THE LICHENS AT THE CHURCH OF ST. MARY, NORTHCHURCH

Grid Ref: SP 974 088

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by Andrew Harris and Paula Shipway

With their variety of features, stonework and other substrates, churches and their yards are hotspots for lichen biodiversity. The long continuity provided by historic sites such as the church of St. Mary, Northchurch, further increases this importance. Many of the lichens associated with the stone on the church or in its yard would be rare or absent from a lowland county lacking natural rock outcrops, such as Hertfordshire, were it not for the opportunities provided by these special places.

Like many churches in Hertfordshire, St. Mary's is built of flint and mortar, with limestone dressings, it dates mainly from the thirteenth and fourteenth centuries on a Saxon site. Its yard retains a number of memorials of varied design, has a modest range of trees and a boundary wall of brick. The number of lichens recorded was in the mid-60s (table 2). This is lower than some medieval churchyards where it is not uncommon for 100 species to be found. It does however make it all the more interesting why this should be so and, relatively speaking, St. Mary's is still a lichen hotspot within the area.

Concerning the first point, one of the fascinating aspects of lichens concerns their use as markers of the current and past health of the environment and of ecological change. One can be an ecological detective e.g. by using certain indicator species to understand the effects of air pollution on a site and its lichens.

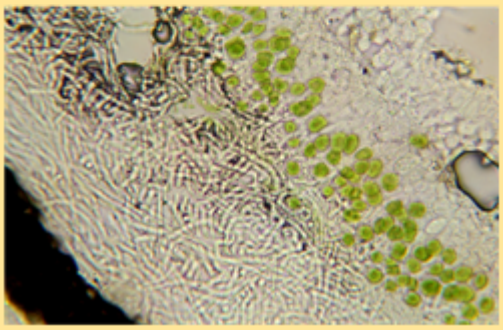
Where St. Mary's is concerned, its proximity to a mainline railway and its location at the head of a populous valley are of note. Another clue is the evidence of soot impregnation of the softer limestones and mortar of the church walls. So, most likely there is a toxic legacy from the former use of coal as a fuel. In particular during winter, when its burning would reach a peak, cold air would pool in the valley and sulphur dioxide released from the combustion would have dissolved in the damp air to acidify the surfaces of stone and other substrates.

It is also of interest how this has affected the fortunes of various species: *Thelidium pyrenpohorum* is of note for occurring prolifically on the limestone dressings of the church, particularly the slopes of the string course and buttresses. The species, possessing flask-shaped fruiting bodies like prominent small dark domes evenly spread over the surface, has an intimate relationship with the limestone which has a buffering effect against the toxic effects of sulphur dioxide.

THE LICHEN PARTNERSHIP

Lichens are a combination of a fungus enclosing an alga (it has now been found that yeasts are also embedded in the lichen thallus). Most lichenised fungi are dependent on the association and the dominant partner exploiting the other for sugars. Though the alga may be capable of living independently, it also benefits from the partnership in being able to survive in exposed habitats, such as sun-baked headstones, protected from strong light and desiccation. Nearly everything a lichen needs can be taken from the atmosphere or rainwater, so they require little from the substrate they grow on, though the chemistry and texture of e.g. stone or bark has a strong influence on the species which can colonise. Lichens can be useful indicators of the quality of the atmosphere and environment.

