Proceedings of the Cambridge Antiquarian Society

(incorporating the Cambs and Hunts Archaeological Society)

Volume XCIII
for 2004

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Editorial

The first thing you will notice about these Proceedings is our leap (as a belated welcome to the 21st century) into colour, for our cover and a number of plates. This is not really an innovation: CAS had beautiful colour plates in 1883 and a few other 19th century volumes. At last this is affordable again, and the water colour drawings and photographs we wanted to show seemed to fully merit some extra expense. In future, we will look carefully at illustrations that would benefit from such reproduction and would be particularly keen to include fine examples of artefacts.

This volume contains some very substantial reports on archaeological work, for we are one of the few outlets available for full publication of excavations. It is refreshing to see that these all relate to recent work, not the backlogs that once were a feature of British archaeology. A quick look at the 'Fieldwork in Cambridgeshire 2003' section however reminds us what a small proportion of current work can be made available in this way. Of course, reports on all sites are produced and can be purchased from the relevant units or consulted in the county archaeological office. In future, these will also be added to a national data base known as OASIS, run by the Archaeology Data Service, so accessing this huge amount of data will eventually be much simpler. We aim to keep you abreast with such advances through our own website, *www.camantsoc.org*.

It was a great pleasure to be asked by the Cambridgeshire Local History Society to publish a short note on their superb photographic project, a worthy successor to CAS' similar project in the early party of the 20th century, now a much valued part of the Cambridgeshire Collection. This voluntary effort will likewise be used by those involved with the historic environment in years to come. The same Society asked us to include the list of recent additions to the Cambridgeshire Collection, compiled by Chris Jakes. This list used to be included in *Conduit* and has been much missed. It reminds us that our local historians are not far behind local archaeologists in their labours, a tribute to the floods of new data from an ever-active antiquarian community.

'Fieldwork', 'Reviews', 'Spring Conference report' and 'Conduit' are regular items we have managed to maintain – and which add to another substantial volume. This year, 'Conduit' was compiled at short notice by our redoubtable President, Tony Kirby, to whom we owe many thanks. In the nature of things this has to be done at the last moment, and even so many societies do not have a complete programme for the following year at the time we need it. We would therefore like to have a Supplement later in the year, as with original *Conduit*, but currently this is beyond our means. Perhaps we will have better news next year.

It remains to offer further thanks to our retiring President. Tony has taken the Society safely through two quite difficult years, and this October hands over to Nicholas James. Our Secretaries carry an even larger burden of work for the Society, of which organising nine lectures, often by speakers of national repute, is only one part. We are therefore extremely grateful to our retiring Secretary, Liz Allan, and to Janet Morris, who has now taken on the challenge. We must say a sorry farewell too to Don Fage, who has had the tough job of Registrar. It may also be noticed that we still have vacancies for Excursions Officer and for Editor of Conduit, so do contact us if you are interested in volunteering.

Alison Taylor
Editor

Cover illustration: Wandlebury, 'Lord Godolphin's house', drawn by Richard Relhan 1801

Surface scatters, rates of destruction and problems of ploughing and weathering in Cambridgeshire

Stephen G Upex

The results of twenty years monitoring of the destructive ploughing of archaeological sites in the middle Nene Valley are presented. Pottery sherd numbers, sherd distal length measurements, pottery movement within the soil and estimates of the 'volume' of destruction calculated by the increased weight of pottery within the soil are also analysed and discussed. Comment is also made on the effects of the applications of agriculture chemical fertilisers as a cause for the weathering of pottery within the soil. The results of this study indicate the deep ploughing continues to pose a major threat to the destruction of sites and that this destruction can be quantified.

Introduction

The destruction of archaeological sites by a range of agents is now well known but ploughing must still remain as the biggest single threat which is constantly eroding the upper layers of many sites (Macinnes 1993: Darvill & Wainwright 1994, 1995: Darvill & Fulton 1998, 1998a). Within the area of this study up to 80% of the total area of parishes is under cultivation (Foard 1979 fig 13). The national figures for England are much the same with the area of permanent grassland falling by 637,000 hectares between 1950 and 2001. This expansion of arable included an estimated 14,000 archaeological sites that came under the plough (English Heritage 2003). On some sites where deep ploughing has been periodically practised ploughing can extend 35–50cm into the soil and eat into the archaeological stratigraphy (CBA 2002). Farmers practise deep ploughing for many reasons. In some cases it can enrich soils with nutrients that have leached into the lower horizons of the soil profile; loosening soil to make a deep tilth for some crops is essential and on gravel soils farmers try to break 'iron panning' where iron minerals within the soil form a hard layer that can impede drainage.

This paper is a summary of work carried out on five sites from 1975 until 1996 in an attempt to quantify such destruction by sampling and quantifying pottery scatters within the topsoil. The project attempted to examine rates of site destruction in terms of the accumulations of sherds within the topsoil, pottery abrasion and degradation and movement of pottery within the topsoil horizons.

The locations of the sites mentioned in the text are shown in Figure 1. All sites are to the west of Peterborough, within the parishes of Elton, (Cambs), Haddon, (Cambs) and Fotheringhay, (Northants). Table 1 gives the sites' precise locations, and details related to geology, the length of time the sites were surveyed and bibliographic references.

All the sites have been monitored for rates of destruction of underlying Roman deposits and three sites have also been monitored for aspects of the destruction rates of Saxon material.

Methodology

At each site a 20m square was gridded in the same position each year from fixed points located in adjacent field boundaries. At Haddon (site A) the fixed points were left within the field next to the on-going excavation of the Roman and Saxon site (Upex 1993; 2002). Pottery was assessed within the square without being removed, as the monitoring progress was ongoing. There was no attempt to assess the type or dates of the pottery beyond the fact that it was Roman or Saxon, as these were the only categories that were being recorded.

Problems arose over the uniformity of the conditions under which assessments were carried out. The surfaces of the fields varied in evenness between years. In years when crops such as sugar beet or oilseed rape were being grown the soil was worked to a fine tilth, making pottery recognition easy. In other years the soil was not broken down as finely and could have restricted or inhibited pottery identification. The same variability was recognised with rainfall and soil moisture. Assessments were made where possible after heavy and recent rain which washed soil from pottery and made recognition easier. However it was sometimes difficult to ensure a standardised approach. Light intensity and cloud cover were also variable and could have influenced the ability of field workers to record pottery uniformly. Lastly there was variability between people carrying out the work.

