

Why do things deteriorate?

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Stop and think a minute. How old is the oldest thing you own? Is it older than you? Perhaps it is an heirloom, a present or something that you have collected. It may be the house you live in, it could be a christening robe, perhaps it's a piece of pottery that you dug up from the garden or a fossil that you found on the beach. Whatever it is, it will - however slowly - be deteriorating, and that deterioration is caused by a wide range of factors, not just the passing of time. Our perception of time is rooted in our understanding of our own life cycle, so most of us consider fifty years a long time because it is more than half our lifetime. Do you think the thing you have thought of will survive longer than you will? Perhaps in time you will pass it onto a child, relative or friend to look after; you may even want to donate it to a museum.

Our world is full of objects and buildings that are very old in human terms - over three thousand years in the case of the pyramids. How have they managed to last so long, and how much longer will they last? We are defined culturally as a society by the things that we produce, by what we choose to preserve and protect and what we choose to disregard and destroy. If we are interested in the preservation of our physical history - the things that survive from the past - then we need to understand why things fall to pieces. If we have an understanding of the processes of decay, then we can begin to understand how and why some things last longer than others and perhaps, more importantly, what we can do to make them last longer.

Things survive the ravages of time for a lot of different reasons. It may be that they are considered as valuable or important such as great works of art like the Mona Lisa, or significant to the State, like the Crown Jewels. These objects are cared for and protected by successive generations who consider them valuable. Some things may survive because of historic accident, such as the Anglian Helmet, which was thrown into a rubbish pit in the City of York sometime in the 8th Century, only to be recovered by archaeologists nearly 900 years later in remarkable condition. How was it able to survive this extended period of burial when it is made of iron and

copper alloys - materials that will usually deteriorate in the damp conditions in which it was discovered? Long bows have been recovered from the wreck of the Mary Rose in such good condition that - following a freeze drying process - they could still be used after 500 years on the seabed!

So, why some things survive and some things do not are complicated questions. What we do know is that everything will fall to pieces eventually. This is due to a law of science called 'entropy'. Put simply, entropy means that everything will deteriorate and return to its constituent "raw" materials, and that the rate of deterioration will occur at the maximum that is possible given the materials in question and their environment.

The rate of decay is dependent upon a range of factors such as what something is made of, how it is used, where it is kept and what its value is. As a general rule of thumb, organic things (for example textiles) that were historically produced from plants and animals will deteriorate more rapidly than inorganic things such as stone or metal. A relatively small amount of organic material such as textiles survives from antiquity, compared to inorganic materials such as stone and metal.

The pyramids and temples of Egypt have survived three or four thousand years because they were protected by being at least partially buried in sand for the majority of that period. Having survived all that time, their rate of deterioration is now accelerating due to their exposure to pollution and the impact of tourism, both of which have increased significantly over the last 100 years.

Another good example of how environment influences deterioration is that of a feather fan that was excavated from a tomb in Egypt in the 1930's in almost perfect condition. This delicate item had survived almost unchanged for over three thousand years, because it was kept in the dark of a tomb that also provided very stable temperature and humidity. You are not able to see this fan today, however, because it has deteriorated beyond recognition or repair, having been exposed to damaging ultraviolet light while it was being exhibited in the museum. Here is an organic object that had lasted for thousands of years, but as soon as the environment surrounding it was altered, its deterioration accelerated, reducing it to dust in a period representing less than 1% of the fan's lifespan. In summary, conservation professionals have identified ten major factors which contribute to the deterioration of historic material. These are:

- Direct physical forces, such as wear and tear
 - Thieves, vandals and displacers
 - Fire – usually with catastrophic results
 - Water – damage from leaks and floods
 - Pests, such as wood-boring or carpet beetle
 - Contaminants, such as atmospheric pollutants
 - Radiation, in the form of ultraviolet and infra-red light cause fading
 - Incorrect temperatures. Cooler temperatures usually increase longevity, higher temperatures increase decay
 - Incorrect humidity. Stable humidity is best for preservation
 - Custodial neglect, by owners, collectors and stewards - resulting in damage
- If we can manage and limit these factors effectively, we will increase the length of time that things will last.

The decay of our cultural heritage is not just influenced by the environment, but also by how we use and value objects. Sometimes an artifact's survival may be influenced by other factors such as greed, conflict, fashion or intolerance. The most recent example of which was the destruction of the Bamiyan Buddhas by the Taliban in Afghanistan.

Conservators have the ability and knowledge to intervene, to ensure that historic material survives. This may involve stabilising corroding material metals - such as those found on the Anglian Helmet, freeze drying the waterlogged long bows from the wreck of the Mary Rose, cleaning a painting, reconstructing a broken ceramic or recommending the correct conditions for storage and display. The professionals that form the membership of the Institute of Conservation (Icon) have a detailed understanding of the decay mechanisms that cause our cultural heritage to fall apart. They use their knowledge and skill to help governments, heritage organisations, museums and individual owners preserve historic and cultural material to ensure that it can be enjoyed today, and preserved for future generations.