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Summary

This report documents the attempts to conduct amino acid racemization analysis for age estimation. It is concluded that while Pennington is clearly younger than all other sites, it is difficult to assess how much younger as the shells have suffered dissolution. We suggest that Norton Farm is MIS7a, that Portfield Pit is MIS7 and that Portfield Pit Tr 31-10-96 Unit VII is younger than other Portfield Pit samples. The remainder of putative MIS7 sites contain only one or two species, none of which occurs at more than one other site. These sites are Oving, Yeoman's Road, Lepe and Selsey. None of these are convincingly younger (but there is a significant caveat that we do not know enough about racemization in the species we have studied). On the basis of *Macoma* data alone, it seems difficult to separate Oving, Yeoman's Road, and Portfield Pit. The remaining three sites, Red Barnes, Harnham, and Brooks Field North all have higher ranges in their DL values. It is difficult to say more than all three sites are MIS9, although given the cold-stage character of Harnham, the DL data is not inconsistent with an MIS8 assignment. However if Red Barnes and Brooksfield North are MIS9, it is unlikely that Harnham is MIS10. The other site, Brighton, Civic Centre, has only one species (*Littorina*) which we have not worked with before. The values for Gix and Asx are higher than other marine species (believed to be MIS7), but the values for Ala are lower. Given this variation it is not safe to make an assignment for this species.

Keywords

Amino-acid Racemisation
Mollusca

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Introduction

A unique Middle and Late Pleistocene sedimentary record is preserved along the Sussex/Hampshire coastal corridor between Southampton and Brighton, beneath the West Sussex Coastal Plain and the Eastern Solent Basin. A project to investigate these deposits with their wealth of Lower and Middle Palaeolithic archaeological remains was begun in October 2002, with funding provided by English Heritage through the Aggregates Levy Sustainability Fund.

Sussex/Hampshire Coastal Corridor

Today the study area forms a low lying region at the eastern end of the Solent in which the unconsolidated Pleistocene deposits of the coastal plain overlie bedrock geologies consisting of Cretaceous chalk or Tertiary clays and silts. In the West Sussex Coastal Plain the predominance of chalk bedrock and the consequent formation of calcareous sediments has often led to the preservation of biological evidence such as molluscs, ostracods and mammalian remains which have proved useful in dating and environmental/climatic reconstruction. In the Eastern Solent Basin the relative absence of chalk bedrock and calcareous Pleistocene sediments has led to a lack of such evidence and a consequent lack of knowledge of dating, climate, and environment.

The group of sediments formed as a direct result of the changes in climate regime during the Quaternary. As a consequence of global temperature changes the Quaternary is marked by growth and decay of ice sheets resulting in changes in sea level of up to 150m. The area of the Sussex/Hampshire coastal corridor will therefore have seen phases of sea-level attaining, or exceeding, modern datums during interglacial periods (leading to the deposition of marine sediments ultimately becoming raised beaches) and phases when sea-level fall resulted in the retreat of the sea and exposure of the floor of the English Channel (leading to deposition of coarse river gravels in the main valleys and solifluction deposits across much of the coastal plain). In addition to sea-level changes the area appears to have been subjected to uplift as a result of tectonic processes. This uplift is responsible for elevating the marine and fluvial deposits above tidal datums for subsequent high sea-level events thereby preserving the deposits as raised beaches and terraces within the area.

This report details attempts to obtain age estimates using amino acid racemization (AAR).

Amino Acid Racemization Geochronology

Theory

Amino acids, the building blocks of proteins, occur as two isomers that are chemically identical, but optically different. These isomers are designated as either D (dextrorotary) or L (levorotary) depending upon whether they rotate plane polarised light to the right or left respectively (Fig 1). In living organisms the amino acids in protein are almost exclusively L and the D/L ratio approaches zero[1]. The potential application to geochronology arises from the fact that after death amino acid isomers start to interconvert. This process is commonly termed racemization. In time the D/L ratio approaches one. The proportion of D to L amino acids is therefore an estimate of the extent of protein degradation, and if this is assumed to be predictable over time can be used to estimate age.

Mechanisms of racemization

The rate of racemization is governed by a variety of factors, most of which have been studied in detail only for free amino acids. North East amino acid racemization (neaar) analyse the intra-crystalline amino acid fraction and in this way, within a closed environment in which other factors (water content, concentration of cations, pH) are constant, the extent of racemization is a function of time/temperature. If the thermal history of a site can be estimated, it is possible to estimate age; conversely if the age of a site is known the extent of racemization can be used to infer the integrated thermal history.

Materials

Molluscan samples were collected and supplied by Martin Bates from 21 Pleistocene samples consisting of seven sites: Red Barns (3 layers), Yeoman's Road (1 layer), Portfield Pit (6 layers), Norton Farm (2 layers), Brook Field North (1 layer), Oving (1 layer), and Brighton (1 layer). Amino acid racemization analyses were conducted from all the samples. Five species were analysed: *Trichia hispida, Pupilla muscorum, Macoma balticha, Lymnaea trunculata,* and *Littorina obtusata.*

Method

Sample Preparation

Shells were examined under a low powered microscope and any adhering sediment removed. The shell samples were sonicated and rinsed several times in HPLC-grade water. The shells were then crushed to <100um. Only bleached samples were analysed.

Bleaching

50µl of 12% solution of sodium hypochlorite at room temperature was added to each milligram of powdered sample and the caps retightened. The powders were bleached for 48 hours with a shake at 24 hours. The bleach was pipetted off and the powders were then rinsed five times in HPLC-grade water and a final rinse in HPLC-grade methanol (MeOH) to destroy any residual oxidant by reaction with the MeOH. The bulk of the MeOH was pippetted off and the remainder left to evaporate to dryness.

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[1] D-amino acids are synthesised by some organisms; they are found free in invertebrate body fluids where they play a role in osmoregulation and can occur peptide bound in bacterial peptidoglycan, where part of their function is resistance to proteases.

Hydrolysis

Protein bound amino acids are released by adding an excess of 7M HCL and hydrolysing at 110°C for 6 or 24 hours. Some Harnham samples were hydrolysed for 6 hours, all subsequent analyses were hydrolysed for 24 hours. Samples hydrolysed for 6 hours are marked H6; those hydrolysed for 24 hours are marked H*.

20µl per milligram of sample of 7M Hydrochloric Acid (HCl) was added to each Hydrolysis (H) sample in sterile glass vials, were flushed with nitrogen for 20 seconds to prevent oxidation of the amino acids, and were then placed in an oven at 110°C for 6 hours. After 10 minutes in the oven, the caps of the 3ml vials were re-tightened to prevent the escape of vapour.

After 24 hours, the samples were dried in a centrifugal evaporator overnight. When completely dry, they were rehydrated with 10µl per mg of Rehydration Fluid: a solution containing 0.01mM HCl, 0.01mM L-homo arginine internal standard, and 0.77mM sodium azide at a pH of 2. Each vial was vortexed for 20 seconds to ensure complete dissolution, and checked visually for undissolved particles.

The first batch of samples to be prepared, H*a, had faulty caps, and all but three of the samples dried out in the oven. The same problem occurred with another set of vials used to process the second set of samples, H*b. The third set of samples, H*c, were prepared with a new set of vials and caps and no problems occurred. However there was not enough material left to prepare all the samples for hydrolysis for the third time and so it was decided to analyse the dried-out samples from the first batch, H*a. These had 20µl/mg 7M HCl added, were flushed with nitrogen and paced in a 110°C oven for 6 hours to complete hydrolysis. These samples were then rehydrated and analysed in the usual way.

Free amino-acid samples (F) were demineralised in cold 2M HCl, which dissolves the carbonate but minimises the hydrolysis of peptide bonds, dried in the centrifugal evaporator, and then rehydrated as above (with 10µl of Rehydration Fluid per milligram of sample).

For each set of sub-samples a blank vial was included at each stage to account for any background interference from the bleach, acid, or rehydration fluid added to the samples.

Approximately 50µl of rehydrated sample was then placed in a sterile, labelled 2ml autosampler vial containing a glass insert, capped and then placed on the autosampler tray of the HPLC. Samples were separated using a Hypersil BDS column.

Analysis of Free and Hydrolysed Amino Acids

Amino acid enantiomers were separated by reverse phase HPLC. North East amino acid racemization uses the method of Kaufman and Manley (1998) using an automated reverse-phase high performance liquid chromatography system. This method achieves separation and detection of L and D isomers in the sub- picomole range. Samples (2µl) were derivitised with 2.2µl *o*-phthaldialdehyde and thiol *N*-isobutyryl-L-cysteine automatically prior to injection. The resulting diastereomeric derivatives were then separated on Hypersil C_{18} BDS column (sphere d. 5 µm; 250 x 3mm) using a linear gradient of a sodium acetate buffer (23mM sodium acetate, 1.3mM Na_2EDTA; pH6), methanol, and acetonitrile on an integrated HP1100 liquid chromatograph (Hewlett-Packard, USA).

The fluorescence intensity of derivitised amino acids was measured (Ex=230nm, Em=445nm) in each sample and normalised to the internal standard. All samples and blank extracts that had been subjected to identical preparation procedures were run in triplicate. Quantification of individual amino acids was achieved by comparison with the standard amino acid mixture.

External standards containing a variety of D- and L- amino acids, allowing calibration with the analyte samples, were analyzed at the beginning and end of every run, and one standard was analyzed every ten samples. Blanks were randomly interspersed amongst the standards.

Reverse Phase High Performance Liquid Chromatography

A Hewlett-Packard 1100 Series HPLC was used to analyze the samples for amino-acid molecules.

Individual amino-acids are separated on a non-polar stationary phase according to their varied retention times: a function of their mass, structure, and hydrophobicity. A fluorescence detector is used to determine the concentrations of each amino-acid and record them as separate peaks on a chromatogram. A gradient elution programme was used to keep the retention time to below 120 minutes.