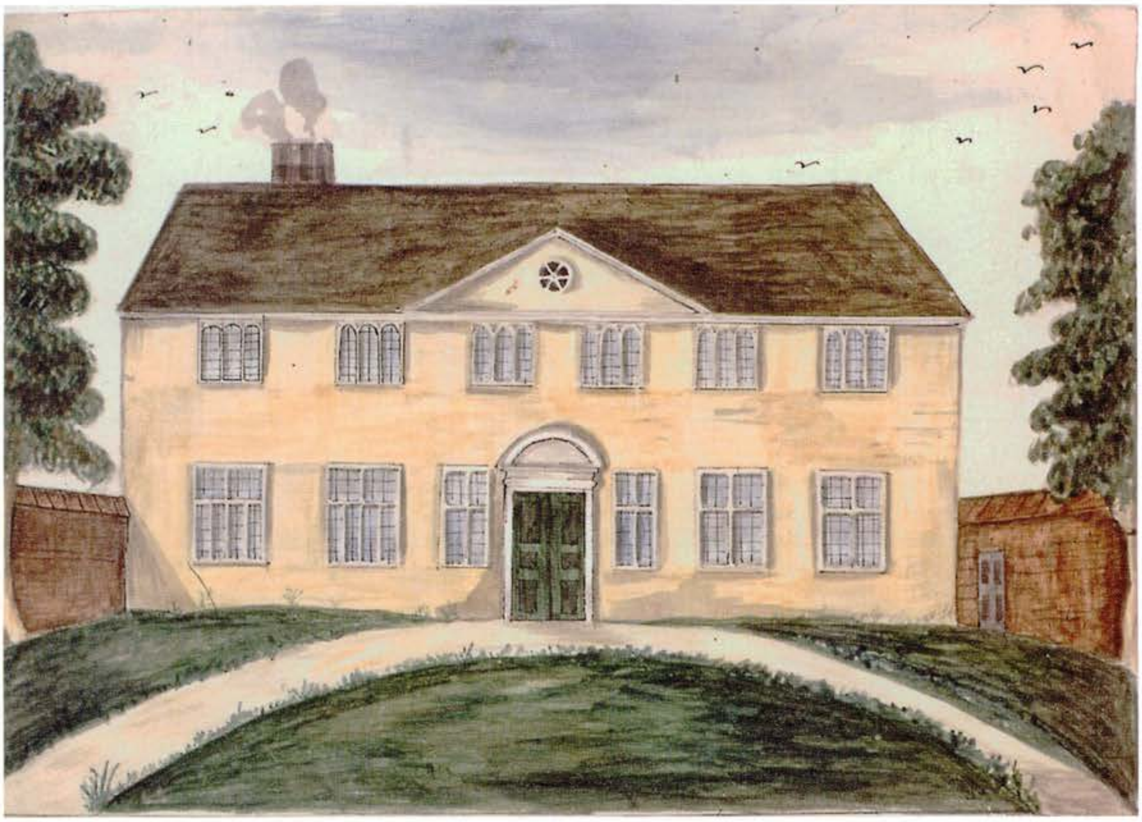


Plate 1. *Barham Hall, Linton, drawn by R Relhan.*

Plate 2. *Bourn Hall, drawn by R Relhan (1819).*

Plate 3. *Childerley Hall, the parlour wing, drawn by R Relhan (1808).*

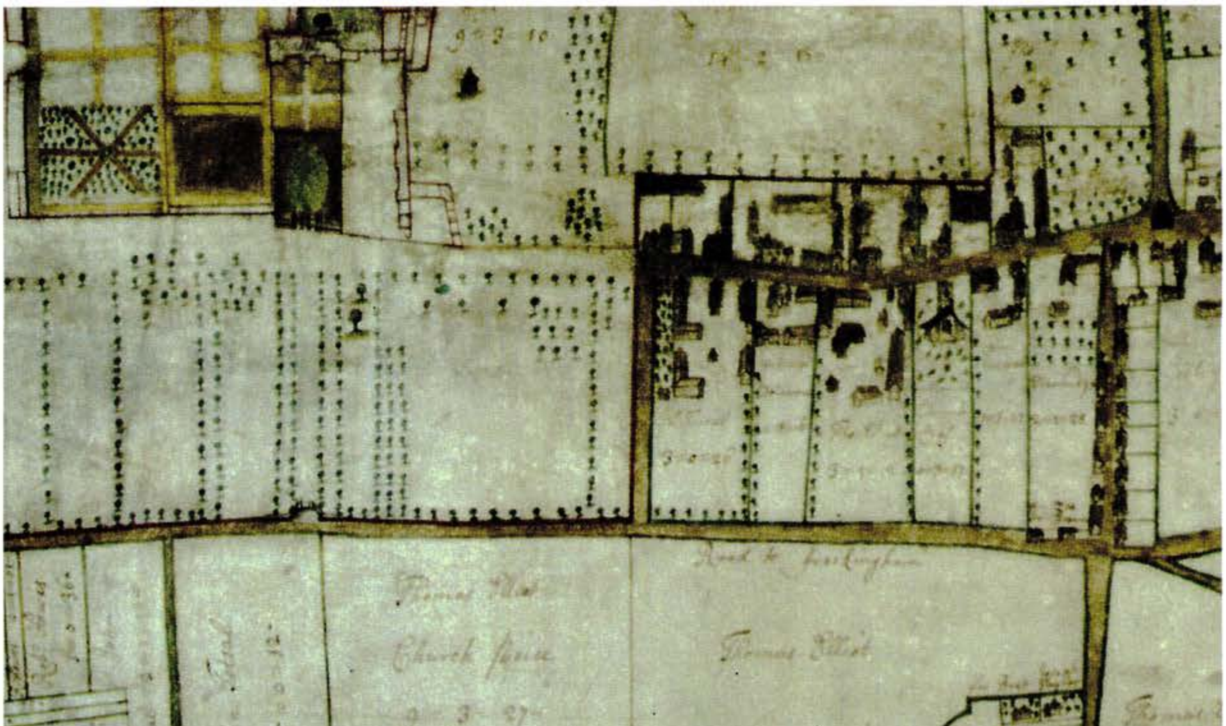


Plate 4. *Chippenham: detail of 1712 map (CRO). (Hall: top left).*

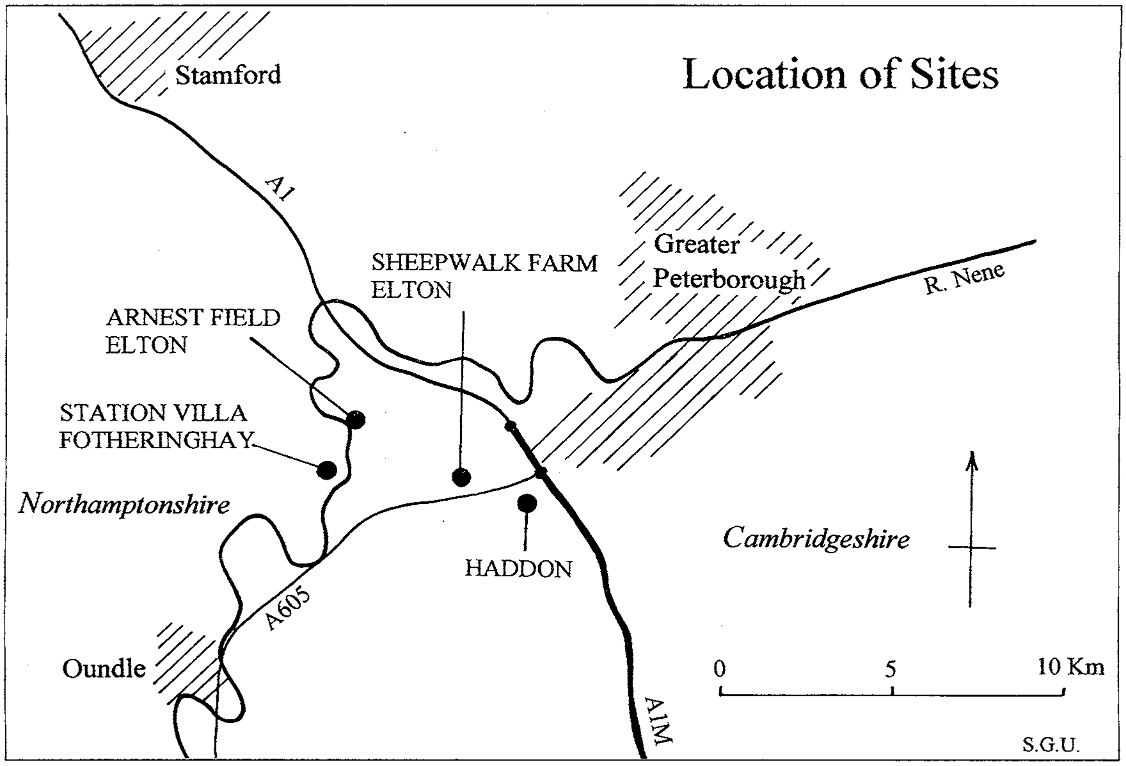


Figure 1. Location of sites.

Table 1. Details of sites referred to in the text.

Site	Period	Parish/county	Grid Ref.	Refs.	Geology	Survey period
Haddon (site A)	Roman Saxon	Haddon, Cambs	TL19119941	Upex 1993 & 2002	Oxford Clay	1990-1996
Haddon (site B)	Roman Saxon	Haddon, Cambs	TL 19135935	O'Brien 1990 & 1994	Oxford Clay	1990-1996
Sheepwalk Farm	Roman Saxon	Elton, Cambs	TL 19137931		Oxford Clay	1975-1996
Arnest Field	Roman	Elton, Cambs	TL 09079962		Second Terrace Gravels	1978-1991
Station Villa	Roman	Fotheringhay, Northants	TL 09079945	RCHM 1975 p 40, no 12, Fig 50	Second Terrace Gravels	1980-1996

