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Blake's Cottage, West Sussex: A botanical report on the thatch

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Blake's Cottage
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SUMMARY
Blake's Cottage, in Felpham, West Sussex, is a grade II* listed cottage, of late 17th or 18th century date. William Blake (1757-1827) and his wife Catherine lived in the cottage between 1800 and 1803, where Blake wrote the words to the hymn *Jerusalem.* Prior to renovation of the thatched roof, samples of the thatch were taken from the exposed base layers. Morphological analysis of the cereal ears provides characterisation of the historic basecoat.

CONTRIBUTORS
Ruth Pelling

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The permission to sample the thatch at Blake's Cottage was given by The Blake's Cottage Trust. Jane Corcoran, Historic England Science Advisor for the South East, assisted the on-site sampling. Robert Williams, Historic England Architect, South East team, coordinated the sampling work on behalf of Historic England for The Blake's Cottage Trust. All images are the copyright of historic England. Site photographs were taken by the author with the exception of Figure 1 right hand image, which was taken by Robert Williams. The images of glumes (Figure 4) were photographed using an AHRC funded Keyence VHX7000 3-D digital microscope (AHRC Award AH/V011758/1).

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INTRODUCTION

Blake's Cottage, in Felpham, West Sussex, is a grade II* listed cottage, of late 17th or 18th century date, built of local flint and timber, and possibly originally whitewashed (National Heritage List for England number 1353792, Appendix 1). William Blake (1757-1827) and his wife Catherine lived in the cottage between 1800 and 1803. He wrote the words to the hymn *Jerusalem* while in residence at the cottage (http://www.blakesociety.org). The original building (phase 1) consisted of two rooms on the ground floor, and two on the first floor, with a central entrance and staircase, and a continuous outshut at the rear (Archaeology South-East 2017). The western end of the original building was extended by a little over one meter towards the road (phase 1a); the date of the extension is unknown but may have been relatively early. A two-storey extension (phase 2) with gabled roof terminal to the rear was constructed at the eastern end of the original building some time before 1876. The current thatched roof appears to run continuously across the phase 1 and 2 structure from the front (south) elevation. Several phases of later, 20th century, single storey extensions and internal modifications were added to the east and rear of the properties.

The cottage was purchased and put into trust for the nation by the Blake Cottage Trust in 2015. Having gone through various periods of alteration, and then largely vacant for a number of years, the cottage requires extensive restoration. The Trust aims to restore the original cottage, removing the later additions, with a new multifunctional centre constructed within the grounds. Restoration will begin with the removal of at least the top layers of the existing thatch. The roof has been substantially over thatched and is in a visible poor state of repair. The identification of the cereal types in the base layer of thatch will provide evidence for the thatching history of the building. A principal research aim was to establish if any of the underlayer of thatch could date to the original construction of the cottage, or had it been replaced entirely during Victorian renovations.

A building survey and thatch report (Carter Jonas 2014, Appendix 3) identified the thatch as being of combed wheat straw/Triticale (a wheat, rye hybrid). The south elevation consists of two coats with a depth of 26 inches (0.66m). The northern slope was made up of several layers and of unknown depth. It was estimated to be in the region of 20 years old, while the ridge may have been more recent. The thatch was in a poor state of repair. A number of the timber rafters had cracked or broken due to a combination of the weight of the thatch, infestation of common furniture beetle, and outward movement of supporting walls. Damage to the lath and plaster ceiling and the need to install props to support the roof, resulted in several substantial holes in the ceiling in the two original bedrooms, allowing visible access to the underside of the thatch.

ON-SITE SAMPLING METHODOLOGY AND OBSERVATIONS

A site visit was made on 16th February 2022. The underside of the thatch roof was accessible in the two rooms of the original cottage on either side of the main staircase. For ease of reference the western room is referred to as Room 1, with the room to the east of the stair case referred to as Room 2. Access to the phase 1a westward extension was through a small opening in Room 1 above the fireplace. In Room 2, access to the roof was through exposures in the ceiling made for the metal props towards the lower end of the slope. A step ladder was used to gain access and enable visual inspection and sampling.