Section through a lichen: Photo ©Paula Shipway



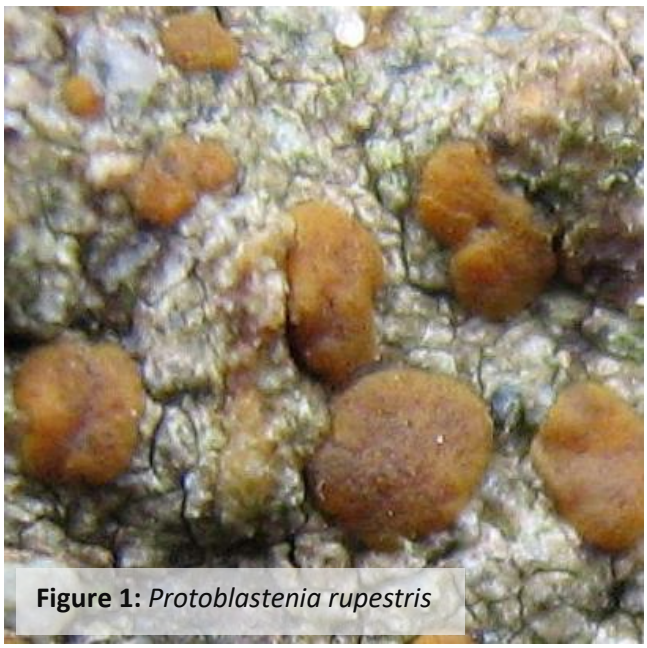


Figure 1: *Protoblastenia rupestris*

Another species common on the limestone dressings, *Protoblastenia rupestris,* forms an inconspicuous crust (figure 5), but has bright apricot coloured fruiting bodies (figure 1). This species tends to favour limestone possessing some impurities. So, where the colonisation of a substrate subject to some soot deposition in the past is concerned, *Protoblastenia rupestris* probably has a competitive edge. *Caloplaca flavocitrina* also seems to have switched niches from neutral-acidic substrates to limestone.

In common with other churchyards, lichens are more obvious here on calcareous stones, presenting a combination of bright yellow-orange and dark and pale grey crusts. As normal, those on sandstone memorials are more subdued in tone, but some of the headstones at Northchurch are also markedly impoverished (figure 7). In contrast, a couple composed of a more calcareous sandstone host an interestingly diverse and colourful array of species (figure 9) and could be termed lichen highpoints within the churchyard.

The brick boundary wall adds further variety to the churchyard with a different suite of lichens - such as *Trapelia placodioides* - more associated with substrates intermediate in pH between with a highly calcareous or siliceous content. The ash tree (figures 12 and 13) adds further species to the total, though these tend to be typical of nutrient-enriched bark due, no doubt to its proximity to the road.

In conclusion, St. Mary's, Northchurch, illustrates well the importance of churchyards both as refuges and as hotspots for lichens. As well as offering good examples of the influence of sulphur dioxide emissions from the burning of coal in the 19th and early 20th centuries on the lichen flora of lowland county such as Hertfordshire. When examining the lichens at St. Mary's one discovers an interesting story about lichen resilience: Their ability to survive both the natural challenges of the environment and the perturbations imposed upon it by humankind. Also, the various niches occupied by lichens and their differing sensitivities makes them and churchyards a good place to understand ecology and environmental change as well as gaining a better understanding of the distribution of under-recorded species such as *Thelidium pyrenophorum* (figure 2 and figure 4). On a final positive note, several species are colonising the young smooth bark of the Rowan, giving hope of increases in the lichen diversity in the future.

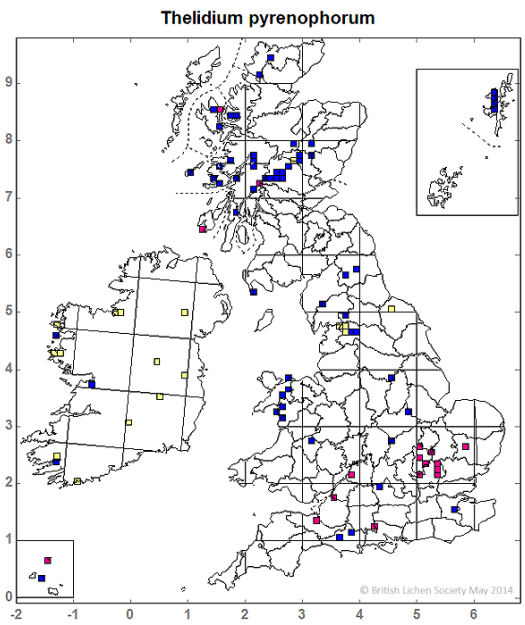


Figure 2: Distribution map of Thelidium pyrenophorum
Map © The British Lichen Society May 2014

