KNAPPING BUILDING FLINTS
IN NORFOLK

by

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Abstract

A group of modern flintknappers at Castle Acre Quarry, Norfolk, produce flint building stones for use in traditional and imitation styles of architecture. Although the craft itself is ancient, the techniques now practiced represent a revival and modification of the old knapper's trade, and illustrate some of the processes of survival, innovation, and retreat that characterize obsolescent industries.

A lithic archaeologist traveling through parts of Britain cannot fail to be struck by the use of flint in building. Across the southeast of England the deposits of Cretaceous chalk produce a fine dark flint. Hundreds of thousands of years ago early hominids made handaxes out of it, a few thousand years ago Neolithic farmers dug it from shafts in the chalk at Grimes Graves, and a couple of hundred years ago, the knappers of Brandon and other villages produced the gunflints that fired the muskets of empire. More visible today than these well-known artifacts are the hundreds of cottages and terraced houses faced with flint in villages like Brandon, Mundford, and Swaffham, or the black towers of churches from St. Peters in Thetford to Southwark Cathedral in London. Flint is much less used in modern building, but a few knappers have maintained or revived some of the old technology. The knappers at Castle Acre Quarry in Norfolk (Figure 1) provide an example, and show how obsolescent industries are modified by decline and reinvention.

Although most lithic archaeologists focus on prehistoric tools and the debitage of their manufacture, recent industries making different lithic products also ought to be of interest. Not only do they reflect economic and social processes relevant to many crafts, but it has been argued that historic knapping shows continuity with prehistoric times, and the indisputable similarity of basic processes and techniques was instrumental in the early understanding of lithic technology (Stevens 1870; Skertchly 1879; Evans 1897). Without a recognition of historic knapping, recent remains may be confused with ancient (Clay 1925; McNabb and Ashton 1990; Whittaker and Stafford 1999). Beyond these reasons, for many of us any lithic craft holds some intrinsic interest, and these small and often ephemeral technologies should be documented for the future. Accordingly, I will briefly describe the historic background of flint building, and then discuss the materials, products, context and significance of a modern knapping industry.

BUILDING FLINTS

The use of flint in building is ancient, and began in areas where there was not much other building stone. Unshaped cobbles of flint set in
Figure 1. Map of southeastern England and important locations in the chalk flint area
copious mortar can be seen in Roman and medieval structures. By the 14th century, knapped flint was being used to face important buildings like churches or the guildhalls in King’s Lynn and Norwich, sometimes in checkerboard patterns with black flint contrasting with white chalk or stone blocks (Shepherd 1972:200; Orna and Orna 1984; Harris 1990). Setting broken flint faces outward produces shiny, black, grey, or multicolored flat surfaces that lend an air of bright solidity to a building (Figures 2, 3, 4).

By the 1600s knapped flint facings were becoming common and there must have been stone-workers who produced building flint in quantity, but I have been unable to find records of them. As the gunflint industry developed in the 1600s, the knappers made "builders" as well as gunflints, finding this a useful way to dispose of cores and other waste. By Victorian times, thousands of domestic structures were being faced with flint, often used in combination with brick, stone, and tile. Skertchly (1879:35-36) thought the trade in "builders" was increasing, and offered a Victorian perspective on the aesthetics of flint: "These flints make a very durable and nice-looking wall ... When the quoining is of brick the appearance is quite attractive, and possesses none of the heavy look that might be expected." Flint could be used as rounded cobbles, or just split cobbles and irregular chunks, but it could be knapped into careful squares or rounds or set in decorative patterns called "diaper work" or "flushwork."

Flint-faced buildings became rare as the gunflint industry declined to near extinction after the late 1800s, but some demand for flints continued. In 1993 the late Fred Avery, last of the gunflint knappers at Brandon, and John Lord, a free-lance archaeologist and knapper, both told me that they made building flints for repair of existing structures and for some new buildings.