Results

In total we conducted 315 analyses (including Harnham), all of which were on bleached samples. As anticipated bleaching reduced the yields of amino acids, and also increased reproducibility.

Neither *Bithynia* or *Valvata* were present in the samples. As a consequence we analysed a wide range of species, few of which are present at more than one site. Therefore we have decided not to report the DMK which is a model derived for the gastropods *Bithynia* and *Valvata*, but instead to report Glx, Asx and Ala. The other DL values are listed in the Appendix 4.

Glutamic Acid/Glutamine

A cross-plot of DL Glx total vs DL Glx free indicates that there is more variation in values from the older sites Harnham, Brooksfield North, and Portfield pit, in addition from *Trichia*. There is also notably less variation in Portfield Pit and Norton Farm, as they display notably little variation, in particular *Lymnea* from these sites (Fig 1).

Instructive comparison of the Glx values with results from *Bithynia* and *Valvata* at sites in the UK suggest that most of the samples are falling in the range of MIS7 sites (*cf* Funthams Lane, Fig 2).

Comparison of the DL Glx data suggests that Brooks Field North is the oldest site. Harnham and Red Barns are similar in age, and indistinguishable.

Yeoman's Road, Portfield Pit, and Norton Farm appear to have similar age ranges. Of these, based on the *Lymnea* data, Norton Farm is the youngest of these. It is believed that all these sites are MIS7, in which case Norton Farm may be 7a and the remainder 7e.

Using the same logic, if the main unit of Portfield Pit is 7e, then the two other sites which contain *Macoma*, Yeomans Road and Oving, either represent marine sub-stages within 7 or perhaps 6. They are younger than MIS 8.

We have no information about *Hydrobia* and *Rissoa*, although the two at Selsey have near identical values. Of the two sites, Selesey appears to be the older, as it has higher Glx values.

Some values have higher than expected differences between the F and H D/L values. We interpret these as having suffered from dissolution, although we have not yet investigated this hypothesis systematically. If dissolution was the cause then the free values would be as high or higher than in a reliable sample, whilst the total values would be depressed. Such cases are seen in Figure 3.

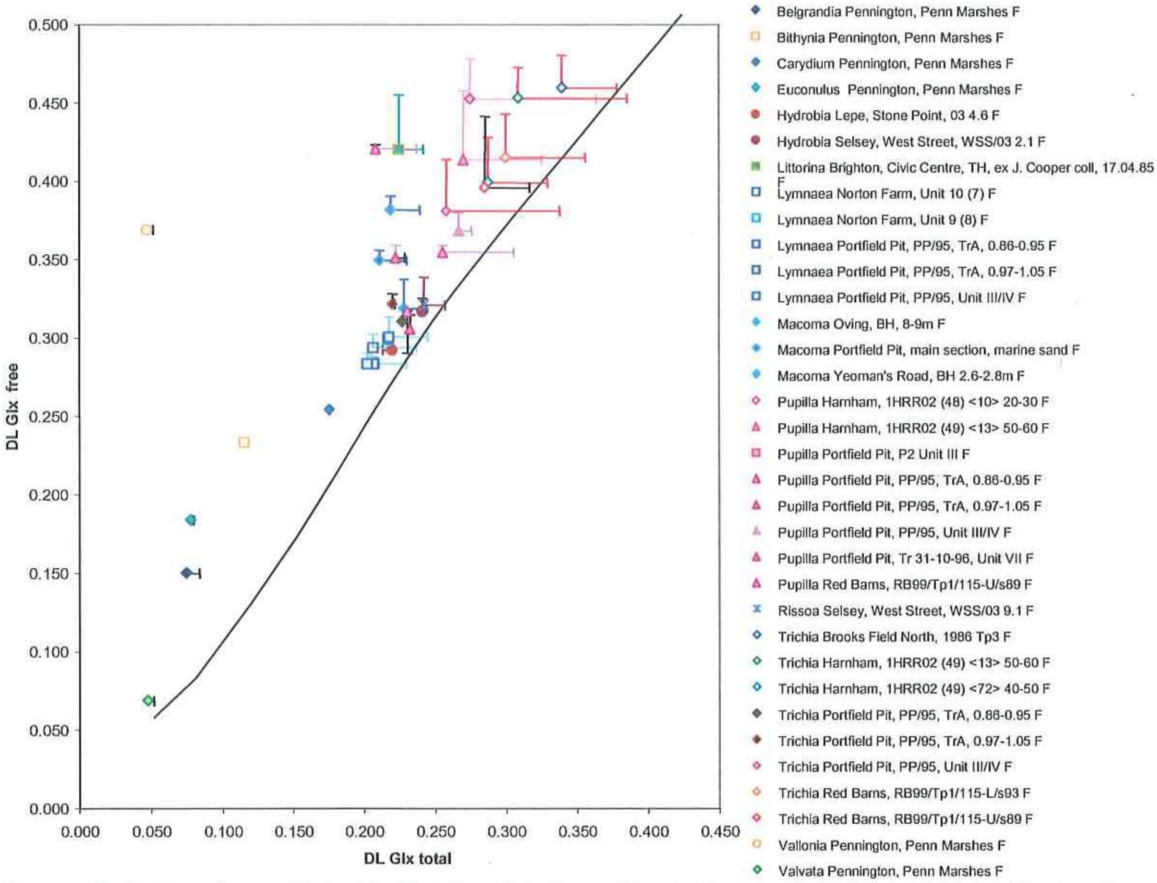


Figure 1 Comparison of DL Glx Total vs DL Free Glx, to the modelled line (in black). In all cases the DL values for the free fraction are higher than predicted from the model. This may in part reflect differences in protein decomposition, such an effect is observed in many species including thick shelled bivalve molluscs. However the very marked offsets observed in Pennington are so extreme they can only be explained in terms of dissolution of the shell.

The range of values in Portfield Pit, the most highly sampled site is interesting in that all samples show similar trends (with the exception of *Trichia* in Unit III/IV). However we do not believe that these trends actually reflect an age dependent increase. Based upon their known stratigraphic relationships it appears that all the samples derive from a single sequence of sediments that conformably change from marine through to wetland terrestrial.

It is noteworthy that Glx has a slightly unusual pattern of racemization in the free form, due to the formation of a lactam (see Walton 1998).

Aspartic acid / Asparagine (Asx)

Asx is the fastest racemizing of the three amino acids discussed here (due to the fact that it can racemize whilst still peptide bound; Collins *et al* 1999). The vales for Asx do not add greatly to the findings from Glx due to the fact that in most shells this amino acid is already highly racemizated. There is a clear increase in the *Trichia* which identities separate groupings for Portfield Pit (MIS 7?), Harnham (MIS 8), and Red Barns and Brooks Field North (MIS9). However the linking of Red Barns and Brooks Field North is not made by the

Glx data. Also note the larger errors in these older sites when compared with the MIS 7 sites discussed above.

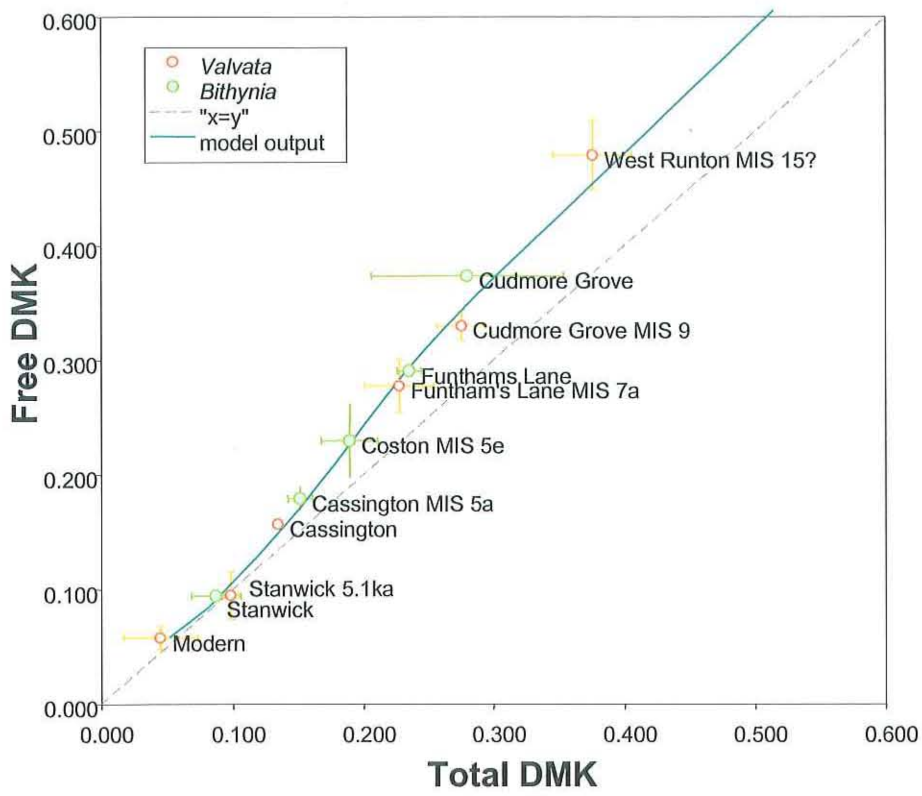


Figure 2 Comparison between DMK data from freshwater gastropods *Valvata* and *Bithynia*.

The values for Pennington are consistently lower for Asx than for all other sites. The wide scatter of data at Pennington suggest that these samples are compromised, but it also is highly suggestive that Pennington is younger than most (probably all) the other sites investigated here. However the range of values is so broad it is not consistent with an MIS5 assignment; indeed no confidence can be placed on the AAR data from this site.

The Asx value for *Littorina* (Fig 5) is notably the highest of any sample studied. However with no other sites to compare, it is difficult to place an MIS assignment on this site.

