

Lime and Earth

Text and illustrations by Ann Hodges

It is the property of the lime made from the shell marble, so common in this island, to contract with age all the closeness and solidity of stone. I have seen plaister taken from an old Spanish tank, or cistern, which could scarcely be broken with a hammer.

Edward Long, *The History of Jamaica* (1774)

Before the cement factory was set up in the 1950s, cement had to be imported into Jamaica in barrels. This was done for the construction of reinforced concrete buildings which began to be built here after the 1907 earthquake. For most masonry buildings, however, cement was not required, as there was ample white lime available for making mortar. This was used for bonding stonework or brickwork, and for constructing masonry walls using wooden structural frameworks. 'Spanish walling', 'wattle and daub', 'nog', and 'kick and buck' are some of the names given to these construction techniques, some of which date back over 400 years to the early Spanish occupation. Many buildings built with these techniques a considerable time ago are still standing today, to testify that reinforced concrete is not the only type of construction that will withstand earthquakes and hurricanes.

Lime

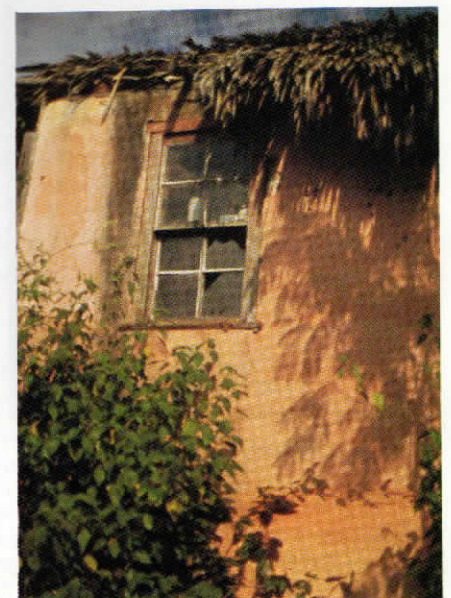
In much of the island, limestone is found in abundance, as was wood until quite recently. Together these are burnt to provide white lime.

Apart from its use in construction, lime was also used in the clarification of sugar. On some estates large stone kilns are found among the estate buildings; no doubt these provided lime for both the sugar factory and for construction. Apart from these elaborate kilns, in many communities lime was burnt in a fashion similar to that used to burn charcoal today, and this practice was common until the 1950s.

Figure 1 shows a plan and cross



Lime washed walls with 'red work'.



Houses of nog construction



section through a typical lime kiln of this type.

Mr Granville Howell of Comfort District in Manchester pointed out to me the spot where his father built a kiln every year, in the bottom of the cultivated valley overlooked by his house. He explained the process:

Yu get man who know how to build de kiln, yu put in a ting call funnel, right down in it like a merry-go-round, an yu pack de wood — it come like a dish an it go right roun, an yu break de stone an tek de stone an trow. An yu get ding ting called duck ants nest — light it wid fire an yu have some good dry wood in de funnel an it burn an burn until it catch every woodhead an it fill right roun, an it burn. Generally yu trow de fire from evening throughout de night. Den in de morning it drop.

