

# The Quarried Face: evidence from Dorset's cliffstone quarries

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## Abstract

*This paper describes current fieldwork, which examines the evidence for quarrying techniques, stone dressing and transport, and seeks to show the potential archaeology of disused quarries. The main sites considered here are along the Purbeck coast - where these workings are also underground.*

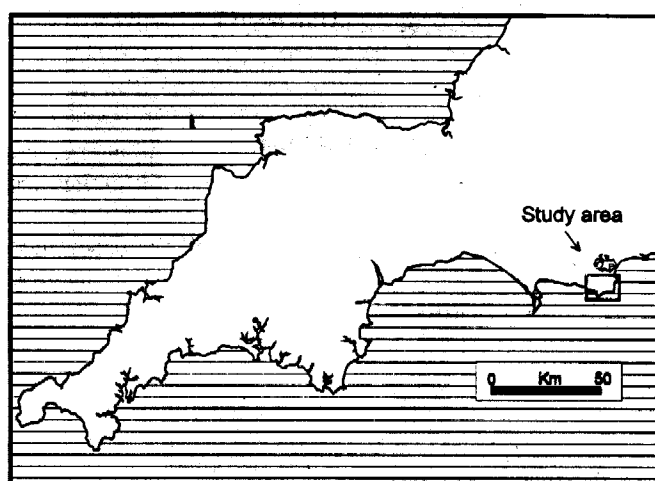


Fig. 1. The study area. Location.

## INTRODUCTION

Quarrying is one of our most important and ancient extractive industries, and yet its image is lowly in comparison with, for example, metal mining in the South-West. Modern working methods are partly responsible for this, as also is the view that an abandoned quarry, from which all cranes, machinery and tools have been removed, has nothing more to say to the industrial archaeologist; at best it presents a playground for the geologist.

So, what is the archaeology of the quarried face? This paper sets the record straight and explains how diligent investigation can help the interpretation of a quarried landscape. Examples are taken from historic coastal quarries in a county famous for its limestone quarries, particularly Portland (where further research is proving fruitful). These are 'traditional' quarries - worked manually, unlike today's brutal mechanical methods. Here and elsewhere, stone has been extracted by hand tools since at least Roman times and the old methods remained basically the same up until very recently.

Dorset's cliffstone quarries represent some of the few limestone quarries to yield evidence for (1) working methods, (2) cranes for stone shipment, and (3) quarrymen's tally-marks and carvings of ships. Because of the nature of their location, not all sites are readily accessible, so particular interest lies in those that can be seen in safety.

## LOCATION AND GEOLOGY OF PURBECK

The Isle of Purbeck on the south coast of Dorset is noted for its scenic beauty, both inland and coastal. In terms of mineral industries, this small district has seen quarrying and mining for oil shale, ball clay, brick clay, and limestone. All except the first still take place today.

The geology of the southern part of Purbeck belongs to the

Jurassic period, and its varied limestones of the Purbeck Beds have been quarried since Roman times. Underlying these are the Portland series, known here as the Purbeck-Portland stone. These are still quarried where they outcrop inland at Swanworth and St Aldhelm's Quarries, but were formerly worked where they are exposed along the cliffs for 7.2 km from St Aldhelm's Head to Durlston Head. The beds, which vary in name and thickness, are well seen in the quarry faces at Seacombe and Winspit. According to Hutchins (1870, 687) and Arkell (1947, 99-102), the sequence at Seacombe Quarry is as follows:

| Portland Beds             | thickness (m) | notes                              |
|---------------------------|---------------|------------------------------------|
| Shrimp Bed                | 3             |                                    |
| Blue Bed)                 |               |                                    |
| White Cap) Titanites Bed  | 3             |                                    |
| Spangle Cap)              |               |                                    |
| Pond Freestone            | 1.5           | (oolitic freestone)                |
| Chert Vein                | 1.5           |                                    |
| Listy Bed                 | 0.3           | ('breaks easily')                  |
| House Cap                 | 2.6           | (3 beds; forms roof of galleries)  |
| Under Picking Cap         | 0.9           | (cut to waste to get to freestone) |
| Under or Bottom Freestone | 2.4           | (two freestone beds; bottom best)  |
| <b>Floor of Quarry</b>    |               |                                    |
| Cherty Beds               | c.1.4         | (unquarried rock to sea level)     |

It was because of the expense of removing the great depth of stone above the good quality Under Freestone that the 'cliffstone' quarries were soon worked inwards from the cliff in underground galleries.

The quarries in this study are confined to a 2.5 km stretch of coast shared by the parishes of Worth Matravers and Langton Matravers (Fig. 2). From the west, they are:

- West Winspit (SY 97657600)
- East Winspit (SY 97807610)
- Winspit East End (SY 97947625)
- Halsewell (SY 98057640)
- Seacombe (SY 98357660)
- Seacombe Gallery (SY 98547651)
- Cliff Fields (SY 98807668)
- West Hedbury (SY 99057674)
- Hedbury (SY 99207680)
- Topmast (SY 99477680)
- Dancing Ledge (SY 99707690).