CASTLE ACRE QUARRY

A modern chalk quarry at Castle Acre, north of Swaffham, Norfolk, is one of the few commercial enterprises turning out building flint in quantity today. In October of 1999 I had the opportunity to visit the quarry and interview the knappers. Bernard Archer is the quarry manager and originator of flint production there. He has worked for the Needham Chalk Company for about 8 years, and taught himself to knap building stone when he realized there could be a demand for what was otherwise a waste product of the chalk quarry. Five years ago he started hiring others to knap, and currently three "lads," David, John, and Rob, work at Castle Acre. Needham Chalk owns seven quarries, producing chalk for building and agricultural lime and for other industrial uses including pharmaceuticals, white traffic line road paint, rubber car mats, and white Sussex bricks. Only three of these quarries produce useful flint, and all the knapping is done at Castle Acre. At the moment, the flint from the Castle Acre quarry is more profitable than the chalk, which is not as hard and pure as some, and only usable for agricultural lime.

Mr. Archer had little information on the geology of the quarry, but it should be in the Upper Chalk, which is the main flint-bearing formation in the region. It was formed in the late Cretaceous seas between 65 and 97 million years ago (Chatwin 1961; Bristow 1990; Wood 1996). Fossils are rare in the chalk at Castle Acre, but the knappers sometimes find them in the flints. Bernard showed me a splendid fossil sea urchin in a split flint nodule. The flint occurs at Castle Acre as irregular nodules, normally from 10 to 30 cm in maximum dimension. There is only a meter or so of gravel overburden, which also produces some usable flint, and the quarry itself is an open pit only 10-20 m deep, so it has not penetrated to the finest black "floorstone" flint mined from the top of the Middle Chalk at Grimes Graves and Brandon. Castle Acre flint is black-to-grey, usually dark and translucent with some coarser white spots, and a thin white chalk cortex that washes off to leave a blue "skin." A second quarry in Essex produces nodules with a thicker, hard white cortex under the soft chalk. This flint is darker and a bit coarser.

On the day of my visit, the workers were knapping nodules from a quarry near Norwich. These have a thin, white cortex, a bit thicker and yellower than that from Castle Acre. The flint is black, with less grey in it and a sheen that John described as "bluish," but it sometimes breaks along flaws that are stained brown with iron oxide. The builders claim this runs and stains the mortar, so flawed flints are undesirable. Other "sand-and-gravel" flint is bought from gravel operations locally. It has rolled brown surfaces and tends to turn grey when knapped. According to David, flint from the gravel works more easily the longer you let it sit, while the quarry flints work better fresh.

Flint quality varies. It looked to me as though about 2/3 of the flint was discarded as debitage,
Figure 2. Typical flint-faced housing in Thetford. An inscription on the gable dates this one: "W. S. 1845."

Figure 3. A miniature version of typical 19th century church architecture, the mausoleum of the Bliss family at Brandon House, now in the Brandon Country Park; dates: 1820-1838.
need trimming. David demonstrated the method on an ideal cylindrical nodule. On other nodules one can work and work and only get one piece, or the whole thing falls apart because of flaws.

KNAPPING

All knapping is done by the men at Castle Acre. They work in a large, open corrugated iron shed, sitting near the mouth around a pile of flint nodules, with a heap of drying chalk behind them under the shelter (Figure 5). Of the three workers, John is the oldest and, with his cloth cap and cigarette, brisk movements and wry comments, would not be out of place in any picture of the British working man of the last century. David, a burly farmer with a round face and short hair, is the youngest. Before taking this job, he drove a tractor to support his family. The third, Rob, was the first to be hired at Castle Acre five years ago, but was doing other work when I visited, so I talked to him least.

Knapping is done with hammer and chisel (Figure 6). The gunflint knappers of old used to work only with hammers of various sizes, but the chisel is more efficient and requires less practice for breaking up flints into usable sizes. The hammers are three- or four-pound (1.5 - 2 kg) sledges, and the chisels have an inserted tungsten bit and strongly mushroomed end. They are expensive, but break fairly often. Bernard showed me a drawer full of damaged chisels, and at the time of my visit, Rob was not knapping because they had only two chisels and were awaiting a new lot.