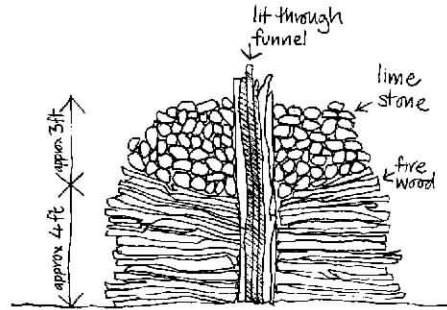


Figure 1:
SECTION THROUGH A
LIMEKILN

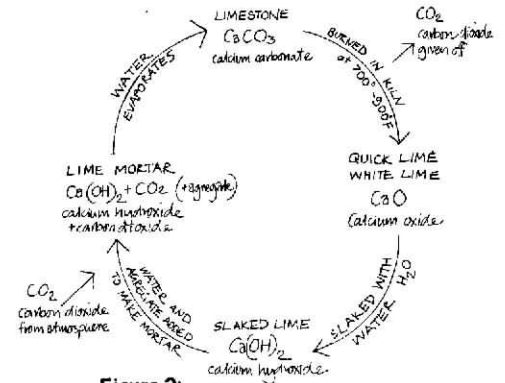


Figure 2:
- THE LIME CYCLE -

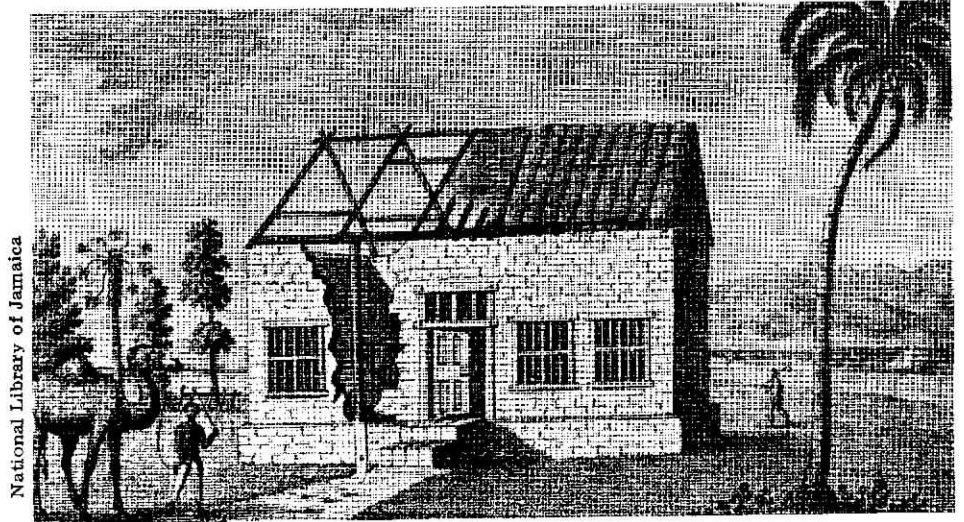
In the burning the stone (calcium carbonate) must reach 950 degrees centigrade. At that temperature it gives off carbon dioxide, and quicklime (calcium oxide) known as 'temper lime' is produced. After three or four days the powdery temper lime is cool, then in two weeks or so when it has been 'slaked' by the addition of rain or atmospheric moisture, it becomes stiff and white, hydrated and ready for use as 'white lime'. (Figure 2).

White lime is mixed with earth or sand to make mortar. The mortar hardens by combining with atmospheric carbon dioxide to form calcium carbonate — limestone. Because the hardening process relies on drying out and the combination with carbon dioxide from the atmosphere, lime mortar gains strength very slowly.

A somewhat different chemical process takes place when in addition to calcium hydroxide the lime contains a percentage of clay materials, principally silica and alumina. The lime is then said to be 'hydraulic', and sets, producing a fine crystalline formation of hydrated silicates and aluminates of calcium. This produces a harder, quicker drying mortar, and mortars using soil high in alumina or 'stoke hole ash' from the sugar factory (high in silica) were once used.

There is evidence that molasses was also once used in mortar, making it harder. The chemical reason for this is not known, but the use of lime in the sugar-making process with a waste sludge being produced, may well explain how it came to be tried in the first place.

Today lime is rarely burned. Not



National Library of Jamaica

View of a Spanish building (from Long's History of Jamaica).

only has cement become widely available, but the wood needed for burning the lime is no longer as easy to find because woodlands have been cut over for lumber, charcoal and firewood.

Ways of Using Mortar

Nog Construction

Nogging is an old English term for a brickwork panel set in a wooden frame. In Jamaica nog is a generic term for masonry in a timber frame; so we have stone nog, brick nog and, nowadays, concrete nog.

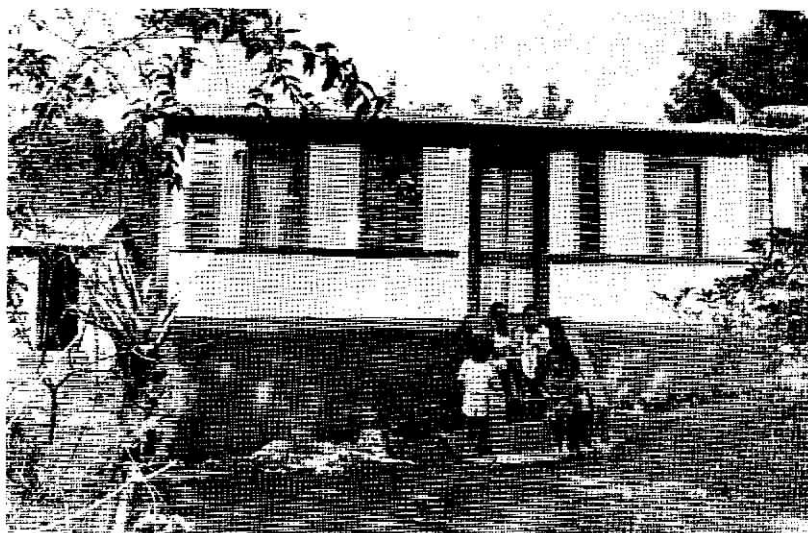
Spanish Walling is a name for stone nog, presumed to have been used by the Spanish settlers in Jamaica. To build a Spanish wall house, a frame is first