There are also small attempted quarries in the Halsewell-Seacombe and Gallery-Cliff Fields cliffs.

There is some confusion in the literature regarding the name of some quarries. For example, West Hedbury is also known as Mike's Corner and Quarry (after Michael Bower, the quarrier), while Topmast may be identified with either Smokey Hole or Scratch-Arse. I have kept to the safer names!

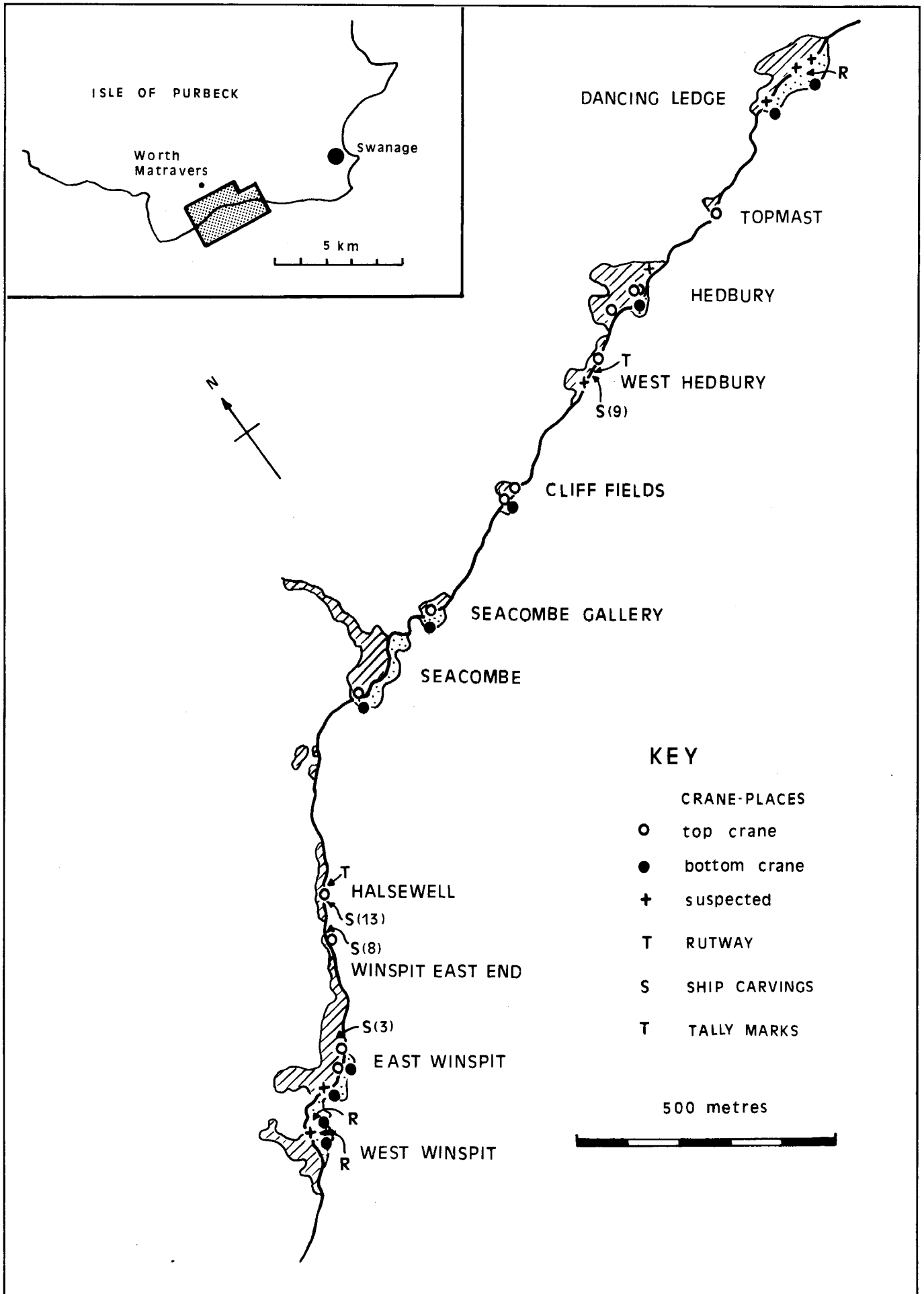


Fig. 2. The location of Dorset's cliffstone quarries.

## HISTORY

Stone has been quarried on Purbeck since the Romans worked the famous Purbeck marble, a stone which became important again in medieval times. By the 17th century, there was a regular trade in Purbeck stone from Swanage to London, which continued down to the early 20th century. This stone, made into kerbs, pavements, etc, was worked in shallow open quarries and underground from inclined shafts (quarrs), each operated by two or three men (see Benfield, 1990; Saville, 1986).