Some were new to fieldwork techniques and this may have caused some differences. All these aspects of variability are further discussed by Woodward (1978, figs 3–5; see also Schofield 2000). The biggest concern however was the field-workers ability to recognise Saxon pottery when quantitative analysis was being carried out. To this end each group plotting this aspect of the work were given sample pottery to handle prior to survey work. However, there was no real way that the standardisation of all of the above aspects could have been scientifically controlled.

Pottery sherd numbers and distal length measurements

The recovery of pottery sherd numbers took place at four sites, including monitoring of one site for over twenty years, starting in 1975. In all cases the same area within the fields was surveyed, and the sherds counted on the surface of the field. The results of this work are shown in Figures 2, 3, 4 & 5A.

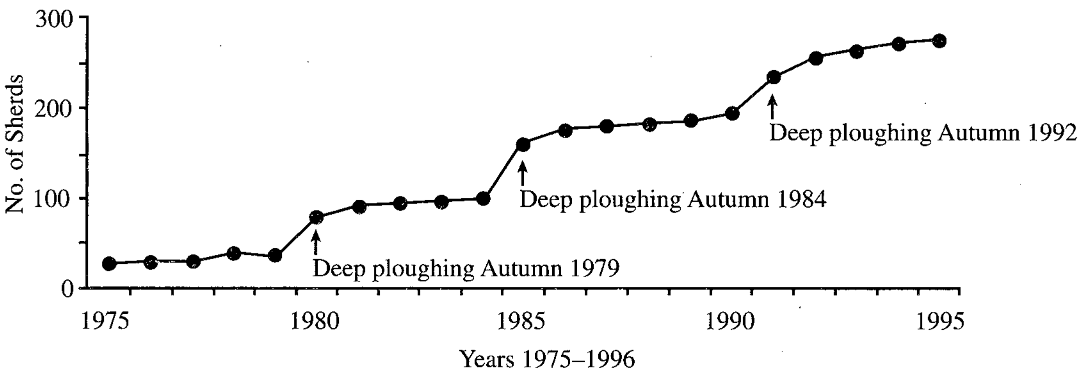


Figure 2. Roman pottery sherd numbers: Sheepwalk Farm, Elton.

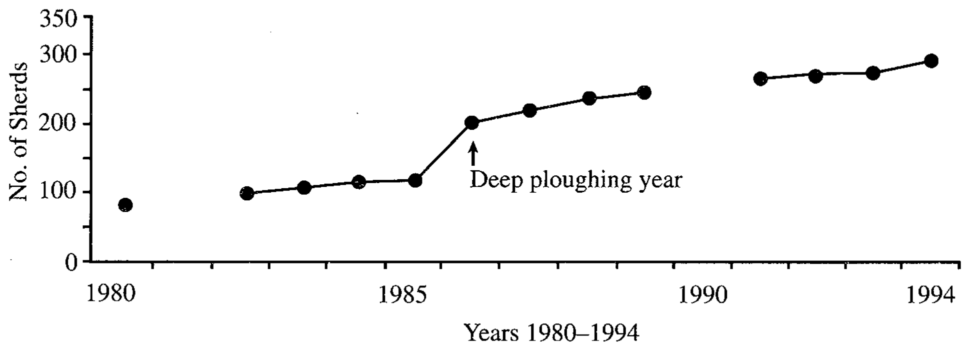


Figure 3. Roman pottery sherd numbers: Station Villa, Fotheringhay.