A PHOTOGRAPHIC TOUR OF THE LICHENS OF ST MARY'S NORTHCHURCH

THE CHURCH

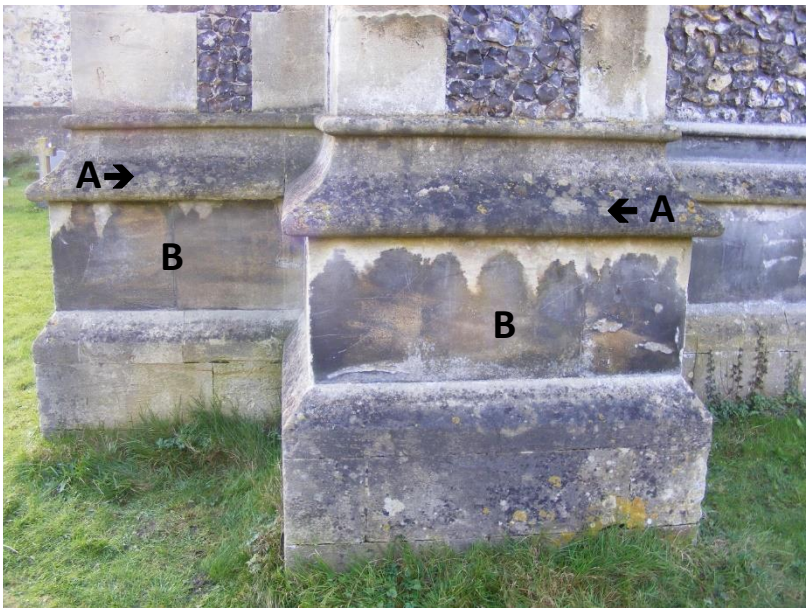


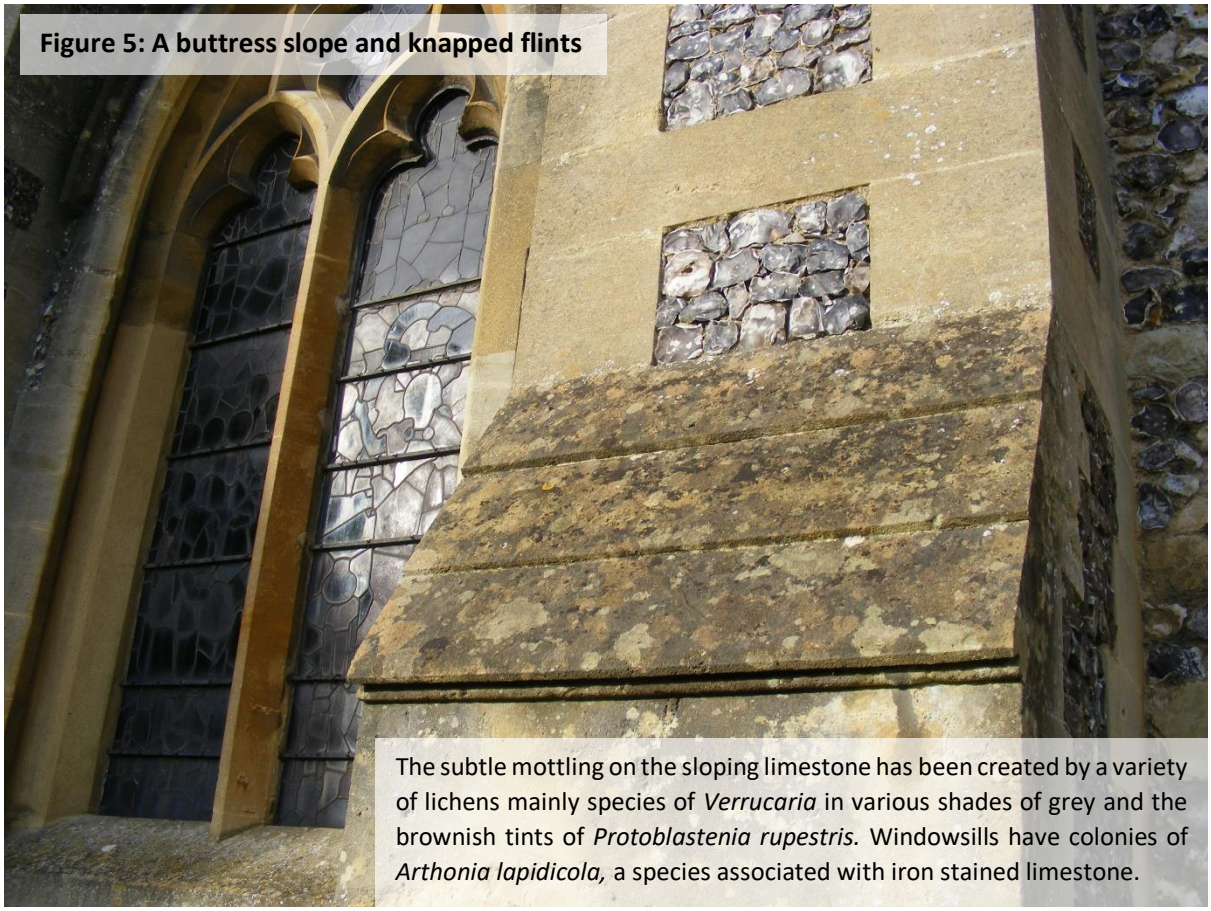
Figure 3: The string course and chamfered plinth at the east end of the church.