The Purbeck-Portland freestone from the cliffs was also being worked by the end of the 17th century. Most references to early cliffstone quarrying concern Winspit, which was worked on both cliffs where the valley of Winspit Bottom meets the sea. Legg (1972, 36) suggests that quarrying probably started here soon after 1673. By 1719 there was a seven-year lease to work 'Winchpitt Quarry & the cliffs thereunto adjoining' (DRO: D/RWR/M9). In 1750-2 the Trustees of Ramsgate Harbour employed 50 ships to carry 15,000 tons of stone from Purbeck (Hutchins, 1870, 657). Not all of this was from the cliffs, but the quarries all along the coast must have received a considerable boost at this time and were well established when John Smeaton visited Purbeck in May 1756 in search of suitable stone for his Eddystone Lighthouse, and later wrote:

I was carried to see the quarries where a species of stone was got in blocks, much of the nature and colour of Portland, which is called Purbeck-Portland. These quarries are situated at, or near the point of high land, almost three miles from Swanage, called St Alban's Head. The strata of merchantable stone lie here in the upper part of the cliffs, as they do at Portland; but having more cover, they are in some measure worked underground. This stone is of the like nature, and puts on so much the appearance of the Portland, that it is often used in lieu of it. It is however inferior in colour, harder to work, and according to the information I then got, not in general so durable.

Although cheaper, Smeaton rejected the Purbeck cliffstone in favour of Portland because he felt it a less reliable source, there being fewer quarrymen and shipments were uncertain (Smeaton, 1791, 66-7).

A map of 1772 shows that 'Freestone quarries' were already quite extensive on both sides of Winspit (DRO: D86/E16/14), and in 1786 Titus Chinchin applied to 'open an Quarry in the Clift on the East part of Windspit Quarry' where he hoped to find more stone (DRO: D/RWR/E14/55). This was six months after the terrible wreck of the East Indiaman *Halsewell*, with a great loss of life below these very cliffs, when quarrymen are said to have lowered ropes to help the survivors.

Records in this period show that ashlar, facing blocks and backing (rubble blocks for infilling) were being shipped for docks at Ramsgate, Portsmouth and Dover (DRO: D/RWR/E14/8 & 18). Other cliffstone products included sinks, troughs, field rollers, saddle stone and caps. There is an account of stone quarried and shipped in 1805-12 at Tilly Whim near Durlston Head, 3 km east of the quarries described here (Robinson, 1882, 94). This cliffstone quarry closed in 1812 but was opened later in the century as 'tourist caves' by George Burt.

Throughout the 19th century the quarries worked intermittently according to demand, but as trade diminished

they became more and more deserted. When George Harris came in September 1893, Seacombe was the only cliff quarry out of six in regular work. There were normally eight quarrymen, but only the owner Ambrose Bower was present. The quarry had been in Bower's family for over 100 years and was worked partly underground. Harris was impressed with the stone at Seacombe and felt it should be better known:

When one remembers that sea carriage is within a few yards, I must say I cannot understand why these quarries are not opened up more extensively. Bower, who seemed a hard working man, and was making a stone pig-trough when I arrived on the scene, told me he wanted more capital! (BGS: 1/969, 200).

Dancing Ledge Quarry was worked in the open by James Webber and two or three men, but activity was at a standstill in 1893. Harris also mentioned Halsewell and Winspit quarries but did not go there. The extent of the East Winspit Quarry changed little between 1886 and 1900 (first and second edition 1:2500 O.S. map, Dorset Sheet LIX.3). There was a last attempt to work Seacombe Quarry on a commercial scale, in 1923-31, when the Dorset Quarry Co. Ltd. invested in compressed air drills and at least four steam cranes around the quarry. Up to 36 men were employed in 1927, but the firm went into liquidation four years later. Informative photographs show the quarry at work in 1930 (Stanier 1995, 69-71).

The last cliff quarrying took place at Winspit, where most activity was confined to West Winspit Quarry. During World War II, thousands of tons of stone from here were crushed for roadstone and aggregates for building roads and airfields. Thereafter, West Winspit returned to small-scale working by R. Harris, and closed in about 1953.

## WORKING THE STONE

Quarrying was begun most easily where the coast was intersected by a valley such as at Winspit or Seacombe. Workings then extended along the cliffs, but elsewhere it was sometimes necessary to descend on ropes to the more isolated quarries, from which the only means of exporting stone was by sea.

The Pond Freestone and Under Freestone were the most valued stones, and it was often expedient to work them in galleries into the cliff. There are old galleries in the Pond Freestone at West Winspit, and East Winspit where the working has collapsed into a lower working, but most galleries were cut in the Under Freestone. The early quarry galleries were connected by a narrow ledge along the cliff, as can be seen at Winspit East End and Halsewell. To extend the larger open quarries inland, the supporting pillars of old underground workings were blown up to collapse the roof. The fallen stone was then picked over before underground galleries commenced again. The stumps of original pillars survive at East Winspit (Fig. 3). At West Winspit and Seacombe the underground galleries go back 60 metres or so and may be 8-10 m wide.