constructed of four-inch round or square timbers, with a sill and wallplate, and uprights about three feet apart, driven into the ground, with diagonal bracing at the corners. Horizontal planks are notched into the posts to support the windows. Pest resistant wood such as braziletto or guango is used. Usually, the roof is put on and covered with thatch or shingle before the walls are infilled between the posts.

Once lime is burned and ready for use the mortar can be mixed, using red dirt. Mixing lime mortar is hard work:

De man have a long hoe. If it is a big bed of mortar yu goin mix yu put six kerosene tin of lime an 24 of dirt put it around an yu trow de water in de middle an yu stir up, stir up, till yu have him like soup, den yu trow down de earth. Yu trow earth now an de man knead, and de man knead. Strong man will mek a bed of mortar, tek around an hour.

The resulting mortar is like a dry putty.

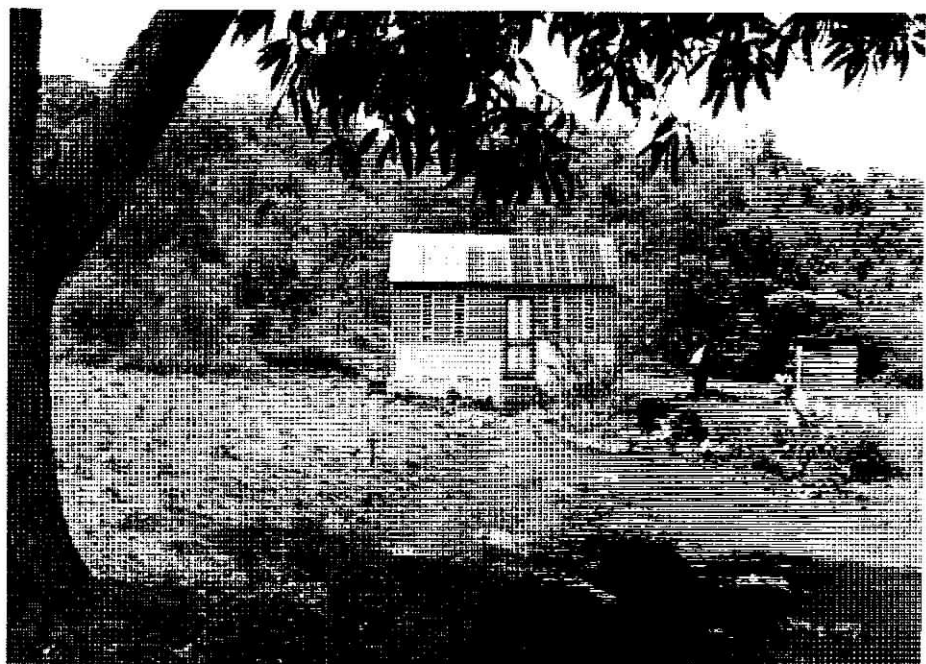


House of nog construction.

Boards are then fixed to the outside of the posts of the house, and the mason breaks stones and packs them in mortar against the board between the posts from the inside. First a layer of mortar, then a layer of stones, then mortar then another row of stones 'bruk joint' to the row below. The boards are left in place for a day or two and then removed and replaced higher up, until the whole wall is filled in. The stone pieces are about four inches at the bottom of the wall, reducing to three inches at the top.