Though not obvious from a distance, the string course has a good range of lichens. These species occur in a zone (A-A) where the angle of the course is wetted by rain. This appears as a darker band due to the abundance of the lichen *Verrucaria nigrescens*

Note also soot impregnation (B) of the softer limestones between the two levels.

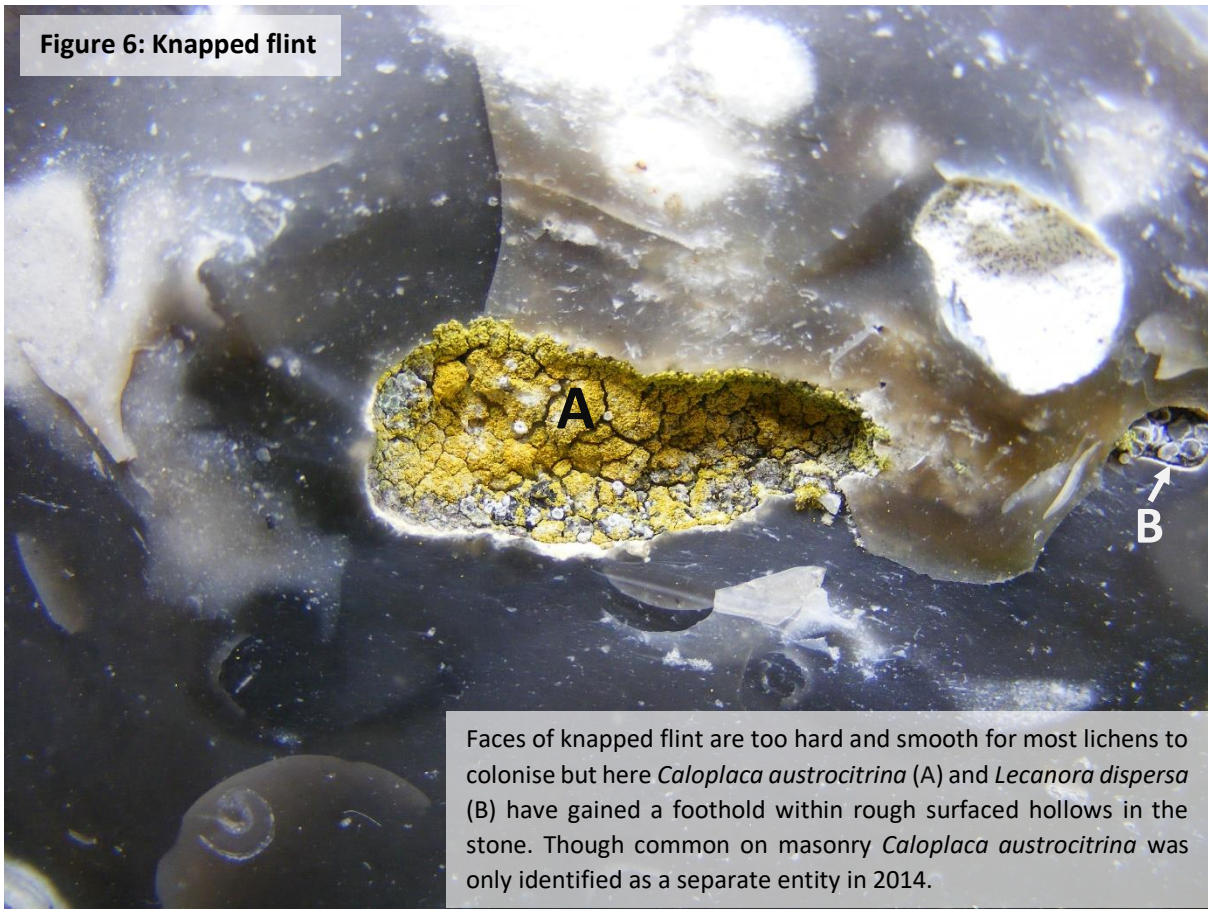
Figure 4: The most noticeable feature of *Thelidium pyrenophorum* is its prominent flask-shaped fruiting bodies known as perithecia, the body of the lichen being difficult to distinguish from the limestone. Inset: The one-septate spore helped to confirm the identity of this lichen, distinguishing it from other species of the *Verrucariaceae* (Both photos: Paula Shipway)

