solnhofen, Germany

- Concretions are sometimes thought to be fossils, and occasionally one contains a fossil, but are generally not fossils themselves. Chert or flint nodules in limestone can often take forms that resemble fossils.



Concretion with calcite-filled septarian cracks.

Cross-section of a concretion showing layers which resemble tree rings

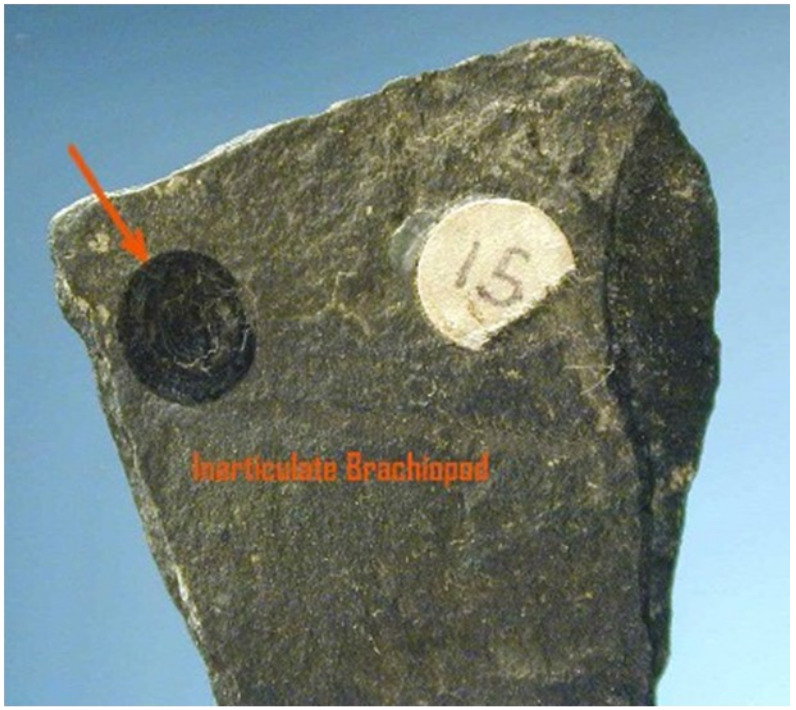
- Pyrite disks or spindles are sometimes mistaken for fossils of sand dollars or other forms. Cracks, bumps, gas bubbles, and such can be difficult to distinguish from true fossils.

A marcasite crystal form resembling a sand dollar

Carbon Films

- All living things are made of Carbon
- A Carbon Film is the film of carbon left on a rock by a decaying organism and is preserved as a fossil.


Leaf Fossils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Inarticulate Brachiopod