Pillars or 'legs' of uncut rock were left to support the roof of House Cap. Legs of stone blocks with occasional timber wedges were put in by the quarrymen where the rock was more fractured (Plate 1); several of these have collapsed or are about to. Where the rock is more stable at West Winspit, vast caverns have very little support. All the quarries were worked down to the Cherty Beds, which form the quarry floor; the beds are exposed in all cliff faces down to sea level. To quarry the two beds of the Under Freestone, Underpicking Cap was first

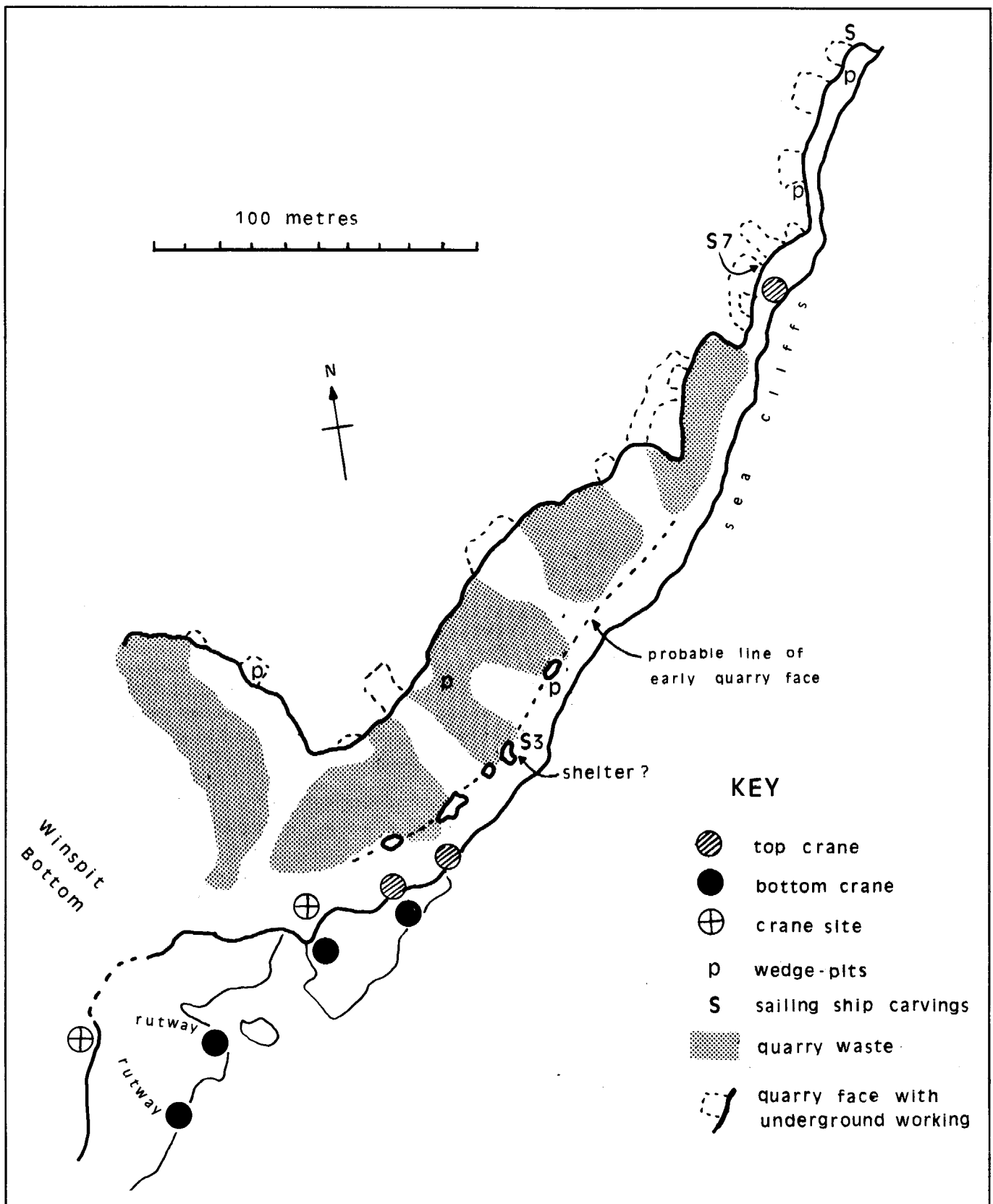
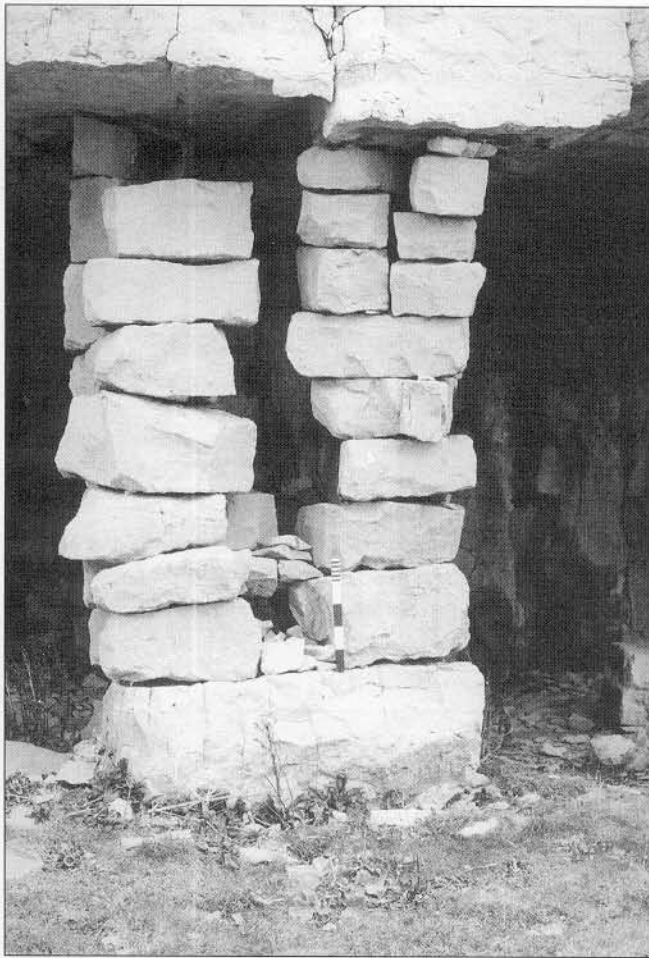