Figure 5: A buttress slope and knapped flints



The subtle mottling on the sloping limestone has been created by a variety of lichens mainly species of *Verrucaria* in various shades of grey and the brownish tints of *Protoblastenia rupestris.* Windowsills have colonies of *Arthonia lapidicola,* a species associated with iron stained limestone.

Figure 6: Knapped flint



Faces of knapped flint are too hard and smooth for most lichens to colonise but here *Caloplaca austrocitrina* (A) and *Lecanora dispersa* (B) have gained a foothold within rough surfaced hollows in the stone. Though common on masonry *Caloplaca austrocitrina* was only identified as a separate entity in 2014.

THE CHURCHYARD

Figure 7: Memorials on the east side of the churchyard are of a variety of design and material.

Here is an example of the different substrates and niches available to lichens in a churchyard, though here they are rather impoverished. The exception to this is the calcareous sandstone headstone in the foreground.

Figure 8: The contrast between headstones of different materials: A limestone one in the foreground has a rich array of lichens, among them golden crusts of *Caloplaca dichroa* and *C. flavescens* and white *C teicholyta* and *Lecanora albescens*. The faces of sandstone memorials in the middle-distance show signs of soot impregnation of the permeable stone. On these lichens are mainly restricted to the tops where nutrients collect and the bases where more calcareous groundwater is drawn up through capillary action. A similar comparison can be made between two headstones behind the rucksack (Limestone on the left, sandstone on the right).

