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Feat Of Clay

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# Feat of clay

**Charles Hippisley-Cox** looks at some problems associated with traditional clay mortars

Historically, clay and soil have been extensively used as building materials until relatively recently. In recent years there has been a revival of interest associated with traditional crafts and the application of 'appropriate' building conservation repairs.

There is also considerable interest in the use of such materials as part of a wider interest in sustainable materials. Local clay and soil are especially low in 'embodied energy' and can potentially replace a number of environmentally expansive materials in new-build as well as for the repair of old buildings.

However, modern expectations in terms of comfort levels (especially the use of excessive heating) can cause



the drying-out of some traditional materials resulting in shrinkage cracks and in some cases structural failure.

This article is based on the study of clay and soil mortars in traditional granite buildings in the south west of England and the granite region of Normandy in North Western France.

It has been noticed that buildings that have been derelict until relatively recently often suffer defects such as the cracking of internal finishes after conversion or refurbishment.

The problem is most acute in buildings taken out of agricultural use such as barns and over-wintering sheds.

Granite regions tend to be remote upland areas sometimes considerable distances from lime kilns. The abundant clay soil that usually sits directly on the granite has traditionally been used with little or without any lime as a mortar for masonry joints. The addition of large quantities of organic matter (usually dung, sometimes straw and/or hair) has made the clay soil suitable for plastering the internal walls of the domestic quarters of buildings in granite areas.

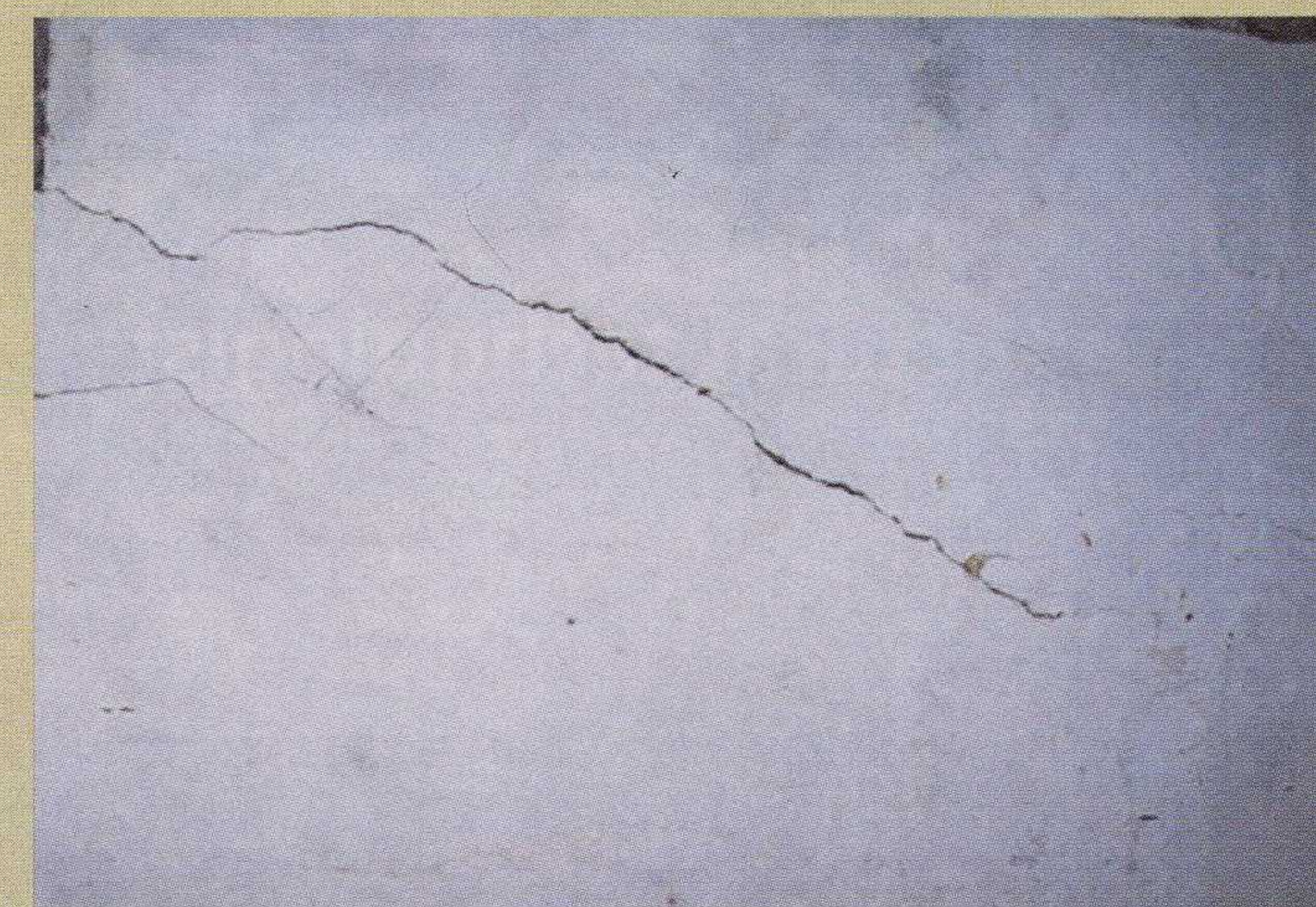
The building defects associated with the shrinkage of clay mortars are usually cracks to the finishes at the corner of buildings or diagonal cracks beneath major structural members such as floor joists and roof trusses. These cracks can affect existing plasters that have been in place for many years, but often appear within the first 18 months of a renovation of an old property.