Fig. 3. Archaeological features at East Winspit and Winspit East End quarries.

blown out with gunpowder, taking care not to damage the good stone below and, if working underground, the Cap Stone above. Formerly, 'it was picked out by a kind of pickaxe, which was a very tedious process' (Hutchins 1870, 687). There is some evidence of drilling for blasting the Cap, but this study has concentrated on the wedge-pits described below.

While also taking advantage of natural joints, the quarrymen extracted the stone in blocks by cutting a line of grooves or wedge-pits with a hammer and punch. Wedges were placed in the pits and hammered in turn to cleave the rock. The pits were

cut deep and narrow enough so the point of a wedge did not touch the bottom, or otherwise the wedge would spring out when struck. Most difficult and awkward to cut was a line along the floor to lift the whole block. This had to be horizontal or the block would cleave at an angle and be wasted. Once successful, vertical lines of pits were cut in two directions to shape out the block. The wedge-pits were in part replaced by plugs and feathers inserted into holes made by compressed air drills during the last working at Seacombe in the nineteen-twenties. This ancient method of quarrying stone must have



*Plate 1. Shaky legs at Seacombe Gallery Quarry. Note inverted wedge pits on fourth block down right hand leg. Scale 0.5m.*

hardly changed for centuries, and although modern drills have taken over today, the principle is the same.

The size of stone obtainable varied between quarries, but Seacombe could provide blocks up to 15 tons. These blocks were split with wedges and scappled (roughly squared) to shape. All the quarried stone was dressed in the open or in the sheltered entrances of the galleries. One large job at Seacombe undertaken by the quarryman Ambrose Bower in 1871 was a 3½ ton trough measuring 8' x 4' x 4' (2.4 x 1.2 x 1.2 m) for the North Woolwich Galvanising Works in 1871 (Legg 1972, 36).

### THE EVIDENCE

Despite the extent of quarrying and size of some quarry faces, there is relatively little evidence for the methods of stone extraction, which would seem to confirm the view that a quarry yields little of interest to the archaeologist. However, diligent searching can reveal marks and more.

Rarest, but most easily detected, are the complete wedge-pits - cut but abandoned before they were used. The quarry face of the last working at Seacombe (1923-31) has vertical lines of these pits which are so regular that they look machine-cut. Cruder pits are seen on the sea-washed ledges below Seacombe, where thin beds of limestone in the Cherty Beds were considered worth removing. Where stone has been detached from the quarry face, the remaining open or half pits are less easy to detect but are more informative. These tapering half pits show tool marks and it can be seen how they relate to joints and bedding in the limestone. They are located at the periphery of most quarries and are likely therefore to

date from the earlier workings before the workings extended landwards. The different sizes and types of wedge-pits which have been recognised may reflect individual quarrymen or local conditions, so that any attempt to use their style for dating should be treated with caution (Plate 2).

### TRANSPORT OF STONE

Quarried stone may have been shipped as scappled blocks, but more often it would have been shaped into products, such as ashlar, troughs, etc, and sent out from the quarry in a finished form which bore a higher value. Stone could be sent inland from Seacombe and Winspit for shipment from Swanage, but it required a difficult climb to over 125 metres. In 1893, Harris noted that some stone from Seacombe was carried inland to Swanage and elsewhere, but the great expense in using horses to drag the stone up the 'fearful precipitous road' was said to be one reason why it was so little known (BGS: 1/969, 201). The inland tracks seen today were mostly made-up for motor vehicles during the developments of the nineteen-twenties and thirties at Seacombe and Winspit. Access to and from other quarries was less easy. A stone for a roller set in the ground above West Hedbury Quarry suggests an incline was tried here. Such stones held a roller to guide the haulage chain at the top of the inclined Purbeck stone quarries which were common around Langton Matravers and Swanage (Saville 1986, 10-19). However, there is now no trace of a capstan round at the top and had it worked there would still have been a very steep climb inland.