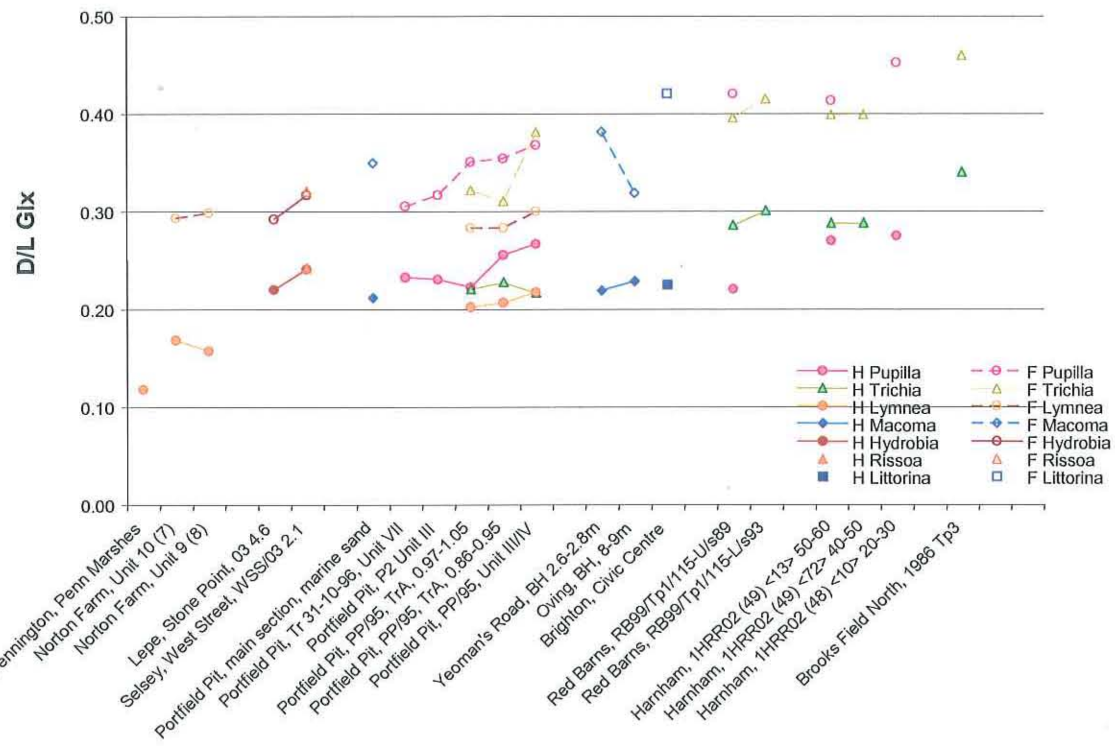


Figure 3 Comparative Free (open symbols) and Hydrolysed (closed symbols) for Glx at sites in which a species occurs more than once (and hence permits cross-correlation).

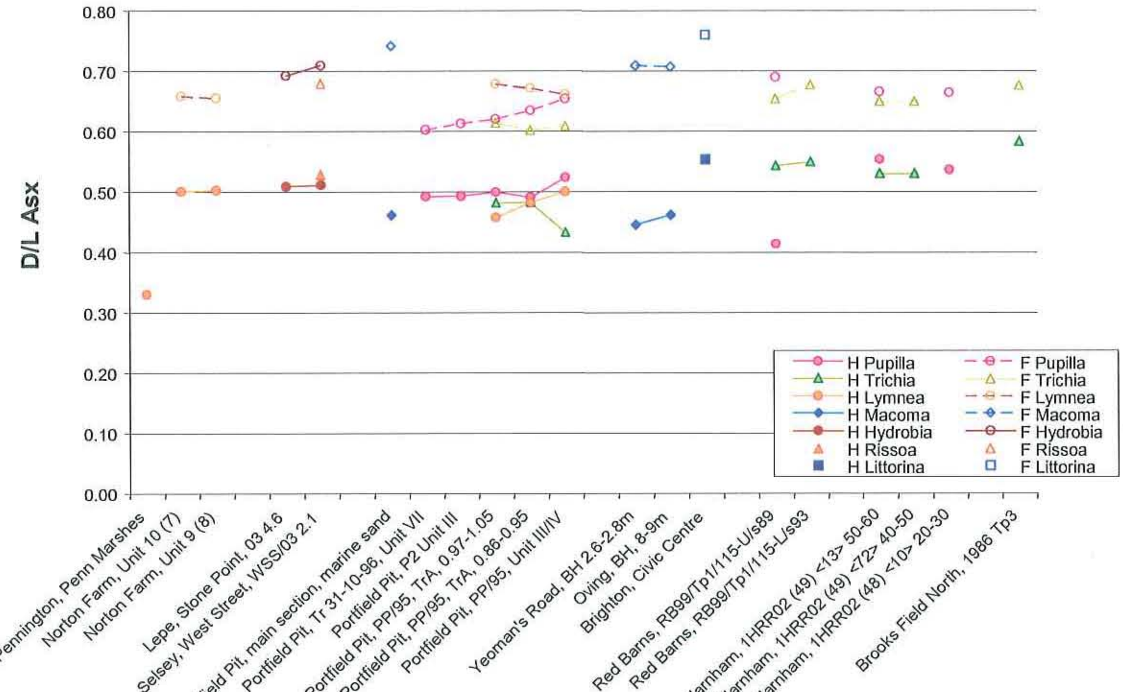


Figure 4 Comparative Free (open symbols) and Hydrolysed (closed symbols) for Asx at sites in which a species occurs more than once (and hence permits cross-correlation).

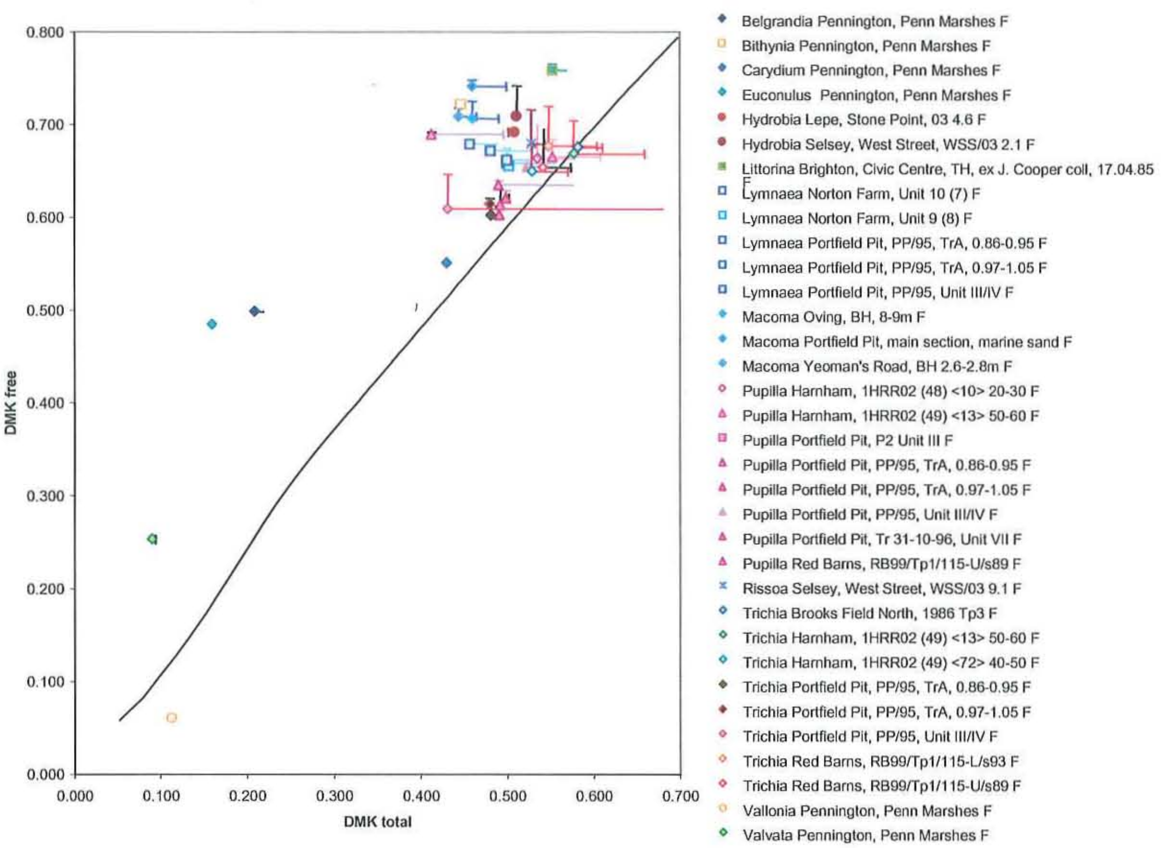


Figure 5 Comparative of DL Total vs Free Asx, compared to the modelled line (in black); compare with Fig. 1. In all cases the DL values for the free fraction are higher than predicted from the model. Note the very high DL ratio for *Littorina* (Brighton Beach).

Alanine

Alanine (Ala) is a hydrophobic amino acid, whose concentration is partly contributed from the decomposition of other amino acids (notably Serine). The results for Ala are broadly similar to Glx. The most notable aspects of the Ala data is that the same problematic samples identified for Asx and Glx are also seen with Ala, further confirming that these samples are compromised (*Trichia* Portfield Pit PP/95 Unit III/IV; *Pupilla* Red Barns RB99/Tp/115-U/89). Ala data supports the interpretation developed by the Asx data that Red Barns and Brooks Field North are the same age (MIS9) and that Harnham is younger early MIS9 or MIS8. However Ala data do not strongly discriminate between these sites and Portfield Pit.

The much higher Ala DL values for *Macoma* at Oving relative to Yeoman's Road are not strongly supported by either of the other two amino acids considered. Ala like the other amino acids suggests Norton Farm is the same age as Portfield Pit. Similarily there is no strong evidence against the conclusion that Lepe, Stone Point, or Selesy, West Street are also MIS7.