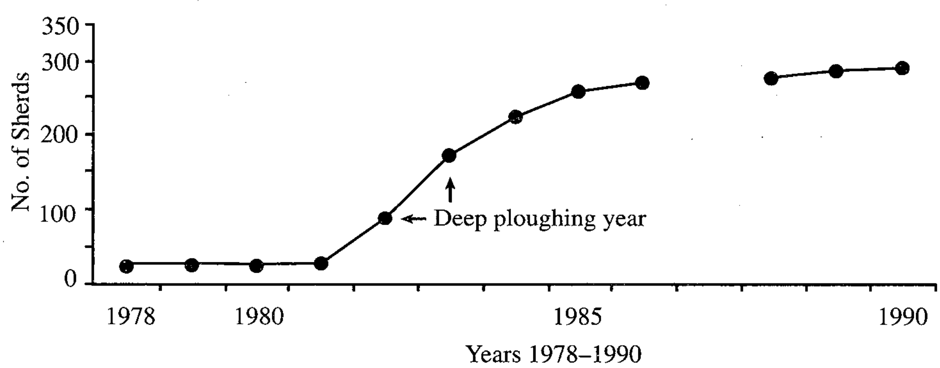


Figure 4. Roman pottery sherd numbers: Arnest Field, Elton.

Clearly the most significant result is the increase in the numbers of sherds after deep ploughing. At Sheepwalk Farm for example the results show three years of deep ploughing: 1979, 1984 and 1992. In each case the numbers of sherds shows a significant increase on the previous year. In 1984 there were 100 sherds within the monitored square but after deep ploughing in 1984 numbers rose to 164 in January 1985. Similar increases can be seen in Figures 3, 4 & 5A. In each incidence of deep ploughing the actual numbers of sherds on the surface area of the topsoil rose dramatically. At Arnest Field at Elton (Figure 4) deep ploughing occurred for two years in succession in 1982 and again in 1983 and the number of sherds increased from 39 to 174. The largest rise in Roman sherd numbers after a single deep ploughing was at Haddon (site A) between 1992 and 1993 with a rise of 211 sherds, from 269 to 480.

Such findings simply reveal what one would expect when deep ploughing occurs: the plough has cut deeper into the underlying archaeological layers to bring more material to the surface. However the results do quantify to some extent the rates of destruction by ploughing that have been talked about in the literature (eg Hinchliffe & Schadla-Hall 1980; Boismier 1998). What is interesting from the statistics

Plate 5. *Dry Drayton Hall, drawn by R Relhan (1809).*

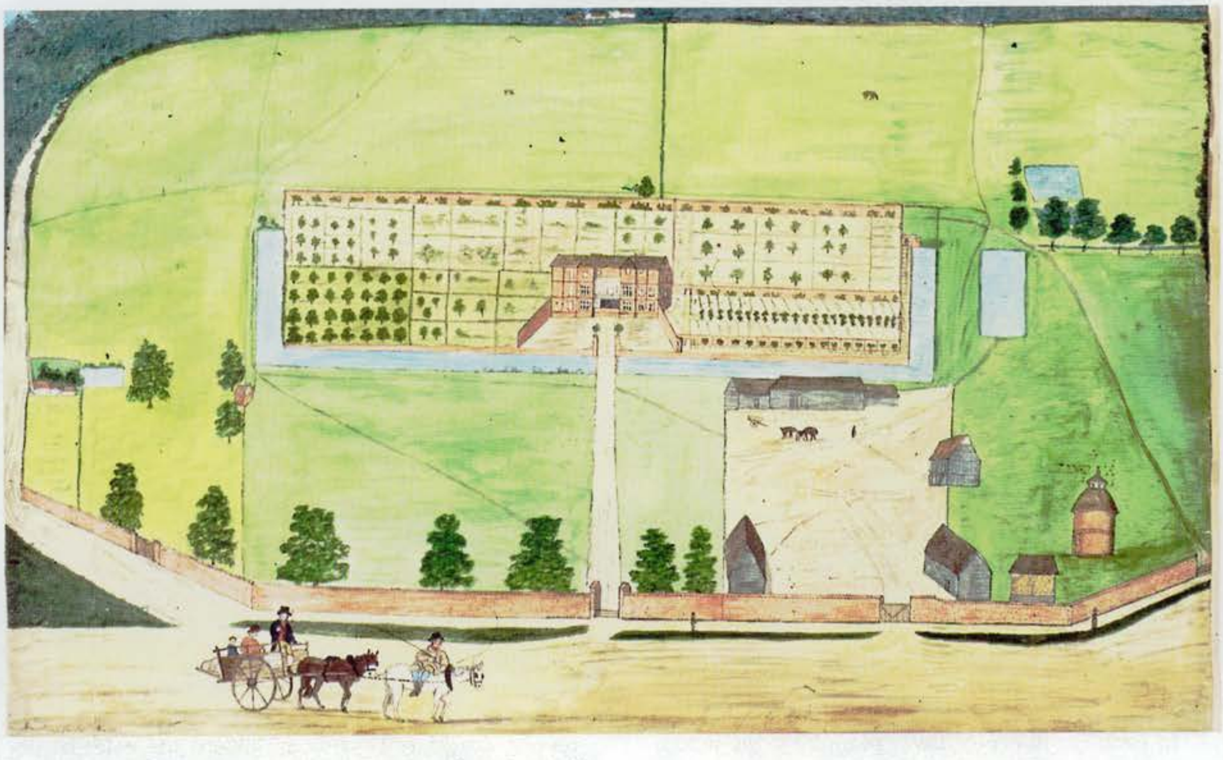


Plate 6. *Haslingfield Hall, drawn by R Relhan (c. 1819).*

Plate 7. *Cherry Hinton. Smithy, etc, back road to Cambridge footpath.*

Plate 8. *Cherry Hinton. Old smithy, 1993. TL 4855 5638*

Plate 9. *Grantchester Mill 'before the fire' in 1928.*

Plate 10. *Grantchester. The Old Mill, with a house built in 1930 to replace the burnt mill, 1997.*

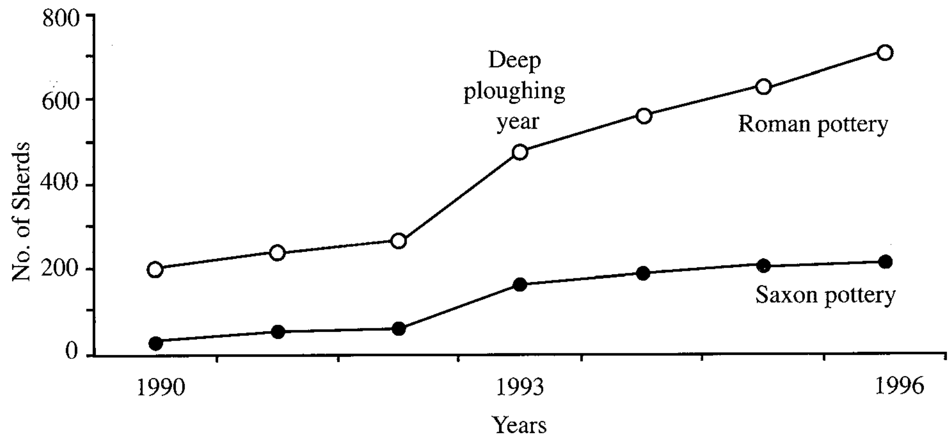


Figure 5A. Numbers of Roman and Saxon sherds at Haddon, (Site A).