The wall is rendered using the same three to one earth/lime mortar mixed to a soft consistency, thrown on, levelled with a board and then trowelled with a mason's trowel to get a smooth finish:

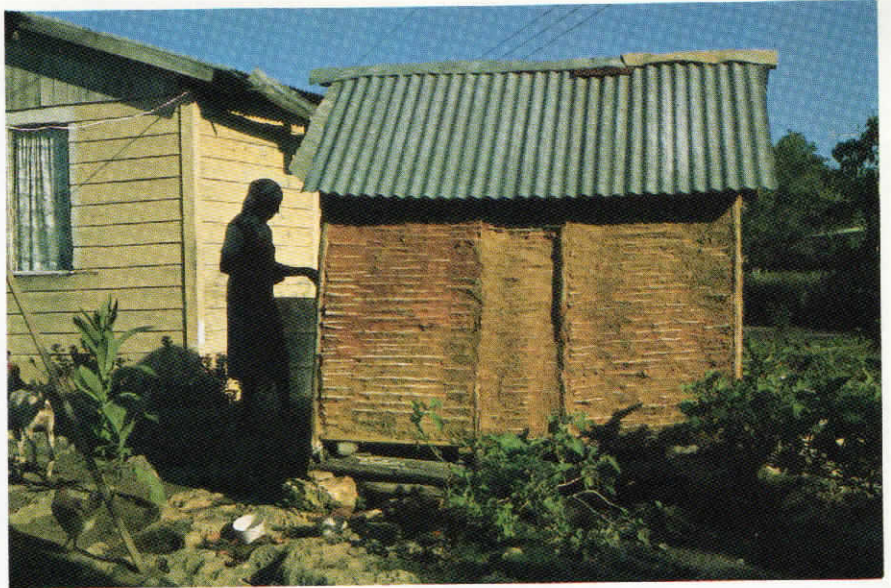
then by tomorrow you will notice it crack, have lots of cracks . . . Dem dey mortar cracks yu dont tek de trowel alone, yu tek a brush, from coconut, beat out de coconut brush an yu dip



it in de grout and grout de crack an rub out all de crack, den when yu going to refine it, mason tek him trowel an dash an rub until de work become hard . . . yu watch it still, an as soon as yu see dose cracks, yu tek out all de cracks, tek bout three days.

And so in a Spanish wall house, wood, earth and stone, found right there on the site are combined to provide a durable, smooth masonry wall. The grout used in the smoothing is made by mixing additional lime and water with some of the same mortar.

Brick Nog. In brick nog the frame is infilled with brickwork laid in lime mortar. This was a traditional English form of timber frame construction, and was often used for buildings in towns. The brickwork and timber were plastered over with lime mortar.



Rice granary in New Broughton, Westmoreland of wattle daubed with clay.



Framework for a concrete nog house. Note the wires strung between the posts for reinforcement.



Water catchment with water tank of kick and buck in the foreground, St. Elizabeth.



Wattled wall.



Unrendered brick nog.

In Jamaica this method of construction was used well into the 20th century for construction of new Corporate Area suburbs such as Vineyard Town, Kencot and Rollington Town.

It is interesting that in Long's history he describes a typical Spanish building which was built in this manner. Perhaps 'Spanish walling' once referred to brick as well as stone nog.

Concrete Nog uses a wooden framework as for Spanish walling, but in order to contain the stone/sand/cement concrete, it must be shuttered with board on both sides, as the concrete is more liquid than lime mortar. The concrete is poured two feet at a time and stones are added. Often, barbed wire is stretch-

ed between the posts in the plane of the wall to give added reinforcement.

Wattle and Daub: To build a wattle and daub building, four-inch timber framing is used, similar to that used for Spanish walling. Panels of wattle are then made between the uprights and braces, using small flexible round wood such as wild coffee or split bamboo. The whole is then plastered over with lime/earth mortar, or clay.

To make a wattle panel, rods are nailed to the sides of the posts and vertically to the frame. One-and-one-half inch strips of wood or split bamboo are then closely woven horizontally between these rods.