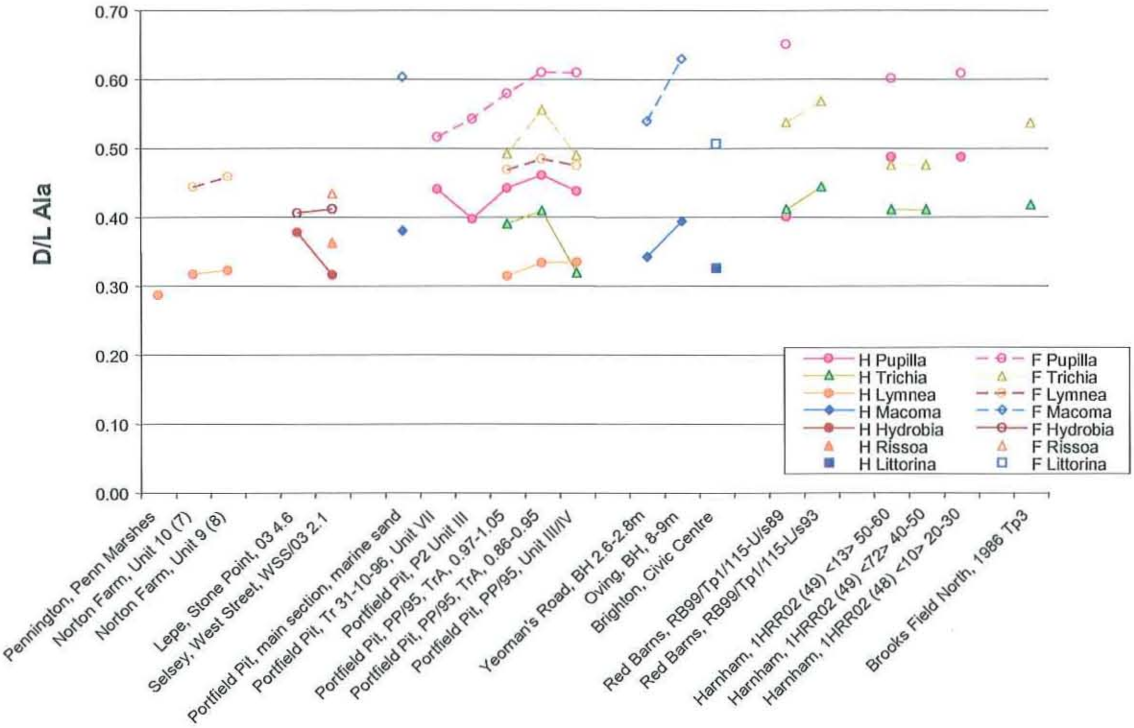


Figure 6 Comparative Free (open symbols) and Hydrolysed (closed symbols) for Ala at sites in which a species occurs more than once (and hence permits cross-correlation). Note that compared with Glx and Asx values for *Littornia* are lower for Ala than the other marine species (in blue).

Discussion

Effects of dissolution

Free amino acid racemization levels produce older (often an order of magnitude older) DMK age estimate values that the total amino acids from the SAME shell. One possible explanation for high *free* and low *total* DMK values is the extent of corrosion observed in shells recovered from a number of the sites in this study. However only at one site (Pennington, Penn Marshes) is the problem so great that no age assignment is possible.

Species effect

We have too little data on different species to confidently estimate the species effect, nor do we yet understand the underlying cause. These questions are being actively investigated in our laboratory, however readers can be directed towards the works of Bowen (eg Bowen and Sykes 1988) who has identified slow and fast racemizing species. At present, without suitable DMK models for the species in question we have tried to make assignments based upon free and total D/L values for Asx, Glx, and Ala.

In order of youngest to oldest we would place the sites as follows:

Pennington: clearly younger than all other sites, but it is difficult to assess how much younger. NB Recent preliminary data from calcitic (and hence more diagenetically robust) gastropod opercula suggest that this is MIS 5.

Yeoman's Road *Macoma* MIS7 is younger than other *Macoma* MIS 7 sites, possibly 7a?

Norton Farm: MIS 7

Portfield Pit: MIS 7 (possibly early MIS 7e). Tr 31-10-96 Unit VII is younger than the other Portfield Pit samples, with PP/95 Unit III/IV being the oldest sample.

Oving, Lepe, Brighton Beach and Selsey: MIS 7

The remainder of putative MIS 7 sites contain only one or two species none of which occurs at more than one other site. None of these sites is convincingly younger than another (but there is a significant caveat that we do not know enough about racemization in the species we have studied). One the basis of *Macoma* data alone, it seems difficult to separate Oving and Portfield Pit., but Yeoman's Road does appear to be slightly younger than the other two (albeit within the same MIS stage).

Red Barns, Harnham, and Brooks Field North: MIS 9?

The remaining three sites Red Barns, Harnham, and Brooks Field North are separated strongly by Asx and Glx, in particular for *Trichia* from MIS7 sites, and so have been placed within the designation of "MIS 9?". However they are not separated by Ala from Portfield Pit, the MIS7 site with the most data. D/L Glx suggests that Brooks Field North is older than either Red Barns or Harnham, whilst D/L Asx and D/L Ala are more supportive of a view that Red Barns and Brooks Field North share the same age, with Harnham younger. A single *Pupilla* from Red Barns gives an aggregate set of analyses more consistent with MIS 7. Given the large errors at all three sites, we would conclude that these sites are all probably MIS 9 and would argue that the data is too variable to make any better discrimination.

Table 1: Sites and locations used in this study

Site Name	County	NGR
Harnham	Wiltshire	SU 1520 2785
Red Barns	Hampshire	SU 608 063
Yeoman's Road	West Sussex	TQ 111 041
Portfield Pit	West Sussex	SU 886 057
Norton Farm	West Sussex	SU 925 066
Brooks Field	West Sussex	SU 912 071
Oving	West Sussex	SU 889 049
Brighton, Civic Centre	East Sussex	TQ 307 041
Pennington	Hampshire	SZ 325 925
Selsey	West Sussex	SZ 854 929
Lepe	Hampshire	SZ 465 986

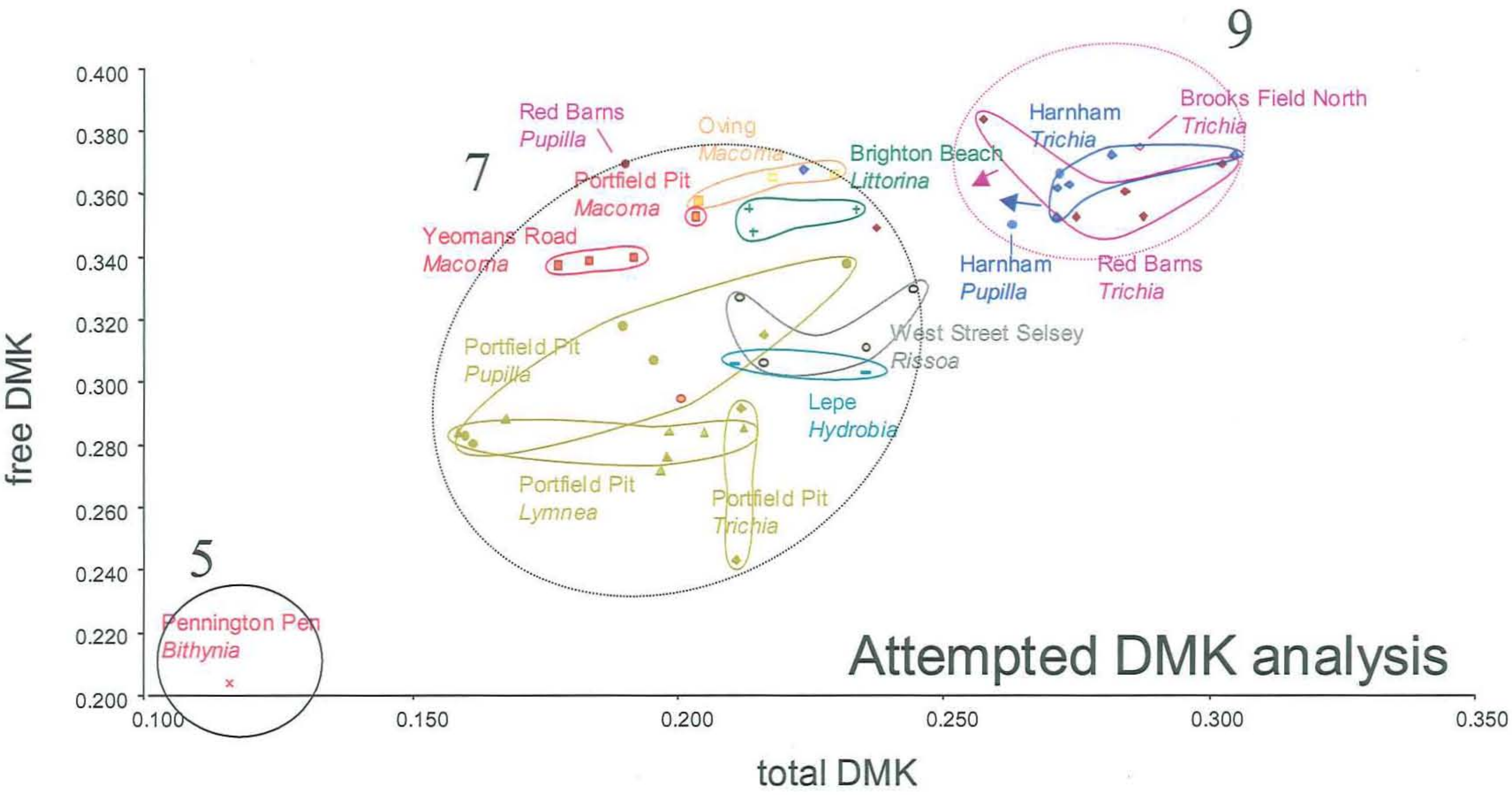


Figure 7: Attempted comparison of all sites using the DMK model. NB As explained due to the species effect DMK estimates are probably inappropriate. Number refers to putative Marine Isotope stages.