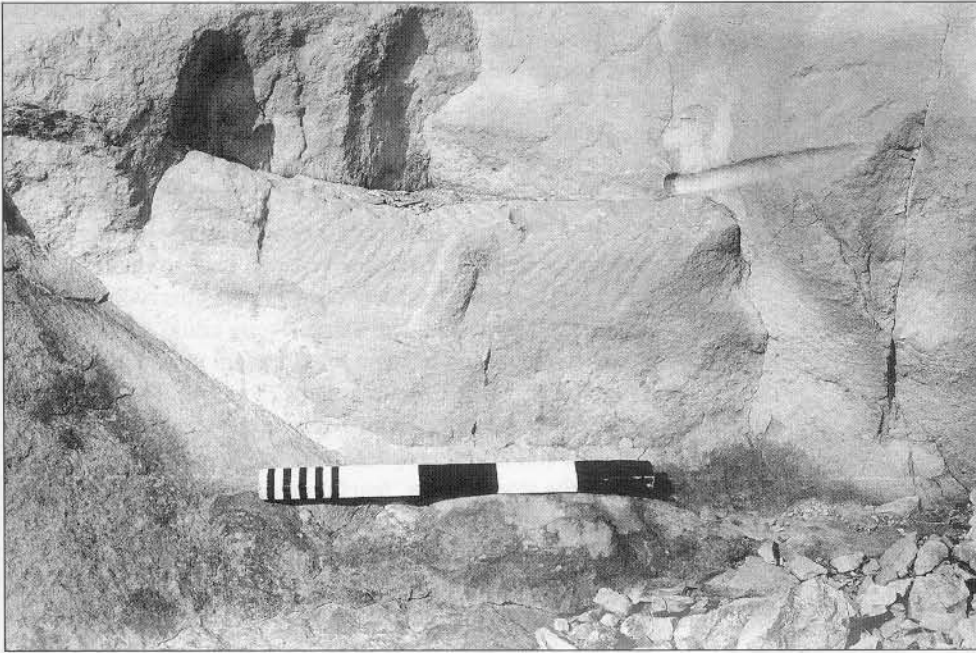
### STONE SHIPPING

It is clear that most stone was shipped off directly by sea because of the expense of land carriage. In 1756, Smeaton noted that the cliffstone quarries could never compete effectively with Portland, where the stone was superior and shipping facilities far easier, because:

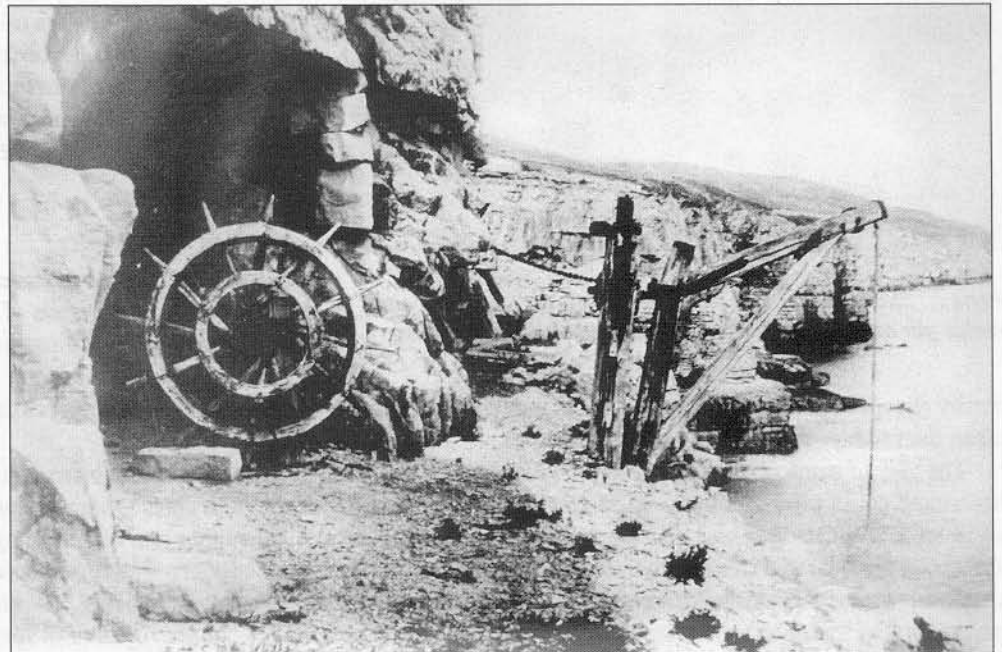
the workmen are obliged to let it down with ropes from the place where it is wrought, to the surface of the sea, either into vessels lying at the foot of the cliffs where there is deep water, or where there is a dry strand at low water; but there being little shelter from the winds and seas, this can only be done in very moderate weather, and particular winds; wherefore the shipping it there, must necessarily be somewhat precarious (Smeaton 1791, 67).

Shipping was largely a summer trade and was most difficult at Winspit and Halsewell; in comparison, Seacombe, Hedbury and Dancing Ledge were considered better landing places. Down to the end of the 19th century, this shipment of cliffstone involved the expense and hazards of multiple handling in dangerous or risky conditions. The stone was first lowered from the cliffs by crane, and then sometimes by a second crane into strongly-built flat-bottomed craft which were about 7 metres long and pointed at both ends. In calm conditions these came alongside the natural ledges which form a convenient 'quay' at low or medium tide, and took on up to 6 tons of stone. They were rowed by two men with sweeps (a lug sail was available for suitable conditions) out to a waiting barge or ketch - a vessel which often towed them around from Swanage. The stones were once again transhipped by man-handling or using the ship's own gear. It is likely that several of these craft met an untimely end with their stone cargoes beneath the cliffs.