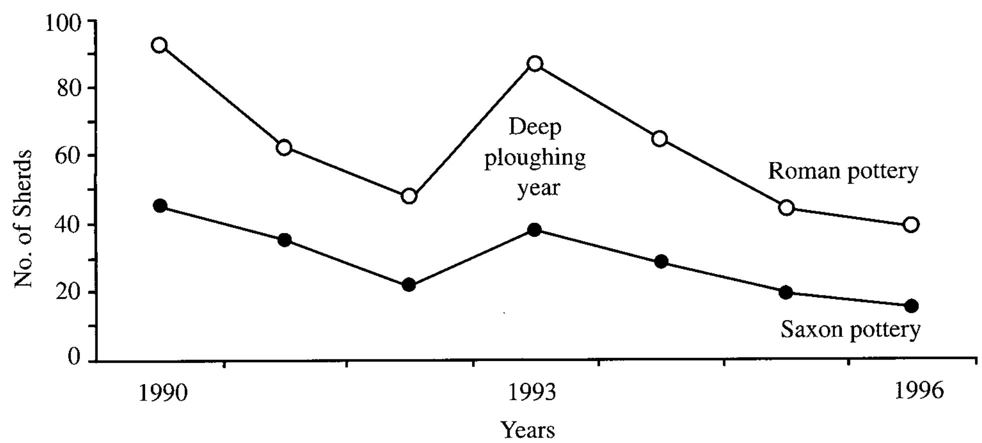


Figure 5B. Distal length of Roman and Saxon sherds at Haddon, (Site A).

is that the numbers of sherds continues to increase in subsequent years. This aspect can be seen in all four sites and probably reflects the breakdown of larger into smaller sherds by abrasion caused by farm machinery, frost action and general weathering. This breakdown or reduction in sherd size is best seen in Figures 5B and 6B. These two graphs show the distal lengths of both Roman and Saxon pottery for Haddon (site A) and Roman pottery at Sheepwalk Farm, Elton. For comparative purposes the numbers of sherds have also been plotted as Figures 5A and 6A. As the graphs show, at both sites the sherd size increases as deep ploughing occurs and new material is lifted out of a stratified context and mixed within the topsoil horizon. Sherd distal length is then reduced in subsequent years as sherd abrasion within the soil occurs.

Haddon (site A) was the only place where assessment was made of the numbers of sherds and breakdown of early Saxon pottery. Figure 5A clearly shows a reduced number of Saxon compared with Roman sherds. This is what one might expect but it also shows that sherds abrade within the soil to smaller fragments.

Volume of destruction

The volume or rate of destruction is on many arable sites simply just a comment related to a visual impression, unless there has been an excavation where a quantifiable comment can be made. Even here however there is little comparative data regarding the rate of destruction between years.

An attempt at Haddon (site A) to quantify destruction was made over a period of deep ploughing by measuring the weight of pottery present within the topsoil the years before, during and after the ploughing. On this site there was an average soil depth of 36cm, which covered the archaeological deposits. Within the 20m square being monitored at Haddon, pottery was collected within each square metre and weighed (this square was also being monitored for pottery size and sherd numbers so the pottery after weighing was left for future quantification). The overall weight of pottery for the whole square was calculated in the 1992 season as 8.43kg. Weight measurements were also made for 1993 after deep ploughing and again for 1994, figures shown in Table 2.

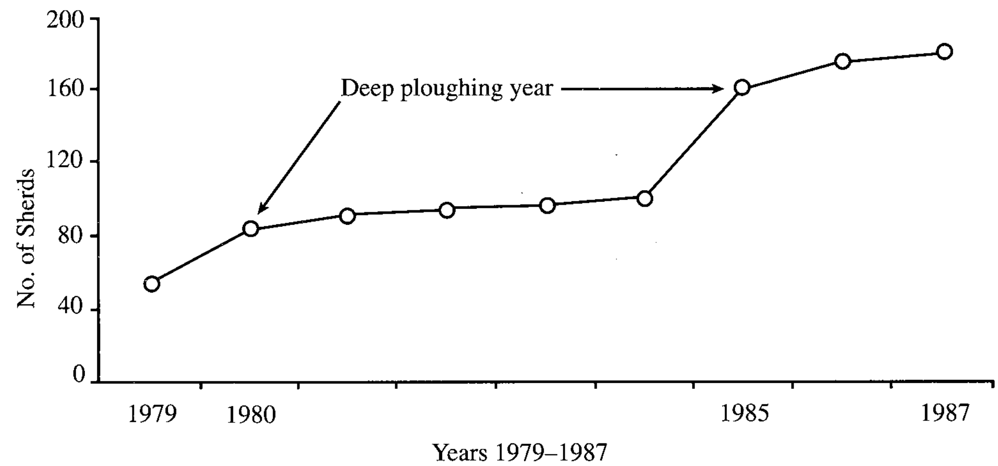


Figure 6A. *Sheepwalk farm Elton: Roman sherd numbers.*

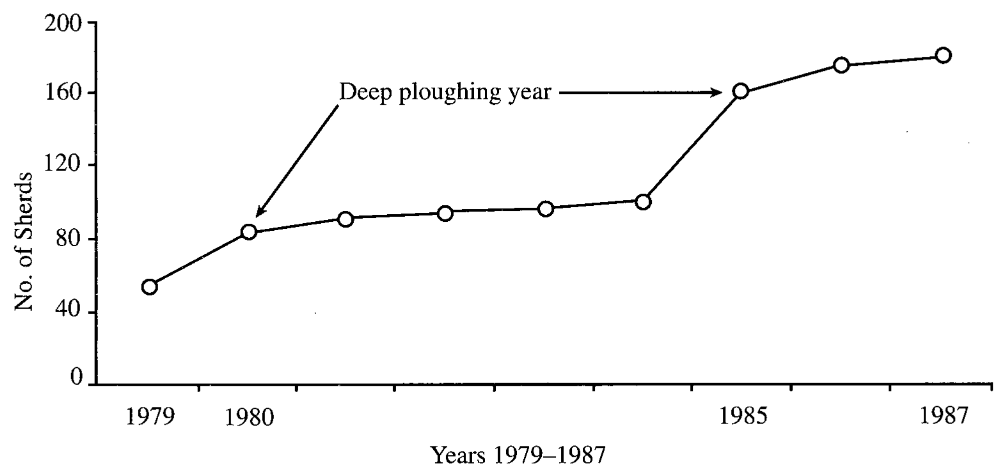


Figure 6B. *Sheepwalk farm Elton: Roman pottery: distal lengths.*

Table 2. *Sherd and weight analysis from 1992 to 1994 for one 20m square at Haddon (site A).*