Appendix 1: Glossary

18MΩ water: The water has a resistivity of 18MΩ/cm, indicating a lack of ions.

HPLC grade water: In addition to low ion content, HPLC grade water has a low organic content (typically < 2 ppb).

Amino acids: the building blocks of proteins and consist of an alpha carbon atom (C_α) which has four different groups bonded to it: an amino group ($-NH_2$), a carboxyl group (-COOH), a hydrogen atom (-H), and a side chain, (often called an R group). About 20 amino acids normally occur in nature and some of these can undergo further modification (eg the hydroxylation of proline to hydroxyproline). The amino acids are commonly known by three letter codes (see Appendix 3: Abbreviations). They exist free in the cell, but are more commonly linked together by **peptide bonds** to form proteins, peptides, and sub-components of some other macromolecules (eg bacterial peptidoglycan).

Amino acid isomers: amino acids occur as two stereoisomers that are chemically identical, but optically different. These isomers are designated as either D (dextrorotary) or L (levorotary) depending upon whether they rotate plane polarised light to the right or left respectively (Fig 6). In living organisms the amino acids in protein are almost exclusively L and the D/L ratio approaches zero. Two amino acids, isoleucine and threonine, have two chiral carbon atoms and therefore have four stereoisomers each. As well as racemization, these two amino acids can undergo a process known as epimerization. The detection of the L-alloisoleucine epimer (derived from L-isoleucine) is possible by conventional ion-exchange chromatography, and was thus the most commonly used reaction pathway in geochronology.

Asx: Measurements of aspartic acid following hydrolysis also include asparagines, which decomposes to Asx. This combined signal of aspartic acid plus asparagine (Asp +Asn) is referred to as Asx (Collins *et al* 1999).

D-amino acid: dextrorotary amino acid, formed following synthesis of the protein as it degrades over time (remember as "dead amino acid").

DMK: Conventional racemization analysis tends to report an allosioleucine / isoleucine (A/I or D/L ratio). This amino acid ratio has the advantage of being relative easy to measure and also sufficiently slow to be used to "date" sediments in the European Quaternary.

Our DMK approach utilises multiple amino acids. However we have avoided trying to give a whole series of D/L values for each amino acid in each sample. Instead we are using a theoretical model of protein degradation. The model outputs are then used to compare observed D/L vales of any amino acid against the A/I value at the same stage of protein decomposition. The relative rate of racemization of any amino acid (its D/L ratio) is then reported as an A/I equivalent - which as a working title we have named the

Degradation Model Kinetic value (or DMK) (Collins Penkman and Kaufman in prep).

Instead of getting a single A/I ratio we obtain a series of (DMK) values, currently DMK_{Asx}, DMK_{Glu}, DMK_{Phe}, DMK_{Ala}, DMK_{Val}, and a (pretty unreliable) A/I ratio ($DMK_{A/I}$ = A/I). Other ratios, notably DMK_{Ser}, are not currently of implemented in the model – ie we don't have a good degradation model for this amino acid yet.

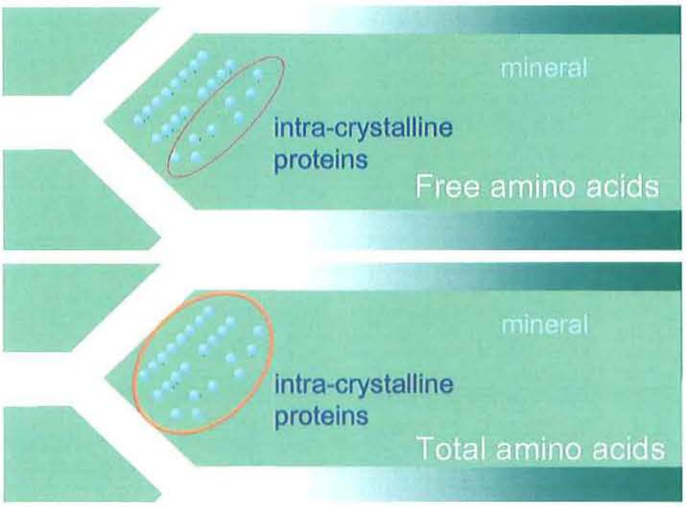
Because each amino acid has its own particular characteristics, only in a well behaved system will $DMK_{Asx} = DMK_{Glu} = DMK_{Phe} = DMK_{Ala} = DMK_{Val} = A/I$. If an amino acid has an unusually low ratio (due to modern contamination) or unusually high racemization (due to inclusion of bacterial cell wall contaminants) either some or all of the amino acids will no longer fit to the idealized degradation model. Indeed we can use elevation of DMK_{Asx} = DMK_{Glu} and = DMK_{Ala} to provide a bacterial contamination index. We have not done so in this case as there was no evidence of contamination.

DMK values: Degradation Model Kinetic, a summary value obtained from multiple amino acid D/L values from a single sample all normalised to a common model of protein degradation and racemization.

Enantiomers / optical isomers: mirror image forms of the same compound that cannot be superimposed on one another.

Epimerisation: the inversion of the chiral α-carbon atom.

Free amino acid fraction: The fraction of amino acids directly amenable to racemization analysis. Only amino acids which have already been naturally hydrolysed (over time) are measured. These are the most highly racemized amino acids.



Hydrolysis: A chemical reaction involving water leading to the breaking apart of a compound (in this case the breaking of peptide bonds to release amino acids).

L-amino acid: levorotary amino acid, the constituent form of proteins (remember as "living amino acid").

Peptide bond: an amide linkage between the carboxyl group of one amino acid and the amino group of another.

Racemization: the inversion of all chiral carbon atoms, leading to the decrease in specific optical rotation. When the optical rotation is reduced to zero, the mixture is said to be racemized.

Stereoisomers: molecules of the same compound that have their atoms arranged differently in space.

Total amino acid fraction: The extent of racemization of all amino acids in a sample, determined following aggressive high temperature hydrolysis with strong mineral acid, which has the effect of breaking apart all peptide bonds so that the total extent of racemization in all amino acids both free and peptide bound are measured.

Zwitterion: A dipolar ion containing ionic groups of opposite charge. At neutral pH the ionic form of amino acids which predominates is the zwitterions

DMK = Glx not alle / Ile?

Due to the problem of being unable to accurately measure A/I in our current system, we have switched to a version DMK which is normalized for Glutamic acid. Although D/L Glu ≡ A/I, we have not yet fully established this relationship.

What does the date estimated from DMK mean?

The date is our best estimate based upon the temperature history of the site. If we wanted to constrain this further we would need reliable independent dates. There are considerable differences in racemization rates between different molluscs. This reflects differences in rates of decomposition of proteins within the shell – the so-called species effects (Lajoie *et al* 1980).

Appendix 2

Past Use of Amino Acid Racemization Dating.

Amino acids were first reported in fossils by Abelson (1954). Later, it was discovered that the systematic changes of amino acids in an organism after its death could be used to determine the age of the fossil (Abelson 1956). Hare and Mitterer (1967) analysed fossil samples from the Miocene and discovered that the proportion of D-amino acids was significantly larger than those found in younger fossils.

The presence of proteins in archaeological remains has been known for some time. Nearly fifty years ago Abelson (1954) separated amino acids from subfossil shell. He suggested the possibility of using the kinetics of the degradation of amino acids as the basis for a dating method (Abelson 1955). In 1967 Hare and Abelson measured the extent of racemization of amino acids extracted from modern and sub-fossil *Mercenaria mercenaria* shells (edible clam). They found that the total amount of amino acids present in shell decreased with the age of the shell. The amino acids in recent shell were all in the L configuration and over time the amount of D configuration amino acid increased (Hare and Abelson 1967). However, even after 35 years this method of dating is still subject to vigorous debate, with the application of AAR to date bone being particularly controversial (Bada 1990; Marshall 1990). Major reviews of AAR include: Johnson and Miller (1997), Hare, von Endt, and Kokis (1997), Rutter and Blackwell (1995), Murray-Wallace (1993), Bada (1991) and Schroeder and Bada (1976). Racemization is a chemical reaction and a number of factors influence its rate (Rutter and Blackwell 1995). These include; amino acid structure, the sequence of amino acids in peptides, pH, buffering effects, metallic cations, the presence of water and temperature. To establish a dating method the kinetics and mechanisms of the racemization (and epimerization) reaction of free and peptide bound amino acids need to be established. To this end various workers in the late 1960s and the 1970s studied free amino acids in solution and carried out laboratory simulations of post mortem changes in the amino acids in bone (Bada 1972) and shell (Hare and Abelson 1967; Hare and Mitterer 1969). Attempts have also been made to relate the kinetics of free amino acids, with those in short polypeptides and the proteins in various archaeological samples (Bada 1982; Smith and Evans 1980).