The westward phase 1a extension was clearly visible in the roof space due to the square cut wooden roof trusses (Figure 1). The earlier roof trusses were constructed from more roughly hewn and rounded wood. All visible thatch retaining ears was recognisably of wheat (*Triticum* sp). While the visible straw was laid in a mostly vertical arrangement, the ears were more randomly laid in varied directions and density across the length of the phase 1 and 1a roof (Figure 2). No fleeking layer (a layer of straw or reed placed against the wood sub-structure of roof to support the thatch) was present. No visible weed inclusions were noted. Wooden spars were visible. No obvious visual differences were noted between the phase 1 and phase 1a thatch.

Figure 1 Contrasting rafters with square cut beams in the phase 1a extension (left) and more roughly shaped beams of the original roof (right).

Grab samples of cereal ears were taken from four locations from the exposed base layer of thatch. Sample 1 was taken from the westward extension in Room 1 (phase 1a). Samples 2 to 4 were taken from Room 2 (phase 1) from above the original door, above the window, and close to the later eastern door to the phase 2 extension.

Sample sizes were small as limited cereal ears were easily visible and reachable. The most complete ears were targeted.

Figure 2 Visible ears of wheat and crushed straw laid in random fashion seen in the phase 1 roof in Room 2.

LABORATORY METHODS

Cereal ears and straw were examined from each sample. Four ears were selected from each sample. The remaining ears were quickly scanned in order to identify any further variation. The most complete ears were selected for laboratory analysis. Observations were made using a stereoscopic microscope at magnifications of x10 to x40. Characteristics were recorded for each sub-sample following the criteria given in Hervey-Murray 1980; limitations and age-related deterioration of the material were such that not all criteria could be recorded for each ear. Glume and lemma descriptive criteria were based on the lower (1st) glume and lemma, selected from a spikelet in the central portion of the ear. Ploidy level was determined using the criteria given developed by Hillman (2001). Ear density (D) was measured following the criteria given by Percival (1948, 66-67), using the formula D = (N x 10)/L where N is the number of spikelets (rachis segments) and L is the length of rachis in cm. Only complete rachis segments were included.

LABORATORY RESULTS

Of the ears recovered from the base layer of thatch, most were incomplete, missing some of the rachis and spikelets, or missing some or all of the glumes, lemma and palea. No grain was present. The straw was hollow, and frequently flattened. Descriptive criteria were limited by preservation, although rachises were well preserved and in all but two examples the lower glumes from the middle section of the ear could be described. Of the ears examined only one retained fewer than 10 rachis segments. The most complete and longest ear retained 20 rachis segments. The shape of the original ears could not be established with certainty. Many of the remaining glumes and lemmas were quickly lost during examination, and it was not always easy to identify the lowest glume of a spikelet pair. Only two ears retained their apical (terminal) spikelet, one of which had lost its lowest internode. Of the

remaining ears, all but one retained their lowest internode. Mould spots were noted on some of the chaff elements and insect frass was present.

Figure 3: A selection of *Triticum aestivum* s.l. ears, samples <1.2>, <4.3> and <2.1>

The criteria recorded is presented in Table 1.

Ploidy level: All ears examined consisted of hexaploid, bread wheat type (*Triticum aestivum* s.l.).

Ear Density: The density of ears was variable. Following Percival's (1948) criteria, the ears ranged from lax (density below 22, four ears) to dense (density 28 – 34, five ears). The largest group, eight ears, fell within the medium category (22-28).

Ear Description: Rachises were predominantly straight and parallel with straight lowest internodes. Four ears had rachises that became increasingly "zig-zag" towards the apical end (top spikelet), while one ear was more strongly zig-zag throughout. The lowest internodes were bent backwards in four ears. Rachises were hairy, with a glabrous lowest rachis segment. It was not possible to establish the number of grains per rachis internode in most cases, but where recorded it ranged from two to five.

Awns: All ears were "awnless" (beardless), with short to medium length awns in the upper portions of ears. The maximum awn length recorded was 12mm.