The chisel is set on the stone and struck hard to split the flint, often producing a wedging fracture initiation (Cotterell and Kamminga 1987) and “split cone,” rather than a Hertzian cone and bulb. The aim is to produce a rough block with a major fracture face 3-6 inches (7.5 - 15 cm) across with about 4 inches (10 cm) of flint projecting back to be set in the concrete. “Three-to-six” is the standard size, but they also make some 2-4” for concrete block setting, and recently had a “one-off” order of 10” flints for a big wall. They also sell some of the smaller waste flakes for “galenting,” or chinking around the larger flints in a wall. These sell for £ 600/ton, while the normal building flint brings £ 210/ton.

Finished flints are mostly just irregular pieces of nodules with a clean fracture surface. However, Bernard occasionally does more complex knapping, making carefully squared flints that can be

Figure 4. Detail of the facing on the Bliss mausoleum shows a common combination of brick and flint. Two types of knapped flints were used here: carefully fitted rectangles to the left, and less regular pieces to the right.

but the knappers said that, with really good flint, only half or maybe one-third ends as waste. It usually takes 4 1/2 - 5 hours to make a ton of flint but, using really good material, workers can finish a ton in 3 1/2 to as little as 3 hours. The best flint is clean, and can be easily cut at a blow. With luck, it comes in long even nodules that are easily knapped into several good sections that hardly
Figure 5. John knapping in the shed. The pile of flint nodules is in front of him, knapped pieces are to his left, and a wheelbarrow for small waste is behind and to his right.

set close together, as was done in some of the more elaborate flint walls of the past. He shapes the flint in a couple of minutes by knapping with a small steel hammer (Figure 7), trimming around the edges of the main face to get a regular square with a pyramidal back to set in the concrete. He recently sent some samples to Southwark Cathedral, where repairs are needed, and will charge them £1 per stone if he gets the contract.

On a normal flint, once the major split is made, some trimming is done with hammer and chisel if, for instance, the end is too long. The chisel can also be used as a baton to whack off any gross irregularities around the periphery of the stone. This is pretty basic knapping, but is more difficult than it looks. As David said, "When I began, it was all brute strength and stupidity," but after a year he had learned some tricks.

He let me try his equipment and gave me some pointers. You cut the flint straight across with a vertical blow on a vertical chisel. In splitting a nodule at first, it works best to put the chisel in a concavity on the irregular nodules (Figure 6). After the first break, if you want to split a wide and thick piece, it is easier to set the chisel toward one side of the face or the other, rather than right in the middle. This way, a right-angled wedge breaks out and the other piece can be removed with a second blow. A blow in the middle requires more force and the fracture is less predictable. It takes a surprisingly hard blow with the hammer to break through a whole nodule, much more than would be needed just to remove a flake.

The nodule is held steady between the feet, and boots do not last long. David had leather work boots and had made a sort of leather sleeve to protect them, but the seams were still beginning to go. John preferred to buy cheap rubber Wellingtons: "They make your feet sweat, but you can have the best leather boots and they'll still get all cut up." Other protective equipment is simple: heavy leather gloves and goggles, or safety glasses. Bernard said they have respirators if they want them, but the ventilation in the open shed is good and none of the knappers was worried about dust. They cut themselves sometimes, but so far no one
Figure 6. David breaking a nodule with hammer and chisel. Note the vertical blow and position of the chisel in a concavity.

Figure 7. Bernard knapping a square builder.

has been badly cut. The most dangerous operation is moving and sorting flint, rather than knapping. If you pick up sharp-edged and heavy pieces carelessly, they can cut right through a leather glove.

Knappers sit around a pile of raw nodules; spacing between knappers is determined by the trajectories of flying flakes and the organization of their flint. Each knapper has a 1-ton polythene bag to his left for the finished flints, and on his right a wheel barrow for small waste and another bag for large waste. Knappers prefer smaller nodules, not too thick, and no more than about 30 - 40 lbs. David showed me how hard it is to break a big, solid nodule — it took several forceful blows, although it finally did split. This process is not only hard work, but is hard on chisels. Really
large pieces of flint are simply put in large waste piles. Larger chunks with irregular fracture faces or brown-stained natural fractures also go on the waste pile. The small waste, of which there is relatively little, goes directly onto the wheelbarrow or is shoveled off the floor onto it and ends up in a pile to be backfilled into the quarry. In the 18th and 19th centuries, some waste from the gunflint industry was sold for use in glass and fine pottery (Shepherd 1972; Mason 1978). A water-powered mill that ground flint for the ceramic industry around Stoke-on-Trent is preserved at Cheddleton. Today there is no longer any industrial market for flint waste, and the knappers had never heard of it being used for glass.