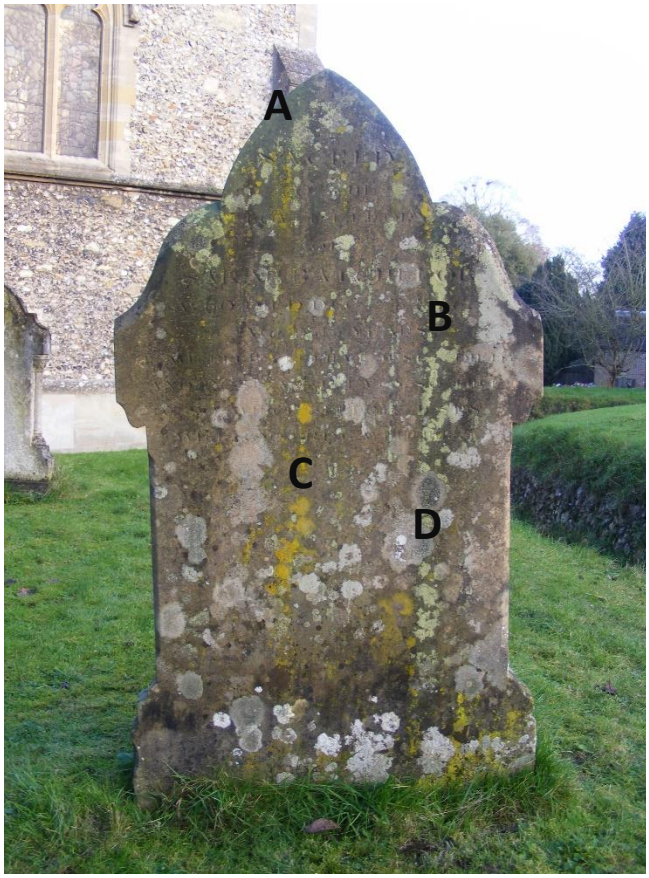


Figure 9: Headstone at the south-west end of the church.

Here is another calcareous sandstone with a rich assemblage of lichens including *Rinodina oleae* and *Caloplaca chlorina* (A), *Lecanora orosthea* (B), *Candelariella vitellina* (C) and *Lecidella stigmatea* (D). Some of the lichens form streaks down the face associated with rainwater runoff carrying nutrients and washing down vegetative propagules produced by the lichens. Other lichens form a zone where the base is influenced by soil moisture.

Figure 10: Marble headstone: The 'cleared' patch is where a fungus *Sarcopyrenia gibba* has parasitized the lichens on the surface. It produces flask shaped fruiting bodies and these are just about visible in the photo as small black specs in the centre (←). The sun-like lichen is *Caloplaca flavescens,* a widespread species on calcareous stones.

Figure 12: A pedestal tomb in the western part of the yard and the effects of nutrient washdown:

Caloplaca flavescens grows prolifically on the pyramidal top of this tomb. Lichens with a golden-yellow colouring are often found in open sunny positions and the pigment is an adaptation to protect their algae from damage from too much exposure to sunlight. It is also of note that yellow coloured lichens are often associated with nutrient enrichment. In this situation the top of memorial presents a prominent perching site for birds with nutrients washed down the sides from their droppings. In the middle distance is an ash tree which added several species to the tally of lichens. The ochre colouring of the branches is caused by abundant *Xanthoria parietina,* in natural situations this too is associated with bird enrichment and the nature of the bark, but here nutrient deposition will be amplified by spray and particulate matter from the busy road alongside the churchyard.

Figure 13: The ash tree near the edge of the churchyard: The upper-sides of the spreading boughs are dominated by leafy (foliose) lichens - including the more environmentally sensitive species *Parmotrema perlatum* which at one time was absent from much of lowland England - while the trunk has crustose species such as *Lecanora expallens*. Ivy, though of value for wildlife can be a problem should it overwhelm headstones, but did not appear of any such threat in the churchyard.