The ability of this technique to be used as a geochronological and geothermometry tool has led to its use in many environmental studies. Goodfriend (1991; 1996) analysed terrestrial gastropods. Other studies have looked at bivalves (Goodfriend and Stanley 1996), foraminifera (Harada *et al* 1996), ostrich egg shells (Miller *et al* 1992; 1999) and speleothems (Lauritzen 1994; Moss 2002)

Appendix 3

Abbreviations used in this report

Abbrev	1-letter code	number of chiral centres	
Ala	A	1	Alanine
Arg	R	1	Arginine
Acn			acetonitrile
AA			Amino acid(n)
Asn	N	1	Asparagine
Asp	D	1	Aspartic acid
Asx			Asparagine + Aspartic acid + succinimide
Asu			Succinimide
Cys	C	1	Cysteine
DCM			Dichlormethane
GABA			γ-Aminobutyric acid
Gln	Q	1	Glutamine
Glu	E	1	Glutamic acid
Gly	G	0	Glycine
His	H	1	Histidine
HPLC			High-Performance Liquid Chromatography
Hyp			Hydroxyproline
IBD(L)C			N-Isobutyryl-D(L)-Cysteine
Ile	I	2	Isoleucin
Leu	L	1	Leucine
Lys	K	1	Lysine
MeOH			Methanol
Met	M	1	Methionine
Nle			Norleucine
OPA			ortho-Phthaldialdehyde
Orn			Ornithine
Phe	F	1	Phenylalanine
Pro	P	1	Proline
Ser	S	1	Serine
Thr	T	2	Threonine
Trp	W	1	Tryptophan
Tyr	Y	1	Tyrosine
Val	V	1	Valine

Appendix 4

Data sheets from PASHCC

Phylum	Genus	Species	location	Quaternary sites	SampleName	File
Gastropoda	*Trichia*	*hispida*	Harnham, 1HRR02 (49) <13> 50-60	Harnham	0507bF	KP118-4637.xls
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Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0820bF	g006-0828.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0820bH*c	g014-4469.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0820bH*c	g014-4482.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0821bF	g006-0911.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0821bF	g006-0929.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0821bH*a	g014-2351.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0821bH*c	g014-4570.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0821bH*c	g014-4583.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0822bF	g006-1012.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0822bF	g006-1030.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0822bH*	g013-1539.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0822bH*	g013-1550.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0822bH*	g013-1563.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0822bH*a	g014-2452.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0822bH*c	g014-4671.xls
Bivalvia	*Macoma*	*baltica*	Yeoman's Road, BH 2.6-2.8m	Yeoman's Road	0822bH*c	g014-4684.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0823bF	g006-1114.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0823bF	g006-1132.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0823bH*	g013-1640.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0823bH*	g013-1651.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0823bH*	g013-1664.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0823bH*a	g014-2553.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0823bH*c	g014-4772.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0823bH*c	g014-4788.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0824bF	g006-1215.xls

Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0824bF	g006-1233.xls
Bivalvia	*Macoma*	*baltica*	Portfield Pit, main section, marine sand	Portfield Pit	0824bH*a	g014-2654.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, P2 Unit III	Portfield Pit	0825bF	g006-1316.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, P2 Unit III	Portfield Pit	0825bF	g006-13AZ.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, P2 Unit III	Portfield Pit	0825bH*a	g014-2755.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, P2 Unit III	Portfield Pit	0825bH*c	g014-4873.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, P2 Unit III	Portfield Pit	0825bH*c	g014-4889.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0826bF	g006-1417.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0826bF	g006-1435.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0826bH*a	g014-2856.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0827bF	g006-1518.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0827bF	g006-1536.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0827bH*	g013-1741.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0827bH*	g013-1752.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0827bH*	g013-1765.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0827bH*a	g014-2995.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0827bH*c	g014-4974.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0827bH*c	g014-4990.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0828bF	g006-1638.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0828bF	g006-1663.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0828bH*a	g015-3001.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0828bH*c	g014-5075.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.86-0.95	Portfield Pit	0828bH*c	g014-5091.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, Tr 31-10-96, Unit VII	Portfield Pit	0829bF	g006-1739.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, Tr 31-10-96, Unit VII	Portfield Pit	0829bF	g006-1764.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, Tr 31-10-96, Unit VII	Portfield Pit	0829bH*a	g014-3186.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, Tr 31-10-96, Unit VII	Portfield Pit	0829bH*a	g014-3193.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0830bF	g006-1840.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0830bF	g006-1865.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0830bH*a	g014-3285.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0830bH*a	g014-3292.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0831bF	g006-1941.xls

Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0831bF	g006-1966.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0831bH*a	g014-3387.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0831bH*a	g014-3394.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0832bF	g006-2042.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0832bF	g006-2067.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0832bH*a	h012-0104.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0832bH*c	h012-1215.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0833bF	g006-2144.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0833bF	g006-2169.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0833bH*	g006-65B3.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, TrA, 0.97-1.05	Portfield Pit	0833bH*	g006-65B9.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0834bF	g006-2245.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0834bF	g006-22B0.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0834bH*a	h012-0205.xls
Gastropoda	*Lymnaea*	*trunculata*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0834bH*c	h012-1316.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0835bF	g006-2346.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0835bF	g006-2371.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0835bH*a	h012-0306.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0835bH*c	h012-1418.xls
Gastropoda	*Pupilla*	*muscorum*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0835bH*c	h012-1432.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0836bF	g006-2447.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0836bF	g006-2372.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0836bH*a	h012-0407.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0836bH*c	h012-1519.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0836bH*c	h012-1533.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0837bF	g006-2548.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0837bF	g006-2573.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0837bH*a	h012-0508.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0837bH*a	h012-0534.xls
Gastropoda	*Trichia*	*hispida*	Portfield Pit, PP/95, Unit III/IV	Portfield Pit	0837bH*c	h012-1620.xls
Gastropoda	*Lymnaea*	*trunculata*	Norton Farm, Unit 9 (8)	Norton Farm	0838bF	g006-2650.xls
Gastropoda	*Lymnaea*	*trunculata*	Norton Farm, Unit 9 (8)	Norton Farm	0838bF	g006-2675.xls

Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 9 (8)	Norton Farm	0838bH*	g006-66B4.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 9 (8)	Norton Farm	0838bH*	g006-66BA.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 9 (8)	Norton Farm	0838bH*c	h012-1721.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 9 (8)	Norton Farm	0838bH*c	h012-1735.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0839bF	g006-2751.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0839bF	g006-2776.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0839bH*a	h012-0609.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0839bH*c	h012-1822.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0839bH*c	h012-1836.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0840bF	g006-2852.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0840bF	g006-2877.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0840bH*a	h012-0710.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0840bH*c	h012-1923.xls
Gastropoda	*Lymnaea*	*truncculata*	Norton Farm, Unit 10 (7)	Norton Farm	0840bH*c	h012-1937.xls
Gastropoda	*Trichia*	*hispida*	Brooks Field North, 1986 Tp3	Brooks Field	0841bF	g006-2953.xls
Gastropoda	*Trichia*	*hispida*	Brooks Field North, 1986 Tp3	Brooks Field	0841bF	g006-2978.xls
Gastropoda	*Trichia*	*hispida*	Brooks Field North, 1986 Tp3	Brooks Field	0841bH*a	h012-0811.xls
Gastropoda	*Trichia*	*hispida*	Brooks Field North, 1986 Tp3	Brooks Field	0841bH*a	h012-0838.xls
Gastropoda	*Trichia*	*hispida*	Brooks Field North, 1986 Tp3	Brooks Field	0841bH*c	h012-2024.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0842bF	g006-3054.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0842bF	g006-3079.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0842bH*	g006-67B5.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0842bH*	g006-67BB.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0842bH*c	h012-2125.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0842bH*c	h012-2139.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0843bF	g006-3156.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0843bF	g006-3181.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0843bH*a	h012-0912.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0843bH*c	h012-2226.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0843bH*c	h012-2240.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0844bF	g006-3257.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0844bF	g006-3282.xls

Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0844bH*c	h012-2327.xls
Bivalvia	*Macoma*	*baltica*	Oving, BH, 8-9m	Oving	0844bH*c	g015-5102.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0845bF	g006-3358.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0845bF	g006-3383.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0845bH*a	h012-1114.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0845bH*c	h012-2428.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0845bH*c	g015-5203.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0846bF	g006-3459.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0846bF	g006-3484.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0846bH*c	h012-2529.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0846bH*c	g015-5304.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0847bF	g006-3560.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0847bF	g006-3585.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0847bH*c	h012-2630.xls
Gastropoda	*Littorina*	*obtusa*	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	Brighton	0847bH*c	g015-5405.xls
Gastropoda	*Bithynia*	*tentaculata*	Pennington, Penn Marshes	Pennington	0949bF	G019-0102.xls
Gastropoda	*Bithynia*	*tentaculata*	Pennington, Penn Marshes	Pennington	0949bF	G019-0102.xls
Gastropoda	*Bithynia*	*tentaculata*	Pennington, Penn Marshes	Pennington	0949bH*	G021-2052.xls
Gastropoda	*Bithynia*	*tentaculata*	Pennington, Penn Marshes	Pennington	0949bH*	G021-2069.xls
Gastropoda	*Vallonia*	sp	Pennington, Penn Marshes	Pennington	0950bF	G019-0203.xls
Gastropoda	*Vallonia*	sp	Pennington, Penn Marshes	Pennington	0950bF	G019-0203.xls
Gastropoda	*Vallonia*	sp	Pennington, Penn Marshes	Pennington	0950bH*	G021-3053.xls
Gastropoda	*Vallonia*	sp	Pennington, Penn Marshes	Pennington	0950bH*	G021-3070.xls
Gastropoda	*Belgrandia*	sp	Pennington, Penn Marshes	Pennington	0951bF	G019-0304.xls
Gastropoda	*Belgrandia*	sp	Pennington, Penn Marshes	Pennington	0951bF	G019-0304.xls
Gastropoda	*Belgrandia*	sp	Pennington, Penn Marshes	Pennington	0951bH*	G021-3154.xls
Gastropoda	*Belgrandia*	sp	Pennington, Penn Marshes	Pennington	0951bH*	G021-3171.xls
Bivalvia	*Carydium*	sp	Pennington, Penn Marshes	Pennington	0952bF	G019-0405.xls
Bivalvia	*Carydium*	sp	Pennington, Penn Marshes	Pennington	0952bF	G019-0405.xls
Bivalvia	*Carydium*	sp	Pennington, Penn Marshes	Pennington	0952bH*	G021-3255.xls
Bivalvia	*Carydium*	sp	Pennington, Penn Marshes	Pennington	0952bH*	G021-3272.xls
Gastropoda	*Valvata*	sp	Pennington, Penn Marshes	Pennington	0953bF	G019-0506.xls