Year	1992	1993	1994
Sherd nos.	269	480	567
Sherd increase		211	87
Weight	8.43kg	19.24kg	19.40kg
Weight increase		10.81kg	0.16kg
Average sherd weight	0.0313	0.0400	0.0342

The weight analysis at Haddon shows that between 1992 and 1993 there was an increase in the number of sherds from 269 to 480 with a corresponding increase in weight from 8.43 to 19.24kg. The ploughing of 1994, although not deep ploughing, still increased the actual numbers of sherds on the surface. It was estimated that this increase was more to do with sherds being abraded within the soil and broken down rather than new sherds being ploughed out of an archaeological context and brought to the surface. This idea is further substantiated by analysis of the weights of pottery present. From 1992 to 1993 the weight increase was 10.81kg but between 1993 and 1994 an increase of only 0.16kg was recorded, implying that pottery was being broken down as the sherd count increased from 480 to 567.

To expand this line of argument further it ought to be possible to calculate the total amount of pottery and its weight within the topsoil for the rest of the site, which covered twelve (20m by 20m) squares. Clearly one ought to expect differential pottery volume across a site, reflecting archaeological 'hotspots'. In the following calculations such 'hotspots' were allowed for by the fact that the sample square was set over an area visually assessed to be representative of the whole site. This ought to work out for the 1993 figures as

monitored square = 480 sherds x12 = 5760 sherds
monitored square = 19.24kg x12 = 230.88kg

Soil unevenness made it difficult to calculate a depth or 'zone' within the soil from which the pottery was recorded on the surface but it was estimated that this was a zone that was approximately 6cm deep. This

Plate 11. *Harlton. May 1930.*

Plate 12. *Harlton. Dilleys Cottage (Armitage), looking towards Wheatsheaf, June 1995. Buildings on one side of the road have survived well, the others have suffered.*

Plate 13. *Swavesey before the fire of 1912. Every house with the exception of the last two back ones no longer stands. The postcard includes the message 'I have sent you a view of Swan Pond, Swavesey, the one in front of Mrs Mustell's house'.*

Plate 14. *Swavesey. Swan Pond, 1998.*

Plate 15. *Haddenham. Aldreth 1926, with imposing Dutch-style house.*

Plate 16. *Haddenham 1994, same view.*

Plate 17. *Lode. Old mill and kilns, June 1927.*

Plate 18. *Lode. Same view of National Trust property, March 1993.*

estimate would be especially true for the year 1992 because the farmer at the Haddon site had worked the soil into a very fine even tilth to plant oilseed rape. If the estimate for the 'pottery recovery zone' were to be set at 6cms and the average depth of the soil horizon at Haddon was 36cms (straight on top of the archaeological deposit) then it is possible to calculate the weight and the numbers of sherds within the total soil mass of the site. These calculations are shown in Table 3, which gives an overall weight of pottery in 1993 of 1385.28kg and a total sherd estimate of 34,560.

What is also possible from these estimates is to calculate the approximate overall rate of 'new' pottery in the topsoil between 1992 and 1993, considering that 1993 was a year of deep ploughing (see Fig 5A and Table 3).

The increase in pottery sherds 1992–3 for the monitored square was 211 and the weight increase 10.81kg. If these figures are multiplied by 12 (estimated to make up the core of the site) then the actual increase in surface (top 6cm) material works out to be 2532 sherds with an estimated increase in weight of 129.77kg. Again if these figures are multiplied by the estimated depth of the topsoil (36cm) the sherd count increase 1992–3 works out at 15,192 and the weight increase at 778,32kg. Such figures, although beset with problems linked to the accuracy of original calculations and problems related to the even distribution of sherds throughout the soils vertical horizon, do give an estimate of the rate of destruction during a single year of deep ploughing. It points to the general picture that .75 metric tonne of pottery could well have been ploughed out of an undisturbed archaeological context! This fact becomes even more worrying when Haddon proved to have very late occupation layers that reached into the 5th and 6th centuries: one of our best chances of unraveling these 'dark age' centuries is by excavation of the top stratigraphic layers.

Pottery movement within topsoil

The site at Haddon also gave the opportunity to carry out research into the movement of pottery sherds within topsoil. Ploughing, harrowing and drilling not only break into the top layers of archaeological sites and then reduce sherd size by abrasion but it is assumed that once pottery is within the topsoil it ought to be possible to drag and move it from its original position. This would be significant if the surface plots of material are used to indicate underlying archaeological features. At Haddon (site A) over a seven year period the horizontal movement of pottery within the topsoil was monitored to calculate actual distances which pottery could be moved. Six large sherds (distal length 10cm) and six small sherds (distal length 5cm) were introduced into a monitored square which could be re-surveyed and fixed every year. The pottery was placed within the centre and recovered the following year, when the new positions were plotted. Each sherd was placed back into the new 'moved' position and re-plotted again the following year. To overcome the problem of pottery retrieval within a vertical soil depth of up to 36cm, each sherd was drilled and tagged with a reference number. The metal tag also acted as a 'recovery' agent allowing it to be pinpointed with a metal detector each year.

Plots of the overall movement of both sets of sherds showed that there was general movement as ploughing and harrowing shifted the original positions. Figure 7 shows a plot of two typical sherds for each of the large and small sizes that were monitored. This shows that in some years the sherds were moved one way and in following years were dragged back again. The average movement away from the original point was for the small sherds only 23cm and for the large sherds 35cm. Both figures therefore show little horizontal movement (see also Taylor, 1979, 99; Reynolds 1989).