TABLE 1: A LIST OF LICHENS AND LICHENICOLOUS FUNGI FOUND AT ST. MARY'S NORTHCHURCH

BLS no.	Taxon name	Status	Substrate	C	Y	Small scale habitats
1	2	3	4	5	6	7
0212	*Amandinea punctata*	LC	Cort		√	Ash
0064	*Arthonia lapidicola*	LC	Sax	●		Windowsill
0069	*Arthonia radiata*	LC	Cort		√	Hawthorn
0113	*Aspicilia contorta subsp. hoffmanniana*	LC NS	Sax		√	Tarmac path
0165	*Bilimbia sabuletorum*	LC	Sax	●		Mortar
1628	*Botryolepraria lesdainii*	LC	Sax	●		Mortar
0219	*Buellia ocellata*	LC	Sax		√	Granite cross
2442	*Caloplaca arcis*	LC NS	Sax	●		String course, buttress slope
2613	*Caloplaca austrocitrina*	LC	Sax	●	√	Church and boundary wall
0242	*Caloplaca cerinella*	LC	Cort		√	Ash
0263	*Caloplaca chlorina*	LC	Sax		√	Calcareous sandstone headstone
0249	*Caloplaca crenulatella*	LC	Sax	●		Concrete kerb of gutter
2443	*Caloplaca dichroa*	LC NS	Sax	●	√	Widespread on limestone
0259	*Caloplaca flavescens*	LC	Sax	●	√	Frequent on limestone
2315	*Caloplaca flavocitrina*	LC	Sax	●	√	Concrete kerb, limestone headstone
2607	*Caloplaca limonia*	LC	Sax	●		Limestone string course
2461	*Caloplaca oasis*	LC	Sax		√	Concrete post of notice board
0281	*Caloplaca teicholyta*	LC	Sax	●	√	Frequent on limestone
0291	*Candelariella aurella f. aurella*	LC	Sax		√	Concrete post of notice board
0296	*Candelariella medians f. medians*	LC	Sax		√	Limestone/marble cross
0297	*Candelariella reflexa*	LC	Cort		√	Rowan
0298	*Candelariella vitellina f. vitellina*	LC	Sax		√	Granite cross
1609	*Catillaria atomarioides*	LC NS	Sax		√	Granite cross
0311	*Catillaria lenticularis*	LC	Sax		√	Limestone cross
0491	*Diploicia canescens*	LC	Sax	●		Mortar
0496	*Diplotomma alboatrum*	LC	Sax		√	Limestone: Chamfered plinth
2071	*Illosporiopsis christiansenii* {LF}	LC NS	Lic		√	Parasitising *Physcia tenella*
0613	*Lecania cyrtella*	LC	Cort		√	Ash
0627	*Lecanora albescens*	LC	Sax	●	√	Widespread on limestone
0635	*Lecanora campestris subsp. campestris*	LC	Sax		√	Brick: Boundary wall
0639	*Lecanora chlarotera*	LC	Cort		√	Ash
0646	*Lecanora dispersa*	LC	Sax	●		Flint and mortar
0649	*Lecanora expallens*	LC	Cort		√	Ash
0621	*Lecanora hagenii*	NE	Cort		√	Rowan
0661	*Lecanora muralis*	LC	Sax		√	Sandstone: Base of War Memorial
0757	*Lecanora orosthea*	LC	Sax		√	Calcareous sandstone headstone
0667	*Lecanora polytropa*	LC	Sax		√	Sandstone headstone
0797	*Lecidella elaeochroma f. elaeochroma*	LC	Cort		√	Rowan
0802	*Lecidella scabra*	LC	Sax		√	Sandstone headstone
0803	*Lecidella stigmatea*	LC	Sax	●	√	Calcareous sandstone headstone
1974	*Lepraria incana s. str.*	LC	Cort+Sax		√	Rowan and sandstone headstone
1604	*Lepraria vouauxii*	LC	Sax	●		Mortar
0877	*Micarea denigrata*	LC	Lig		√	Small wooden cross
0719	*Micarea erratica*	LC	Sax		√	Sandstone headstone
1022	*Parmelia sulcata*	LC	Lig		√	Small wooden cross
1008	*Parmotrema perlatum*	LC	Cort		√	Ash

BLS no.	Taxon name	Status	Substrate	C	Y	Small scale habitats
1107	*Phaeophyscia orbicularis*	LC	Cort		√	Ash
1112	*Physcia adscendens*	LC	Cort		√	Ash
1120	*Physcia tenella*	LC	Cort		√	Hawthorn
1690	*Porpidia soredizodes*	LC	Sax	●	√	Sandstone grill cover and memorials
0572	*Porpidia tuberculosa*	LC	Sax		√	Sandstone headstone
1189	*Protoblastenia rupestris*	LC	Sax	●		Limestone string course
1200	*Psilolechia lucida*	LC	Sax	●		Flint
1989	*Punctelia jeckeri*	LC	Cort		√	Ash
2070	*Punctelia subrudecta s. str.*	LC	Cort		√	Ash
1266	*Rhizocarpon reductum*	LC	Sax	●	√	Sandstone headstone
1289	*Rinodina oleae*	LC	Sax		√	Sandstone headstone
1307	*Sarcopyrenia gibba var. geisleri* {LF}	LC	Sax		√	Marble headstone
1395	*Thelidium pyrenophorum*	LC NS	Sax	●		Limestone string course
1415	*Toninia aromatica*	LC	Sax	●		Mortar
1595	*Trapelia placodioides*	LC	Sax		√	Brick: Boundary wall
#N/A	*Verrucaria hochstetteri s.lat.*	#N/A	Sax	●		Limestone dressings
1519	*Verrucaria macrostoma f. furfuracea*	LC	Sax	●		Limestone string course
1510	*Verrucaria nigrescens f. nigrescens*	LC	Sax	●	√	Widespread on limestone
2514	*Verrucaria nigrescens f. tectorum*	LC	Sax	●		Limestone string course
1528	*Xanthoria elegans*	LC	Sax	●		Flint
1530	*Xanthoria parietina*	LC	Cort		√	Ash and Hawthorn
1	2	3	4	5	6	7