Lower glume: Typically, the lower glumes (Figure 1) were flat, with blunt to short beaks and narrow to medium, sloping or square shoulders, spineless or with few spines, and minimal internal hair (groups i or ii) with occasional examples showing a slightly increased hair growth (group iii). All had a prominent keel.

Lower Lemma: “Beaks” were short to medium and curved to geniculate.

Figure 4. Mid ear glume, sample 3.2, external (left) and interior (right) showing medium straight beak, narrow square shoulder and strong keel. Slight spines are visible on the keel towards the top of the beak. Hairs are visible at the base of the glume (exterior view). A medium-large internal imprint is visible (right), shown in the area of paler colour. The beak has no split and internal hairs of group iii are visible within the fold of the keel and across the top of the interior surface. Photographed using AHRC funded Keyence VHX7000 3-D digital microscope at x 20 magnification (AHRC Award AH/V011758/1).

DISCUSSION

The base layer of thatch remaining at Blake’s Cottage, consisted of cereal straw, some of which retained the ears, all of which were of bread wheat type (*Triticum aestivum* s.l.). The absence of grain within the ears indicates that the wheat had been threshed. The presence of flattened straw may suggest mechanical threshing, although this modification could have occurred by other means. Mechanised threshing machines became increasingly widely used during the first half of the 19th century (Slicher van Bath 1963, 306-7; Moir and Letts, 1999, 81-3) The distribution, random orientation, and relative paucity of ears compared to straw within the base coat of the thatch, would be consistent with the use of threshing waste and crushed straw, with no fleeking layer applied. Triticale was noted in the visible upper thatch during a building survey (Carter Jonas 2014, Appendix 3), indicating the upper coats are later 20th century in date when this modern wheat-rye hybrid has become widely commercially available and popular for thatching.

Sufficient chaff portions remained to provide a descriptive record of the range of characteristics present. The wheat ears recovered are consistent with a beardless, medium dense, variety of bread wheat (*Triticum aestivum* s.l.), with some variation

in ear density, ranging from lax to dense. Variation was also seen in glume, lemma and rachis morphology including presence of spines, distribution of hairs, shoulder shape and beak length. Insufficient data is available to statistically demonstrate spatial variation, although the specimens from sample 2 (Room 2, above the inner door) included a higher proportion of lax ears (3 of 4 ears examined) and glumes with a sloping shoulder. The thatch from the phase 1a extension does not appear to significantly differ from that in Room 2 in either placement or ear characteristics, and it is possible that the base coat across the entire stretch of roof is of the same date.

The use of threshing waste and crushed straw as base coats appears to have been a common practice in medieval and post-medieval thatching (Letts 1999; Moir and Letts 1999), primarily because it was free and easily available, particularly in arable districts. External thatch would likely have been made of combed reed or long straw of wheat or rye, or possibly water reed (*Phragmites australis*). The variation in morphological characteristics of the cereals within the base coat may indicate a mixed origin for the threshing waste used but may simply be the result of greater genetic variation within a single crop than is seen in modern cereal crops.

Most of the modern wheats used for thatching have complex international pedigrees which can be traced back to late 19th or early 20th century varieties (Letts 1999). *Maris Widgeon, Maris Huntsman*, and *Aquilla* were developed in the 1960 and 1970s from French, Polish, Canadian and English varieties (ibid, 21; fig 37). Older traditional late 19th/early 20th century thatching varieties include *Squareheads Master*, *Little Joss*, *N59* and *Elite Lepeuple*. Prior to the development of improved strains of cereals in the mid-late 19th century, there was likely to have been significantly greater diversity in arable fields. It is thus possible that morphological variation within the threshing waste used in the base coat of the thatch at Blake's Cottage is simply a reflection of this greater variation. The variation seen within the thatching cereals may therefore point towards a relatively early date, although it may post-date the phase 1a extension.

CONCLUSIONS

The base layer of the thatched roof at Blake's Cottage appears to have been formed, at least partially, of mixed crushed straw and threshing waste. Beardless bread wheat was used, showing some morphological variation. The variation within the wheat ears recorded indicates either a mixed source for the material used or may reflect the more heterogeneous nature of wheat crops prior to the development of improved strains and named varieties from the mid-19th century onwards. The retention of the existing base coat would ensure some historic integrity is maintained. It would be of some interest to examine the thatch immediately overlying the base coat, as this could provide additional historic information about the development of the roof and thatching techniques employed.