The downslope movement of pottery was tested between 1990 and 1993 in a similar exercise where

Table 3. *Figures and estimates for Haddon (site A) showing the calculations for the whole site (based on 12 squares) extrapolated from Table 2.*

Depth of soil	Total weight of pottery 1993	Total no of sherds 1993	Increase in weight 1992-3	Increase in sherd nos 1992-3	
6cms	230.88kg	5760	129.77kg	2532	ACTUAL
12cms	461,76kg	11,520	259.44kg	5064	ESTIMATE
18cms	69264kg	17,280	389.16kg	7596	ESTIMATE
24cms	92352kg	23,040	518.88kg	10,128	ESTIMATE
30cms	1,15444kg	28800	648.60kg	12,660	ESTIMATE
36cms	**1,385.28kg**	**34,560 sherds**	**778.32kg**	**15,192 sherds**	**Estimated Totals**

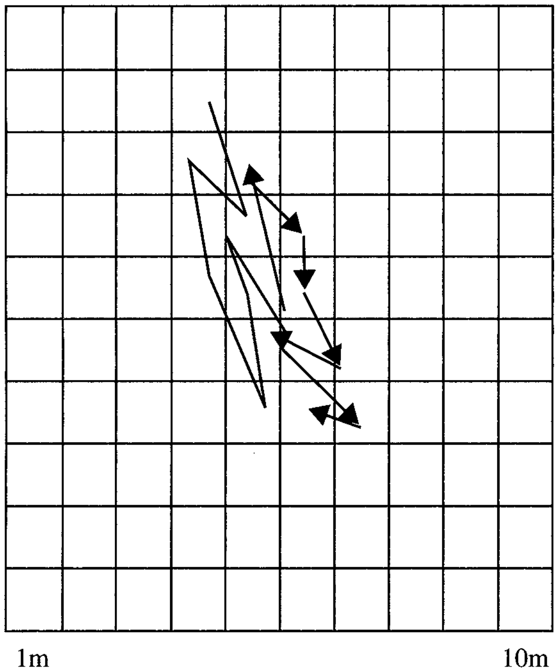
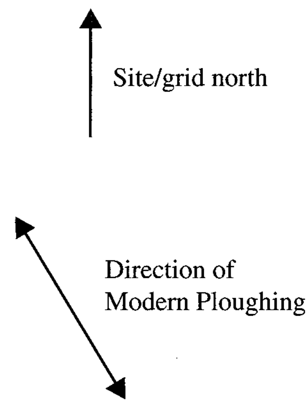


Figure 7a.
Small Sized Pottery Sherd Movement (distal length 5cm) Within the Topsoil at Haddon, Cambs (Two sherds plotted) 1990–1996.



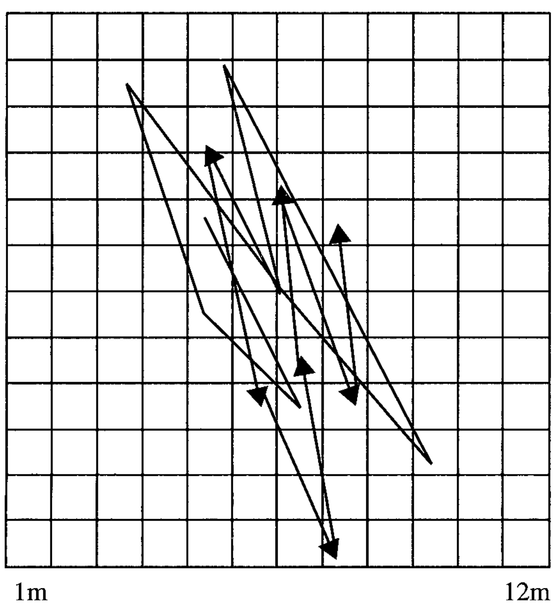


Figure 7b.
Large Sized Pottery Sherd Movement (distal length 10cm) Within the Topsoil at Haddon, Cambs (Two sherds plotted) 1990–1996.

seven pottery sherds (distal length 10cm) were introduced into a sample square at Haddon (site B), on a slope of 12 degrees. The control mechanisms were the same as for Haddon site A, which was on level ground. Here there was a marked movement of material down slope, aided by the fact that the farmer ploughed this particular field up and down the slope. Had the site been 'contour ploughed' the results may have been different. The 'averaged' results of both the exercise on the flat and the sloping site are shown in Figure 8. In Figure 8A the average deviation of the seven sample sherds from their original position is shown for the site on the flat ground (Haddon site A). This shows for example that for 1991 there was movement of all seven sherds that averaged 1.34m in one direction and 1.56m in the other. The right hand column in Figure 8A shows the average over the whole four-year period, indicating little movement.

Figure 8B shows a similar plot but this time for the sloping site (Haddon site B). The averaged figures show that there was general movement downslope. In 1991 for example this was 59cms, but the average for all four years was 27cm.

Thus it is possible that on sloping ground (12 degrees) sherds could migrate at an average annual rate of 27cm.

***Plate 19.** Swaffham Bulbeck. Original school, July 1928.*

***Plate 20.** Swaffham Bulbeck. Village hall, 1992.*

***Plate 21.** Swaffham Prior. Churches of St Mary, and St Cyriac and St Julitta c. 1900.*

***Plate 22.** Swaffham Prior. Same view after restoration and tidying up, 1993.*

Plate 23. *Teversham. Cottages on the green.*

Plate 24. *Teversham. Cottages looking little different, 1998.*

Plate 25. *Wicken. Village green 1929.*

Plate 26. *Wicken. Village green with play equipment, 1994.*

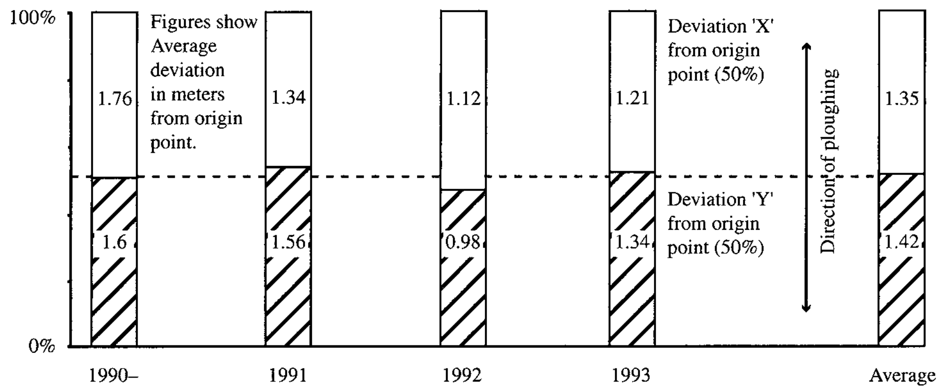


Figure 8A. *Small sized pottery sherd movement within the topsoil, Haddon (Site A), (flat surface).*