One of the big polythene bags holds a ton of finished flint. Knappers are paid by the ton and, in a normal day, each knapper expects to turn out a ton of finished flint. Bernard says they can earn £300-500/week, which is good money compared to farm labor at about £180/week. He hires the others and, although the pay is good, it is not always easy to find knappers, because the work is arduous and somewhat boring. On the other hand, they work relatively short hours — 8:00 or 9:00 a.m. to 3:00 p.m., minus breaks. It typically takes around five hours of work to make a ton of flints, and by the end of that, one has had about enough. The knappers can talk some, but it is rather noisy with three of them working and they can’t sit very close to one another, since the various bins of flint take up room, the main pile of raw material is quite large, and flying chips are a danger.

There are also advantages. The work is not seasonal, since they can knap in the open-fronted shed through the winter. As David said: “You’d be surprised how warm you get making a ton of flints. Sometimes in the summer I want to strip off, but of course you can’t.” Sometimes the building trade falls off in the winter and they might take a week or two off, but they essentially work when they like, so they have some independence and shorter, more adjustable hours than most jobs.

MARKETS

There are two main markets for the Castle Acre flints. Most of their finished flints go to builders and building supply dealers in the south of England, where flint facings are still needed to follow traditional styles, to fit into existing architectural environments, or to repair and remodel old buildings. Bernard estimated that they sell about 800 tons a year, at around $210 per ton. (At the time, one British pound exchanged for about $1.65 U.S.).

A second major buyer is Dorset Flint and Stone Blocks Limited. This firm produces Dorset Flintblocks, “product of the past with a future,” by setting knapped flints in one face of a cast cement block. This overcomes some of the disadvantages of traditional flint building. Irregular flints can make unstable walls, requiring lots of mortar, and were built no more than about 9 courses high in a day, to allow the mortar to set before building upward. Moreover, current building codes allow flints to be used only as facings on a wall of more modern materials. “Flintblocks” are made to standard size and can be used like any cement block; if properly pointed, the regular joints are not too visible. The resulting face of knapped flint looks similar to traditional walls, although a knowledgeable eye can tell the difference. The buildings shown in the Dorset Flint brochure are attractive. Some other builders make prefabricated concrete sheet walls with flints set in them. Dorset Flint and Stone Blocks buys some finished flints from Castle Acre quarry, but also takes the large waste flint, which they crush with a hydraulic guillotine and use for less regular facings. Dorset in turn supplies builders in the south of England but, according to Bernard, also exports quite a lot to Ireland and recently sold an order in the U.S. to build a “traditional English pub.”

OBsolescence, Survival, and Re-invention

In the 1800s, gunflint knappers had developed an extensive body of specialized knowledge and an esoteric vocabulary of terms for qualities and quantities of flints, knapping techniques, and tools (Skertchly 1879). The workers at Castle Acre reflect only a little of this. Their specialized knowledge includes the techniques they use and they have a lively appreciation of the varying qualities of flints and their places of origin. As was probably true also in the past, they have little formal geological knowledge. They have talked to other archaeologists and geologists visiting the quarry, and know that flint is silica and that sponges were probably involved in its formation. They are aware of the former gunflint industry in the district, and the Neolithic mines at Grimes Graves less than 20 miles away, but have not investigated very much. David remembers visiting
the English Heritage site and visitor center at Grimes Graves as a school boy, and plans to take his children sometime. They were curious to know if we had flint like theirs in the U.S., and were intrigued by the differences in tools and techniques when I made them a handaxe with an antler billet.

David and John told me of a kind of flint they called a "bermuda," which they said was like a large cone, but hollow. They got this term from a recently visiting geologist: it ought to be "paramoudra," a vertical flint up to two meters long, formed around an ancient burrow (Cox et al. 1983:2; Wood 1996:87). When I asked if they had names for any other special kinds of flints, David said "No, but geologists do." John grinned and said "Yes, we call them all sorts of names in the working day." Unfortunately, I was not there long enough to expand my vocabulary of British profanity.