Traditional stone buildings with clay mortars will have always had small annual cycles of wetting and drying resulting in the slight expansion of the clay in the winter and slight shrinkage in the summer. It is the breaking of this rhythm by excessive heating (usually central heating) that leads to the failure of internal finishes.

It has also possible that the retrospective insertion (or rather injection) of damp-courses can lead to the excessive drying out of walls containing clay mortar. It seems that a little rising damp and moisture landing on the external walls prevents the clay from shrinking too much.

The problem is not only restricted to buildings where internal plasters are applied directly to the walls, as plasterboard and 'dry lining' systems can be twisted causing failure along joints.

Gypsum-based plasters and strong sand/cement mixtures tend to be quite brittle and the shrinkage needs only to be slight for cracks to appear usually within the first two years following a conversion/ restoration.



The use of traditional lime plasters (especially lime putty) is to be encouraged as they tend to be more 'flexible' and can accommodate small structural movements of this kind. Weaker sand and cement mixtures (less than 1:6 cement to sand) are quite tolerant of small movements especially if there is a wide range of grain-size and shape within the sand especially when the mix is improved with hydrated lime.

Repairs to these cracks are fairly straight forward where brittle modern plasters have been applied directly to the inner face of the masonry. It is best to 'chase out' the small cracks with a chisel to form a channel about 40mm wide which can be filled with a more flexible plaster (usually in at least two layer and then sanded smooth).

A more extensive long-term solution is to replace all plaster with a proper traditional mix which would be tolerant of movement and have the additional advantage of enabling the building to 'breathe'.

Another strategy is to review the type of heating used within the building and to maybe encourage the owners to adopt a more traditional life-style to match the building!

Dry-lining is another potential solution which may not be appropriate for traditional buildings of quality, but can be used to isolate the internal finishes from the structural movement especially if flexible mastics are used at the junctions.

The purpose of this article is to encourage all professionals involved in the restoration and conversion of old buildings to consider the properties of traditional materials. Any 'intervention' needs to consider the requirements of a traditional building especially with regard to the equilibrium between building materials and the elements.

*Charles Hippisley-Cox is the Senior Lecturer in Building Conservation at Huddersfield University (CIAT accredited)*

Opposite page top: Granite and Clay Wall in need of Pointing  
Opposite page bottom: Crumbling wall showing granite and dried out clay

This page top: Granite and clay mortar wall in good repair  
This page middle: Over enthusiastic application of Lime Mortar  
This page bottom: Typical diagonal crack from ceiling beam after renovation using brittle gypsum plaster finish

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