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Table 1: Morphological characteristic of ear samples from thatch following Hervey-Murray1980, Percival 1948 and Hillman 2001

	Room 1, phase 1a extension				Room 2, phase 1											
Sub-sample number	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
ploidy level	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
remaining ear length (cm; **L**x10)	8	6	5.5	5.6	8.3	6	6.5	6.1	8.8	2.1	1.9	2.7	5.4	48	44	50
number of rachis segments/spikelets (**N**)	16	18	13	18	17	16	13	13	20	6	5	7	14	14	11	15
ear density (**D**)	20	30	23.64	32.14	20.48	26.67	20	21.31	22.73	28.57	26.32	25.93	25.93	29.17	25	30
density (Percival 1948)	lax	dense	med	dense	lax	med	lax	lax	med	dense	med	med	med	dense	med	dense
lower glume, mid-third rachis																
glume shape	flat	flat	flat	flat	flat	flat	flat	flat	-	flat	flat	flat	flat	flat	flat	flat
glume beak shape	Short/ blunt	short/ med, strt	short, blunt	-	short/ med, curved	short/m ed, curved	-	short, blunt	-	med, strt	Short blunt/ med strt	short blunt	med, strt	short, blunt	short, blunt	short, blunt
glume shoulder shape	square	square	square	-	sloping	sloping	-	sloping	-	square	square	sloping	square	square	square	sloping
glume surface	rough	rough	rough	-	rough	rough	rough	rough	-	rough	rough	smooth	smooth	rough	rough	rough
glume, visible spines	no	no	no	-	slight, broad wing	broad wing	no	no	-	keel	no	narrow wing	no	no	keel, broad wing	no
glume, internal hair group	ii	ii	ii	-	iii	Ii	ii	ii	-	iii	i	iii	i	i	i	i
glume beak split	no	no	?no	-	n o	no	no	no	-	no	no	no	no	no	no	no
glume internal imprints	med	med/ large	med/ large	-	large	large	large	med	-	med	large	large	large	med	med	large
lower apical glume, shape	-	-	-	-	deep nick	shallow nick	-	-	-	-	-	-	-	-	-	-

	Room 1, phase 1a extension				Room 2, phase 1											
Sub-sample number	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
upper apical glume, beak	-	-	-	-	short, rounded	rounded	-	-	-	-	-	-	-	-	-	-
lower lemma, beak shape	med, curve	med, curve	short, strt	short, strt	short, curved	med, geniculate	short geniculate	med/short geniculate	-	short, geniculate	med, curved	short geniculate	med, geniculate	short, geniculate	short-med, geniculate	short, geniculate
lower lemma, hairs on beak base	-	-	-	-	slight	-	-	-	-	no	no	no	no	no	no	no
upper lemma, awn length	-	-	-	-	-	-	-	-	-	-	-	-	med 12mm	5-6mm	short-med	-
apical rachis hairs	-	-	-	-	c,m,cn	c,m,cn	-	-	c,m,cn							
mid-third rachis hairs	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s	m,i,s
lowest rachis hairs	glab	glab	glab	glab	-	margin	-	glab	glab	glab	margin	-	glab	glab	glab	Glab
rachis internode shape	strt	strt	strt	strt	strt,	strt - zag	strt-zzag	±strrt	strt	strt	zzag	strt-zzag	strt	strt	strt	strt-zzag
lowest rachis internode shape	strt	strt	strt	strt	-	bent back	-	strt	bent back	strt	strt	-	strt	strt	± bent back	± bent back
grains per spikelet	-	-	-	-	-	-	≥4	-	≥4	-	2	-	-	4 - 5	-	-

Key:
strt = straight, med = medium, zzag = zigzag, glab = glabrous
apical rachis hairs c, m, cn – collar, margin, convex surface hairs
mid-third rachis hairs m, i, s = margin, interglume, shoulder

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