Gastropoda	*Valvata*	sp	Pennington, Penn Marshes	Pennington	0953bF	G019-0506.xls
Gastropoda	*Valvata*	sp	Pennington, Penn Marshes	Pennington	0953bH*	G021-3356.xls
Gastropoda	*Valvata*	sp	Pennington, Penn Marshes	Pennington	0953bH*	G021-3373.xls
Gastropoda	*Euconulus*	*fulvus*	Pennington, Penn Marshes	Pennington	0954bF	G019-0607.xls
Gastropoda	*Euconulus*	*fulvus*	Pennington, Penn Marshes	Pennington	0954bF	G019-0607.xls
Gastropoda	*Euconulus*	*fulvus*	Pennington, Penn Marshes	Pennington	0954bH*	G021-3457.xls
Gastropoda	*Euconulus*	*fulvus*	Pennington, Penn Marshes	Pennington	0954bH*	G021-3474.xls
Gastropoda	*Lymnaea*	sp	Pennington, Penn Marshes	Pennington	0955bH*	G021-3558.xls
Gastropoda	*Lymnaea*	sp	Pennington, Penn Marshes	Pennington	0955bH*	G021-3575.xls
Gastropoda	*Hydrobia*	*ulvae*	Selsey, West Street, WSS/03 2.1	Selsey	0959bF	G021-1445.xls
Gastropoda	*Hydrobia*	*ulvae*	Selsey, West Street, WSS/03 2.1	Selsey	0959bF	G021-1463.xls
Gastropoda	*Hydrobia*	*ulvae*	Selsey, West Street, WSS/03 2.1	Selsey	0959bH*	G021-2410.xls
Gastropoda	*Hydrobia*	*ulvae*	Selsey, West Street, WSS/03 2.1	Selsey	0959bH*	G020-2444.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0960bF	G021-1546.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0960bF	G021-1564.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0960bH*	G021-2512.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0960bH*	G020-2545.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0961bF	G021-1647.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0961bF	G021-1665.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0961bH*	G021-2613.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0961bH*	G020-2646.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0962bF	G021-1741.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0962bF	G021-1766.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0962bH*	G021-2704.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0962bH*	G021-2714.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0963bF	G021-1849.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0963bF	G021-1867.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0963bH*	G021-2805.xls
Gastropoda	*Rissoa*	*membranacea*	Selsey, West Street, WSS/03 9.1	Selsey	0963bH*	G021-2815.xls
Gastropoda	*Hydrobia*	*ventrosa*	Lepe, Stone Point, 03 4.6	Lepe	0964bF	G021-1950.xls
Gastropoda	*Hydrobia*	*ventrosa*	Lepe, Stone Point, 03 4.6	Lepe	0964bF	G021-1968.xls
Gastropoda	*Hydrobia*	*ventrosa*	Lepe, Stone Point, 03 4.6	Lepe	0964bH*	G021-2906.xls

Gastropoda *Hydrobia ventrosa* Lepe, Stone Point, 03 4.6 Lepe 0964bH* G021-2916.xls

Sample Name	File	Location	Asx conc	Glx conc	Ser conc	L Thr conc / mg	L His conc / mg	Gly conc / mg	Arg conc	Ala conc	Val conc	Phe conc	Leu conc	Ile conc
0507bF	KP118-4637.xls	Harnham, 1HRR02 (49) <13> 50-60	959	494	253	120	278	3183	156	1035	373	300	505	302
0507bF	KP122-4632.xls	Harnham, 1HRR02 (49) <13> 50-60	1168	538	265	129	295	2406	236	1091	447	388	542	358
0507bF	KP122-4647.xls	Harnham, 1HRR02 (49) <13> 50-60	1123	530	265	129	295	2449	256	1075	431	343	550	291
0507bH6	KP118-5142.xls	Harnham, 1HRR02 (49) <13> 50-60	1471	1906	566	305	351	4690	268	1446	636	635	887	539
0507bH6	KP122-5137.xls	Harnham, 1HRR02 (49) <13> 50-60	1752	2045	589	308	360	3841	420	1488	712	799	940	584
0507bH6	KP122-5152.xls	Harnham, 1HRR02 (49) <13> 50-60	1780	2068	579	321	362	3723	406	1477	764	726	949	457
0507uF	KP118-3625.xls	Harnham, 1HRR02 (49) <13> 50-60	1196	533	350	160	1058	3562	240	1295	465	401	552	337
0507uF	KP119-3614.xls	Harnham, 1HRR02 (49) <13> 50-60	1321	582	366	186	1131	2799	250	1364	564	434	681	445
0507uF	KP122-3621.xls	Harnham, 1HRR02 (49) <13> 50-60	1291	566	357	172	818	2642	231	1362	508	507	566	354
0507uH6	KP118-4131.xls	Harnham, 1HRR02 (49) <13> 50-60	2124	1816	609	334	179	5972	318	1772	761	695	1000	667
0507uH6	KP119-4121.xls	Harnham, 1HRR02 (49) <13> 50-60	2301	1926	675	364	229	4807	412	1829	803	698	1063	718
0507uH6	KP122-4127.xls	Harnham, 1HRR02 (49) <13> 50-60	2485	1929	652	346	256	4558	384	1863	766	723	955	475
0508bF	KP122-6062.xls	Harnham, 1HRR02 (49) <13> 50-60	1610	647	342	196	0	3187	217	1409	607	443	657	421
0508bF	KP122-6079.xls	Harnham, 1HRR02 (49) <13> 50-60	1537	666	356	202	0	3076	216	1429	623	420	681	394
0508bF	KP123-6010.xls	Harnham, 1HRR02 (49) <13> 50-60	1486	629	348	192	71	2476	230	1406	630	399	682	403
0508bH*	KP122-7266.xls	Harnham, 1HRR02 (49) <13> 50-60	2121	1880	407	338	288	4464	0	1730	813	814	960	559
0508bH*	KP122-7281.xls	Harnham, 1HRR02 (49) <13> 50-60	2022	1948	417	356	290	4778	0	1703	820	791	1013	479

0508bH*	KP123-7212.xls	Harnham, 1HRR02 (49) <13> 50-60	1923	1870	395	340	263	4567	167	1685	799	699	930	524
0508bH*	KP123-7212.xls	Harnham, 1HRR02 (49) <13> 50-60	1923	1870	395	340	263	4567	167	1685	799	699	930	524
0508bH6	KP122-7468.xls	Harnham, 1HRR02 (49) <13> 50-60	2243	2003	498	363	272	4654	335	1861	843	820	996	553
0508bH6	KP122-7483.xls	Harnham, 1HRR02 (49) <13> 50-60	2129	2098	527	386	477	5369	367	1882	838	794	1047	438
0508bH6	KP123-7414.xls	Harnham, 1HRR02 (49) <13> 50-60	2045	2021	507	375	463	4638	351	1882	874	726	1005	502
0508uF	KP122-5658.xls	Harnham, 1HRR02 (49) <13> 50-60	1661	654	323	207	227	3679	232	1493	646	510	710	441
0508uF	KP122-5671.xls	Harnham, 1HRR02 (49) <13> 50-60	1585	643	324	207	240	3699	234	1492	645	506	711	466
0508uF	KP123-5606.xls	Harnham, 1HRR02 (49) <13> 50-60	1514	646	348	212	250	3138	233	1533	688	456	725	450
0508uH*	KP122-5860.xls	Harnham, 1HRR02 (49) <13> 50-60	3135	2325	539	476	441	5112	173	1924	972	866	1061	596
0508uH*	KP122-5877.xls	Harnham, 1HRR02 (49) <13> 50-60	2783	2240	542	459	403	4499	200	2172	958	797	1057	660
0508uH*	KP123-5808.xls	Harnham, 1HRR02 (49) <13> 50-60	2847	2310	533	473	414	4418	267	1923	1017	789	1081	684
0508uH*	KP123-5808.xls	Harnham, 1HRR02 (49) <13> 50-60	2847	2310	533	473	414	4418	267	1923	1017	789	1081	684
0509bF	KP122-7163.xls	Harnham, 1HRR02 (49) <13> 50-60	1125	528	248	120	249	2536	162	1089	469	365	526	334
0509bF	KP122-7180.xls	Harnham, 1HRR02 (49) <13> 50-60	1141	544	264	128	261	2575	164	1118	476	342	546	303
0509bF	KP123-7111.xls	Harnham, 1HRR02 (49) <13> 50-60	1083	502	249	124	243	2332	155	1087	480	319	531	306
0509bH*	KP122-7367.xls	Harnham, 1HRR02 (49) <13> 50-60	1669	1433	325	230	0	3267	0	1332	636	653	728	526
0509bH*	KP122-7382.xls	Harnham, 1HRR02 (49) <13> 50-60	1582	1495	333	244	0	3667	0	1313	642	618	757	355
0509bH*	KP123-7313.xls	Harnham, 1HRR02 (49) <13> 50-60	1491	1465	321	236	174	3317	91	1323	659	603	734	503
0509bH6	KP122-7569.xls	Harnham, 1HRR02 (49) <13> 50-60	1461	1439	353	236	442	3388	108	1306	632	660	888	445
0509bH6	kp122-7584.xls	Harnham, 1HRR02 (49) <13> 50-60	1498	1508	382	255	449	3750	256	1313	635	620	965	400