The framework is left to dry and

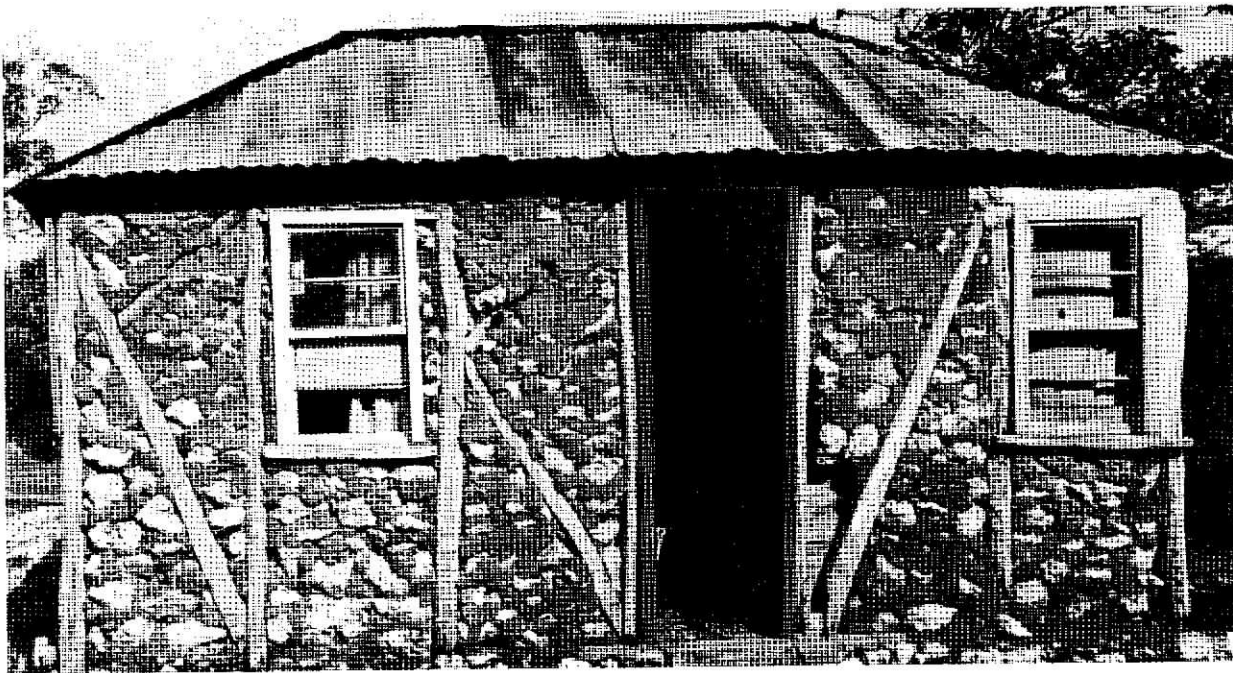
warp before it is plastered.

... After it is newly wattle it tick, yu know, an tough . . . after yu mix de white lime wid de earth yu tek yu trowel an tek e up an trow it on de wattle, an tek yu trowel an fine plaster it an yu do it inside an outside, an after yu paint it yu dont know nuttin like dese is in dere.

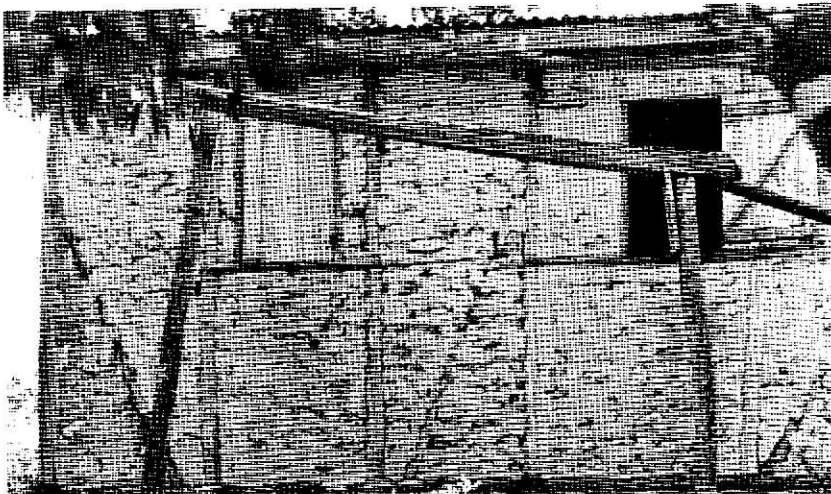
If yu go to Manchester an see some everlasting buildings an anybody dont tell yu dat it is wattle, yu wouldnt believe.

In some places such as in the Blue Mountains, clay is still used, but the wall is considered makeshift, to be replaced with proper boarding when that can be afforded.