For an explanation of the columns see below

TABLE 2

ABBREVIATIONS used in TABLE 1 and TOTALS			Substrate	Definition	Total
		Bry	Bryicolous	On moss	-
Total taxa recorded Including 1 tentative record	67	**Cort**	Corticolous	On Bark	17
		Fol	Folicolous	On foliage	-
		Lic	Lichenicolous	On lichens	1
Lichens	65	**Lig**	Lignicolous	On lignum (timber)	2
Non-lichenised fungi {F}	-	**Met**	Metalliferous	On metal	-
Lichenicolous fungi {LF}	2	**Sax**	Saxicolous	On stone, brick, mortar etc	48
C On the church	27	Note: Some of the species may occur on both the church and in the churchyard and/or on more than one substrate so that the total of these may exceed the total taxa recorded			
Y In the churchyard	50				

Conservation status – see note 3 below

LC = Least concern	NS = Nationally scarce	NR = Nationally rare	NT = Near threatened	IR = International responsibility	DD = Data deficient	NE = Not evaluated

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The meaning of the columns in table 1:

1. The British lichen society number
2. Taxa includes species, subspecies, varieties and forms, anything that has a BLS no! Taxa marked {LF} are lichenicolous fungi i.e. fungal parasites on lichens. Records new to the county are highlighted.
3. While most of the taxa have an IUCN rating of least concern some are also nationally scarce or rare, but as many lichens are difficult to identify are easily overlooked and there have been changes in taxonomy, most of these species have been under-recorded e.g. *Caloplaca dichroa,* though very common in churchyards, is classed as nationally scarce, but this is because the species was only described in 2006 just six years before lichens were evaluated in Woods and Coppins (2012).
4. Substrate as explained in table 2
5. Taxa recorded on the church
6. Taxa recorded in the churchyard
7. This may be one particular place the lichen was found or an example or where a widespread species typically occurred.

References:

Woods, R. G. & Coppins, B. J. (2012). A Conservation Evaluation of British Lichens and Lichenicolous Fungi. Species Status 13. Joint Nature Conservation Committee, Peterborough.

Smith, C. W., Aptroot, A., Coppins, B. J., Fletcher, A., Gilbert, O. L., James, P. J. & Wolseley, P. A., (eds) (2009) *The Lichens of Great Britain and Ireland*. London: British Lichen Society.

Dobson, F. S. (2005) *Lichens: An illustrated Guide to the British and Irish Species* (Fifth edition), Slough, The Richmond Publishing Co. Ltd)

Further information can be obtained from the following websites:

Fungi.myspecies: http://fungi.myspecies.info/content/list-lichens
British Lichens Website species gallery: http://www.britishlichens.co.uk/speciesgallery.html
British Lichen Society Website: http://www.britishlichensociety.org.uk/

Available from the British Lichen Society website:
BLS Churchyard Lichens factsheet: *CHURCHYARD LICHENS: A factsheet – your questions answered* (pdf –updated September 2012) British Lichen Society

Chester, T. and Palmer, K. (1994); Chester, T. (2001); Revised: Pedley, I. (BLS Churchyards Project Co-ordinator) (2009) Churchyard Lichens, Green_cfga_article_IP_final

Figure 14: A general view of the churchyard

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