Although they follow in the footsteps of ancient industry, the knappers at Castle Acre are few and recent. An interest in "heritage," and the preservation of old buildings, and in mimicking traditional building styles for modern use appears to be keeping alive some remnants of an old craft. The current building flint industry reflects patterns common to other obsolescent industries, and innovation suited to its modern setting.

Compared to the gunflint and building flint industries of the 19th century the modern knappers are but a vestige. As well as a range of gunflint sizes and qualities, the Brandon knappers reported by Skertchly (1879:34) recognized several different kinds of building stones, which they made to size as ordered. These included "Black-faced" and "Mixed coloured" builders, both square and round, with an additional distinction made between those whose face was a smooth fracture plane, and lesser quality "chip-backs" whose faces had to be leveled by flaking. All these were made from exhausted gunflint cores; in addition, "rough builders" were made from irregular waste produced in preparing cores. The current product is closest to these "rough builders," although Mr. Archer occasionally makes forms similar to the higher quality builders.

Obsolescent industries often show a reduction in the variety of products, the number of people involved, and the geographical spread of the processes and products (Gould 1981; Whittaker 1994:50–54). Tools become simplified and reduced in variety, and supporting industry and social settings atrophy and are lost. We see this at Castle Acre, where the simple techniques and limited products do not require the kinds of specialized communication used by the gunflint knappers. There has been neither the time nor an adequate number of knappers to create communities centered around a trade, as Brandon was around gunflint making.

Although the Castle Acre knappers are following a traditional trade, it is not strictly correct to see their practice as a surviving tradition. Their techniques have been reinvented, rather than handed down. When Bernard started knapping, he was responding to an opportunity, reviving an industry he knew had been there for donkey's years," but in his own way. He learned the chisel technique from a firm in London that was processing Scandinavian flint at the time. Now even that technique may be superseded. Between my visit and this publication, the quarry has acquired a "guillotine," which Bernard says is more efficient and leaves less waste, although his workers will still be necessary. The use of prefabricated cement blocks and panels incorporating flint facing is another example of how a small industry, based on a dying tradition, uses new concepts and adapts to modern circumstances.

Stone tools are a byword for obsolescence and a symbol of antiquity. What could be a more appropriate place to examine the patterns of small, dying industries than in the few surviving lithic traditions? The Castle Acre knapping industry, partly traditional and partly re-invented, reflects both continuity with the past and innovation to fit modern times. The social and technological elaboration of the earlier trade died in the late 1800s and has not been revived. Knapping building stone by hand is an eccentric enterprise carried on by a few practitioners, and supported in a limited marker by a popular fondness for historic buildings.

ACKNOWLEDGEMENTS

Caroline Wickham-Jones "discovered" the Castle Acre knappers, and set me on their track. This paper is largely my attempt to explain for others what Bernard Archer, David Wag, John Moore, and Robert Hunt told me about the craft. Meeting interesting and hospitable people like them is the best reason I can think of for being an anthropologist. My thanks also to the owners of Needham Chalks, Ltd., for allowing me to investigate their business and distract their employees.
Kathy Kamp, Nick Kardulias, Lee Patterson, and others commented on previous drafts of this article. Amy Henderson drew the map.

NOTES

1. For those not familiar with British flint, some representative Munsell colors are: for Brandon floorstone, 2.5YR 2.5/0 black, and for most of the others mentioned, 2.5YR 3/0 very dark gray to 6/0 gray.

REFERENCES

Bristow, C. R.

Chatwin, C. P.

Clay, R. C. C.

Cotterell, B., and J. Kamminga

Cox, F. C., R. W. Gallois, and C. J. Wood

Evans, Sir J.

Gould, R. A.

Harris, A. P.

Mason, H. J.

McNabb, J., and N. Ashton

Orna, B., and E. Orna
1984 Flint Building in Norfolk. Running Angel, Norwich.

Shepherd, W.

Sketchely, S. B. J.

Stevens, E. T.

Whittaker, J. C.

Whittaker, J.C., and M. Stafford

Wood, C. J.