The tradition of shipping from the cliffs was continued briefly in the early 20th century. It is said that E. Burt



*Plate 2. Wedge-pits and blast hole at Seacombe Quarry. Scale 0.5m.*



*Plate 3. Ruinous crane on narrow quarry ledge at West Hedbury, c.1900.*



*Plate 4. Top crane-place at Hedbury Quarry.*

attempted one season to ship stone with a derrick crane (brought overland in parts) from the west end of Dancing Ledge. A barge was loaded and towed by tug around to Poole, where a crane transferred the stone to rail for carriage to a stoneyard in Swanage, a total journey of 47 km, yet just 3 km from the quarry! In the 1920s, another derrick at Seacombe loaded barges with stone blocks for building the training wall at the entrance to Poole harbour.

### CRANES FOR SHIPPING STONE

The name Tilly Whim near Swanage would seem to refer to the crane (or whim) used for lowering stone over the cliff into boats. In 1882, the ledge here bore traces of the 'attachments of rude cranes, such as are still used in workings more to the westward' (Robinson 1882, 93). Nine years later, George Harris found at Dancing Ledge Quarry 'old fashioned wooden cranes - old and rusty here - erected for dropping the stone alongside into barges, the ship standing out to sea a short distance.' (BGS: 1/969, 198). A fine painting by H.T. Wells of about 1870 shows a crane at Hedbury Quarry, lowering a stone while a ketch-rigged vessel is taking on stone from a small boat in the sea. Smaller blocks or kerbs are stacked behind the crane ready for shipment. A stone sink is being made and an ashlar block is being unchained from a stone cart. The picture also shows the quarrier Thomas Chinchin Lander and his sons Albert and Thomas. A photograph of c.1885 shows a dilapidated but similar type of crane at West Hedbury (see Haysom & Bragg 1991, 152). Plate 3 is a later view.

Traditionally, the cranes were made of shipwreck timber, this being a convenient material readily available. A king-post set in a square hole on the cliff edge supported a gibbet-like jib,

which had to raise a stone just enough so it could be swung out through 90 degrees and lowered. A separate windlass was controlled by a large wheel like a ship's wheel, and the whole apparatus was anchored firmly.

### CRANE-PLACES

Cranes were erected in two positions. Top cranes at the cliff edge of the quarry floor lowered stone directly into vessels below (if the cliff was vertical or overhanging), or down to a flat ledge just above the sea where there was a second crane for loading vessels. The more exposed bottom cranes were probably dismantled in stormy winter months. In both cases, the timber cranes were set in square holes chiselled from the rock.

Many of the crane-places survive, attesting to the skill and daring of the quarrymen, and at least 23 were located during the survey between West Winspit and Dancing Ledge (see Fig. 2). The evidence for a crane-place is typically a large square-cut hole (showing tool marks) at the very edge of the quarry floor above the sea cliff. There is no standard size but sides may be up to 55 cm and depth 50 cm. Other holes and occasional ironwork nearby were anchor points for the crane and the winch which stood a little behind. They are difficult to interpret, especially where some have been re-cut for replacement cranes. Some holes have been lost through cliff falls, most notably at East Winspit where large fissures are opening up behind some crane places (Fig. 3).

Some top cranes which lowered stone directly to the sea had a 15-metre free fall off overhanging cliffs, as at Hedbury and West Hedbury. Other quarries had shorter drops, such as 6 metres at the west end of Dancing Ledge. To the casual



Plate 5. Holes for bottom crane-place and tramway(?) structure on western Seacombe ledge, 12m below.



Plate 6. Rutway at Dancing Ledge. Scale: 0.5m.

visitor the most notable feature in Hedbury Quarry is an old cannon said to date from 1803, but the remains of cranes can be seen at the cliff edge. Not far from the cannon is an obviously shaped stone slab with square-cut holes. This unique feature overlies the hole for an earlier crane cut in the quarry floor (Plate 4). The site is said to be the one depicted in the period painting by H.T. Wells described above. This crane lowered stone 8 metres to a ledge where a bottom crane continued the work to the sea. The position of the bottom cranes varied, being dependent on whether a landing place was possible along the exposed coast.

An extensive sea-washed area in the cove at Seacombe may have been partly levelled by quarrying. It is said that barges went alongside with care on the east of the main ledge near a cave (Bruce 1989, 41-2), but the platform surface is extremely rough and there is now no evidence of a crane here. A far better shipping place was on the west side, where:

a crane is fixed at the quarry to lower it on a rock which is nearly level with the surface of the water, whence another crane takes it into boats, which carry it into vessels at some distance (Hutchins 1870, 687).