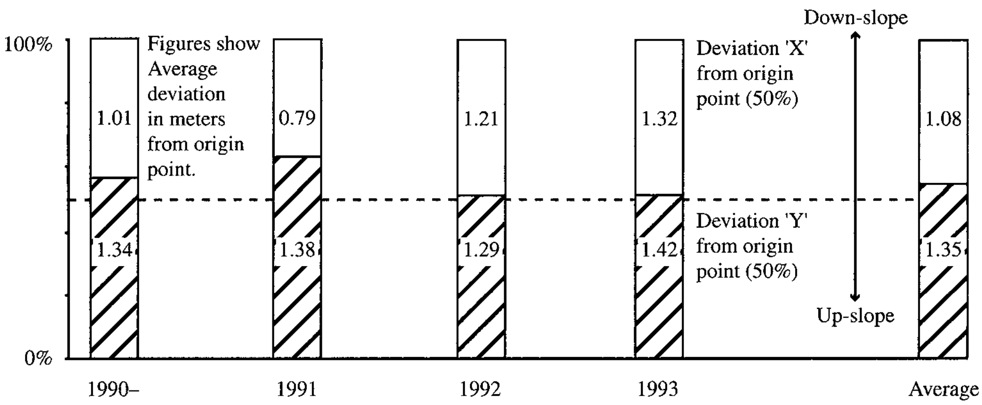


Figure 8B. *Small sized pottery sherd movement within the topsoil, Haddon (Site B), (12 degree slope).*

Weathering of pottery within the soil

In addition to abrasion the influence of weathering on pottery, especially friable prehistoric and Saxon ceramics, must also be a cause of concern. Roman pottery is fairly 'tough' stuff, but even so its abrasion into smaller sherd sizes has been well illustrated in Figures 5A & 6A. Saxon pottery was abraded down to a distal mean length at Haddon (site A) of 15mm. Such eroded sherds look like small pebbles and become almost invisible except to the most experienced field worker.

Both mechanical and chemical weathering agents may be responsible for the breakdown of archaeological material in the soil (Lambert 1987, 33–47: Pollard & Heron 1996, 187). Apart from agricultural practices, chief among the mechanical agents would be frost action, using a basic freeze thaw mechanism, which through time would be especially destructive to pottery with highly porous fabrics, which most prehistoric and Saxon wares tend to have. In addition to frost, seasonal and diurnal temperature ranges could also cause the development of stress fractures within the fabrics of ceramic material, causing them to abrade. Sunlight and the effects of U/V light may also cause stress to material exposed for long periods on the surfaces of fields. Little is known about how pottery would react to such conditions but it could speed up the process of abrasion (Desmond Brown, pers comm). The effects of sun, temperature and frost would be especially true for surface material but would presumably decrease the deeper the material was buried.

As for the problems caused by chemical weathering, acid rain may be a growing problem here. This already has caused weathering to most parent rock surfaces beneath the soil (Knapp 1982, 108–113). However, potentially more worrying are the agricultural fertilisers and dressings which are repeatedly added to crops and which may be responsible for pottery being 'dissolved' chemically by weak acids. Typical among these are fertilisers (used for example in the growing of cereals and potatoes) which contain approximately 8% nitrogen (NO3 = nitrates group), 13% phosphorous (PO3 = phosphates group), and 17% potassium. Taken into solution with acidic rainwater this would provide an acid base for increased chemical weathering. Most farm crops prefer slightly acid soil conditions. Potatoes grow best when the soil is around a Ph value of 6.0 while barley and wheat prefer a Ph of 6.7 (Warn, 1985, 20). Even more threatening are the dressings applied to grassland, which is best suited to a Ph value of around 5.0. Long term applications of fertilisers and dressing would leech into all horizons of the soil, potentially increasing acidity.

Implications for the corrosion of ceramic material can be extended to metals. The coin evidence from the bathhouse site at Haddon (site A) has been examined by Adrian Challands, who commented that the coins showed little sign of wear but that they were all very heavily corroded. Such corrosion may well be increasing with continued applications of fertilisers.

The threat to ceramic materials within soil horizons from both natural and chemical weathering is therefore serious and worrying. Research carried out at the University of Brunei indicates that at the current rate of decay caused by chemical weathering alone, the chemical cocktail within most modern plough soils in the English Midlands could be responsible for the disappearance of most of the Saxon pottery currently within the topsoil horizons within the next ten years. Clearly this rate of destruction would be dependent on the size of sherd/ friability of the fabric/depth within the soil horizon etc. However, when the average sized sherds from the site at Haddon (site A) were subjected to testing, a model was produced that suggested that they had a life expectancy of around ten years before they totally dissolved. Similar results could be expected for pottery from other periods (especially prehistoric material) which have similarly absorbent and friable fabrics.

With the continuous leaching of agriculturally applied chemicals through the soils horizons chemical weathering ought to penetrate even the lower stratified layers on some archaeological sites. The model of chemical weathering indicates that, through time, it might only be those layers which are either very deep and/or waterlogged and therefore excluding air which escape the effects of agricultural chemical applications.

Conclusions

The methodological problems inherent in research of this nature have been partly outlined already. Aspects of geology and differing soil types, and of the somewhat crude way in which quantitative calculations of sherd numbers and their weights have been made could all be questioned and refined. However, whatever the methodological problems there is clear evidence of the sheer destructive capability of ploughing, especially deep ploughing, and its ability to abrade archaeological sites with devastating loss of evidence. Sites such as Haddon (site A), where it has been possible to calculate not just the crude numbers of sherds within the topsoil but more importantly to estimate the total weight of new material ploughed into the topsoil from the underlying deposits, suggests large scale destruction. Such destruction is even more worrying when one considers that the site at Haddon has (or had?) the potential to link late Roman with early Saxon deposits. With continuous ploughing all that may be left to show this transition may be deeply stratified deposits in pits and wells, forming isolated areas between ploughed out surfaces.

Perhaps, with this in mind, research ought to be launched to assess the remaining potential of the evidence. This may take the form of fieldwalking followed by selective excavation to assess damage and preservation levels. A similar argument was put forward by Jeffrey (1978) in an attempt to 'manage' the agricultural destruction in Hertfordshire. The campaign launched in July 2003 by English Heritage to encourage farmers to 'protect and not plough' will hopefully draw greater attention to the problems of deep ploughing (English Heritage 2003a). However destructive ploughing is, equally worrying is the policy of putting sites down to grassland management to preserve them from the effects of ploughing. Research contained within this paper suggests that even on such 'preserved' grassland sites the application of chemical fertilisers is potentially destructive.

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