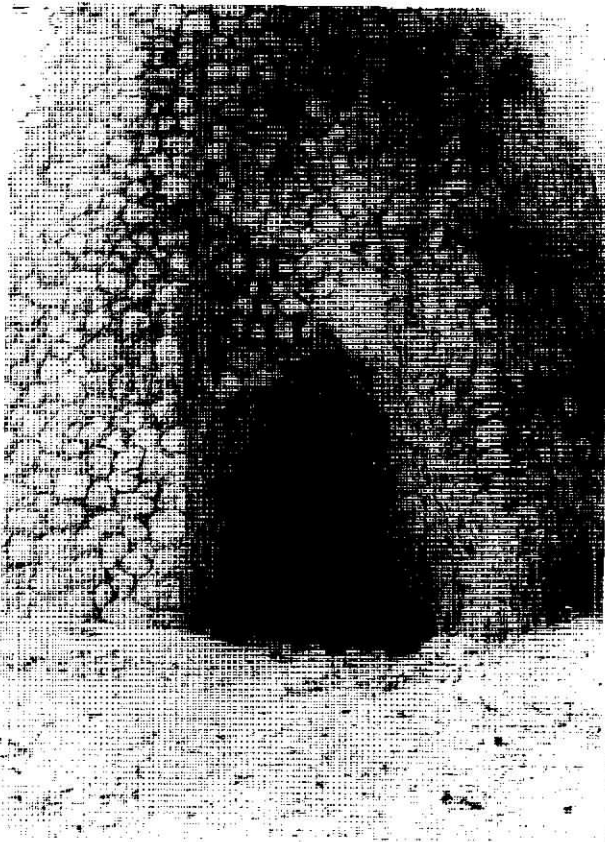
In southern Westmoreland granaries



Old unrendered house of Spanish walling showing the timber framework.



Unrendered concrete nog wall.



Eighteenth century lime kiln at Prospect, one of the historic monuments of the Parish of St Thomas. The kiln's interior is lined with brick and the exterior is of cutstone.

are built using wattle daubed with clay.

Limewash. Nog walls can be decorated with whitewash made from white lime and water. To this is added common salt or mason's 'glue' dissolved in hot water, either of which serves to stabilise the limewash, preventing it from rubbing or washing off.

Colour can also be added. Subtle colours are traditionally produced by adding finely sieved earth or prepared red ochre, known as 'red work' or yellow ochre, — 'yellow work'. Washing blue can also be used to obtain a blue tint.

Kick and Buck

The water tank by the Red Hills school in St. Andrew which supplied that community until the 1950s when standpipes were installed, is still known as 'buck an kick', but in Red Hills the origin of this name has been forgotten. Elsewhere, however, a technique known as kick and buck is remembered, as a way of making waterproof linings for tanks.

A hole seven to ten feet deep is dug for the tank. The lime and dirt (a one to three ratio) is mixed just barely damp, and then packed around the inside of the hole.

Yu go roun as far as you can go until 12 o'clock . . . Then you have something now you call the mallet an you go wid that an you tuff it an yu tuff it but you tuff it an mek it level. Yu pack it about six inches thick, but yu goin to get it down to three when you are finished wid it, when yu finish tamp it.

The afternoon is spent beating the mortar with a mallet or sticks, compacting it to a water-tight finish. Each day's work is bevelled at the top so that the next day's work will overlap, and to ensure that the joint will be waterproof, the work cannot be left to dry out for too long.

Yu must try and finish by Friday, even if yu haffi use spare man. Why yu have to finish by Friday, yu cant leave this work until next week.

Above ground level a cut stone wall four feet high by two feet six inches thick is built using lime mortar, and the kick and buck is taken right up. The earth dug from the watertank was traditionally used to build a water catchment for the tank, again with the addition of lime and stone. The water catchment often doubled as a barbecue in sunny weather, for drying pimento, ginger, and other produce.

The Future

The speed with which knowledge and

skills can be lost is frightening.

In 1943, the journal of the Jamaica Agricultural Society published excellent articles describing good practice in "Housing for country districts", "Mortar floors and barbecues", "Red dirt and lime mortar", "Spanish walling" and "Wattle and daub". All were describing techniques then in use. Today I am talking to the men at whom those articles were aimed, who tell me:

De ting is dat of today its not easy to get de lime because people cut out all de wood an burn coal and tings like dese. But de other ting again is dat de younger generation doan know nuttin about it. Deh have no knowledge now, so if anything like dat, yu would haffi use de older men to learn dem, right!

For both cultural and economic reasons there is in Jamaica a growing interest in the conservation of older buildings, and the use of traditional materials such as brick. Younger men and women need to learn the properties and ways of using lime mortar from the older masons to meet a growing market for these skills.

It should also be noted that nog techniques (probably using cement mortar as lime is both scarce and time consuming to use) are cheaper than blockwork and, as Edward Long puts it, 'Excellently contrived . . . to guard against the sudden concussion of earthquakes, the impetuosity of hurricanes, the drift of the heavy periodical rains, and the heat of the sun'.

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Interviews with:

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 Vincent Reynolds, St Elizabeth, 1986

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