The archaeology of this site is most instructive. There are holes marking a crane-place at the top above a shear drop of 12 metres to the lower ledge. As at some other sites, there is evidence that the cliff face (Cherty Beds) has been cut and straightened to allow stones to be lowered unhindered. The lower ledge has been quarried too, to form a levelled area to make handling of the stones easier and perhaps for stockpiling during calm weather. The bottom crane position can be seen, with a line of three sets of square post-holes leading from the cliff base across the ledge to the crane position (Plate 5). It is suggested that these may have supported a raised platform or tramway to carry the stones across the ledge.

### RUTWAYS

There are other places where a ledge is so wide that the shipping point is some distance from the foot of the main cliff, so the lowered stones had to be carried to the shipping crane. The best known example is at Dancing Ledge, a popular spot for summer visitors because its broad bench gives rare access to the water. Here there are traces of rutways, deliberately cut in the surface of the ledge to guide the wheels of a 'horn cart' which had curved shafts by which men dragged the heavy load. Two top cranes must have lowered stone to the ends of rutways which join after 11 and 14 metres and run on a further 19 metres to the end of the sea-washed ledge where square holes mark the shipping crane. On both the branches a smooth crossing of open cracks was achieved by bolting down a wooden (?) block into a rectangular section recessed into the rock. The ruts at Dancing Ledge are 5-10 cm deep and 20 cm wide; the gauge between centres is 80 cm (Plate 6).

There are also rutways on the sea-washed ledge at West Winspit (Fig. 3). There is a 'dock' here with deep water alongside but a hazardous submerged rock at the approach. A rather crude rutway of c.50 cm gauge leads to a crane-place here. Just to the west is a better rutway (later date?) 21 metres long with ruts 30 cm wide and a gauge of 80 cm, as at Dancing Ledge. It starts in a flat area, partly quarried, beneath the probable position of a crane, and runs for 21 metres to a crane-place which is flooded except at low tide. This is a more exposed ledge but has deeper water. Although rare, these interesting rutways are not unique. Several have been

recognised along the Yorkshire coast between Saltburn and Scarborough, where most are related to the alum industry, but they have a much larger gauge between centres of 1.32 metres (Owen 1991, 126-132; Marshall 1995, 55-58). There is another example at Prussia Cove in Cornwall.

### QUARRY CARVINGS

At least 33 line carvings of period sailing vessels - mostly single-masted smacks, as well as two-masted ketches, brigs, schooners and full-rigged ships - can be found just inside the entrance of galleries at Winspit East End, Halsewell and West Hedbury (Figs 2 & 3). Although noted in the literature, these have never been fully recorded. They are said to have been carved in idle moments when the quarrymen were waiting for suitable loading conditions. Several may represent the vessels which shipped the stone, while others could be types seen passing up or down channel. What appear to be tally marks have been cut near these carvings at Halsewell and West Hedbury (Fig. 4). Three carvings at East Winspit are on the stump of a pillar at the entrance to a destroyed gallery. The western end of Halsewell Quarry was not visited during the survey, access being considered unsafe, but is said to contain the finest collection of all the line carvings, including the depiction of a warship (Legg 1984, 70). It is no wonder the quarrymen had the time to make them in these old workings above an exposed shore.

### CONCLUSION

There is more work to be done after this initial survey. Access is difficult at some sites, but the crane-places need to be surveyed accurately and an interpretation attempted. Some must represent several cranes and efforts at shipping stone over the years. It is unlikely that a standard size will emerge as the cranes were, traditionally, built of available timber and by individuals.

The archaeology of quarrying has 'considerable potential' (Crossley 1990, 211) and this paper is an attempt to realise that potential. For evidence of stone-cutting techniques - in this case wedge-pits - can similar field work be applied to other quarries? Or are the cliff quarries unique because their sites have restricted outward development which preserved traces of the older workings, whereas more accessible inland quarries continued to be worked, so that past evidence was destroyed or buried under waste? The cliff quarries have the added interest of the crane-places and carvings.

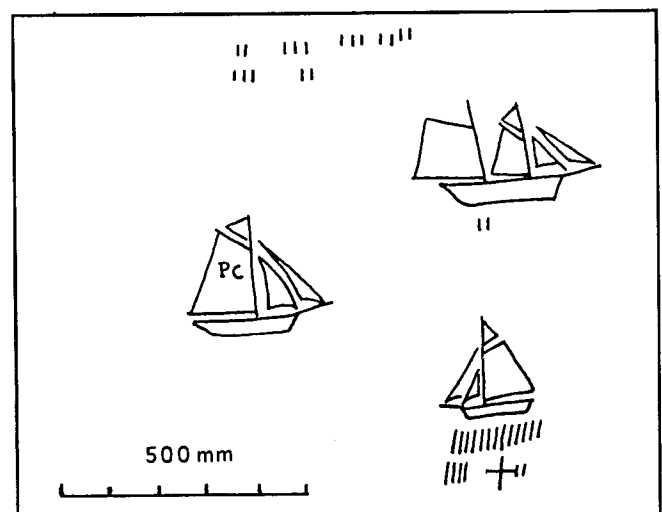


Fig. 4. Examples of ship carvings and tally marks, Halsewell quarry gallery.

## ACKNOWLEDGEMENTS

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