0509bH6	kp122-7584.xls	Harnham, 1HRR02 (49) <13> 50-60	1498	1508	382	255	449	3750	256	1313	635	620	965	400
0509bH6	KP123-7515.xls	Harnham, 1HRR02 (49) <13> 50-60	1418	1446	365	241	440	3398	233	1292	651	593	902	428
0509uF	KP122-5759.xls	Harnham, 1HRR02 (49) <13> 50-60	1323	591	343	166	519	3030	337	1244	536	460	665	380
0509uF	KP122-5776.xls	Harnham, 1HRR02 (49) <13> 50-60	1232	597	395	170	503	2462	413	1385	529	421	681	352
0509uF	KP123-5707.xls	Harnham, 1HRR02 (49) <13> 50-60	1192	572	309	176	495	2456	487	1212	557	394	652	360
0509uH*	KP122-5961.xls	Harnham, 1HRR02 (49) <13> 50-60	2654	1810	578	339	260	4641	376	1544	786	804	1006	537
0509uH*	KP122-5978.xls	Harnham, 1HRR02 (49) <13> 50-60	2617	1865	607	348	247	4482	389	1621	815	766	1056	481
0509uH*	KP123-5909.xls	Harnham, 1HRR02 (49) <13> 50-60	2530	1804	584	331	230	4053	365	1559	835	706	1033	537
0510bF	KP118-4738.xls	Harnham, 1HRR02 (49) <13> 50-60	1128	524	279	143	0	3184	185	1133	448	314	528	319
0510bF	KP122-4733.xls	Harnham, 1HRR02 (49) <13> 50-60	1313	563	295	144	0	2236	180	1203	512	394	562	353
0510bF	KP122-4748.xls	Harnham, 1HRR02 (49) <13> 50-60	1378	590	305	163	0	2533	185	1211	528	385	590	340
0510bH6	KP118-5243.xls	Harnham, 1HRR02 (49) <13> 50-60	1459	1469	419	269	258	4525	303	1315	599	571	762	478
0510bH6	KP122-5238.xls	Harnham, 1HRR02 (49) <13> 50-60	1757	1559	468	283	287	3613	253	1413	673	730	806	535
0510bH6	KP122-5253.xls	Harnham, 1HRR02 (49) <13> 50-60	1814	1635	447	291	294	3780	262	1400	709	654	845	407
0510uF	KP118-3727.xls	Harnham, 1HRR02 (49) <13> 50-60	1105	542	303	151	128	3410	198	1202	468	313	577	298
0510uF	KP119-3716.xls	Harnham, 1HRR02 (49) <13> 50-60	1302	618	314	171	173	2773	205	1289	574	324	691	366
0510uF	KP122-3722.xls	Harnham, 1HRR02 (49) <13> 50-60	1241	592	305	161	169	2561	193	1278	505	372	630	314
0510uH6	KP118-4232.xls	Harnham, 1HRR02 (49) <13> 50-60	2187	1705	428	350	338	5594	396	1591	668	585	844	485
0510uH6	KP119-4222.xls	Harnham, 1HRR02 (49) <13> 50-60	2333	1809	461	370	368	4632	390	1681	868	606	903	539
0510uH6	KP122-4228.xls	Harnham, 1HRR02 (49) <13> 50-60	2515	1778	450	362	509	4225	336	1691	805	752	880	497

0512bF	KP118-4839.xls	Harnham, 1HRR02 (49) <13> 50-60	2059	721	436	278	276	5149	267	2277	662	528	1063	478
0512bF	KP122-4834.xls	Harnham, 1HRR02 (49) <13> 50-60	2347	741	440	284	215	3656	267	2352	699	609	1071	498
0512bF	KP122-4849.xls	Harnham, 1HRR02 (49) <13> 50-60	2398	755	451	278	0	3694	277	2364	702	551	1122	460
0512bH6	KP118-5344.xls	Harnham, 1HRR02 (49) <13> 50-60	2770	2655	581	523	195	6859	399	2719	929	865	1608	607
0512bH6	KP122-5339.xls	Harnham, 1HRR02 (49) <13> 50-60	3456	2984	701	586	258	4902	525	3285	1039	990	1857	558
0512bH6	KP122-5354.xls	Harnham, 1HRR02 (49) <13> 50-60	3409	2926	649	581	259	5444	505	2880	1054	972	1775	629
0512uF	KP118-3828.xls	Harnham, 1HRR02 (49) <13> 50-60	2025	751	418	274	1234	5955	256	2571	558	506	1100	398
0512uF	KP119-3817.xls	Harnham, 1HRR02 (49) <13> 50-60	2251	824	449	306	1386	4866	299	2749	619	534	1311	530
0512uF	KP122-3823.xls	Harnham, 1HRR02 (49) <13> 50-60	2186	784	445	288	849	4514	270	2722	611	625	1163	353
0512uH6	KP118-4333.xls	Harnham, 1HRR02 (49) <13> 50-60	3731	3440	905	757	585	8399	587	3465	1363	1104	2097	947
0512uH6	KP119-4323.xls	Harnham, 1HRR02 (49) <13> 50-60	3731	3411	884	773	782	6314	692	3664	1507	1169	2202	1109
0512uH6	KP122-4329.xls	Harnham, 1HRR02 (49) <13> 50-60	4321	3580	934	801	630	5910	772	3658	1386	1198	2066	918
0513bF	KP118-4940.xls	Harnham, 1HRR02 (48) <10> 20-30	1895	698	491	291	1876	4665	242	2479	766	640	784	446
0513bF	KP122-4935.xls	Harnham, 1HRR02 (48) <10> 20-30	2059	709	522	285	359	3536	316	2636	785	736	821	425
0513bF	KP122-4950.xls	Harnham, 1HRR02 (48) <10> 20-30	2225	715	537	284	338	3457	348	2657	803	628	839	455
0513bH6	KP118-5445.xls	Harnham, 1HRR02 (48) <10> 20-30	2556	2489	633	447	436	6207	363	2672	848	830	1546	742
0513bH6	KP122-5440.xls	Harnham, 1HRR02 (48) <10> 20-30	3152	2711	723	496	492	4796	408	3014	953	845	1712	687
0513bH6	KP122-5455.xls	Harnham, 1HRR02 (48) <10> 20-30	3117	2640	689	485	485	4654	431	2825	944	860	1689	725
0513uF	KP118-3929.xls	Harnham, 1HRR02 (48) <10> 20-30	2373	814	603	302	721	8019	436	2967	677	934	1208	486
0513uF	KP119-3918.xls	Harnham, 1HRR02 (48) <10> 20-30	2671	914	680	329	1158	6648	431	3200	768	889	1356	560

0513uF	KP122-3924.xls	Harnham, 1HRR02 (48) <10> 20-30	2498	830	683	282	892	6126	204	3087	642	1112	1230	402
0513uH6	KP118-4434.xls	Harnham, 1HRR02 (48) <10> 20-30	3369	3586	1343	641	167	8506	710	3508	1621	2283	2021	1183
0513uH6	KP119-4424.xls	Harnham, 1HRR02 (48) <10> 20-30	3617	3797	1457	690	201	6595	687	3611	1517	1830	2306	799
0513uH6	KP122-4430.xls	Harnham, 1HRR02 (48) <10> 20-30	3992	3759	1409	697	0	6041	914	3717	1403	1981	2179	1284
0514bF	KP118-5041.xls	Harnham, 1HRR02 (49) <72> 40-50	1657	689	410	240	1090	5515	282	1933	624	625	746	523
0514bF	KP122-5036.xls	Harnham, 1HRR02 (49) <72> 40-50	1982	720	419	236	595	3990	472	2010	686	653	720	571
0514bF	KP122-5051.xls	Harnham, 1HRR02 (49) <72> 40-50	1889	707	405	229	475	3603	611	1979	668	543	721	455
0514bH6	KP118-5546.xls	Harnham, 1HRR02 (49) <72> 40-50	1802	1753	435	366	343	5345	419	1716	656	738	835	568
0514bH6	KP122-5541.xls	Harnham, 1HRR02 (49) <72> 40-50	2030	1949	491	390	673	5109	382	1922	779	767	927	423
0514bH6	KP122-5556.xls	Harnham, 1HRR02 (49) <72> 40-50	2197	1925	463	392	681	5390	365	1788	754	776	932	547
0514uF	KP118-4030.xls	Harnham, 1HRR02 (49) <72> 40-50	1825	732	645	288	1990	5926	481	2089	862	966	764	618
0514uF	KP119-4019.xls	Harnham, 1HRR02 (49) <72> 40-50	2070	810	812	337	1973	4901	488	2245	965	938	1025	876
0514uF	KP122-4025.xls	Harnham, 1HRR02 (49) <72> 40-50	1977	753	664	298	1059	4274	254	2199	683	1077	755	491
0514uH6	KP118-4535.xls	Harnham, 1HRR02 (49) <72> 40-50	2633	1861	604	492	666	6446	351	1825	738	701	1022	600
0514uH6	KP122-4531.xls	Harnham, 1HRR02 (49) <72> 40-50	3053	1949	631	523	429	4782	450	1925	832	804	1100	663
0514uH6	KP122-4546.xls	Harnham, 1HRR02 (49) <72> 40-50	3271	2061	679	565	457	5182	515	1980	859	751	1157	642
0813bF	g006-0102.xls	Red Barns, RB99/Tp1/115-U/s89	1150	625	282	148	0	3091	183	1312	497	401	939	307
0813bF	g006-0120.xls	Red Barns, RB99/Tp1/115-U/s89	1123	612	268	126	0	2978	171	1231	491	411	978	313
0813bH*	g006-22B1.xls	Red Barns, RB99/Tp1/115-U/s89	1749	1839	478	336	0	4472	340	1619	838	755	1468	563
0813bH*	g006-59B7.xls	Red Barns, RB99/Tp1/115-U/s89	1771	1851	476	342	0	4448	337	1605	826	744	1490	572

0814bF	g006-0203.xls	Red Barns, RB99/Tp1/115-U/s89	1345	856	286	119	0	2354	152	1564	488	385	1045	404
0814bF	g006-0221.xls	Red Barns, RB99/Tp1/115-U/s89	1318	849	271	117	0	2462	144	1504	476	374	1086	396
0814bH*a	g014-1839.xls	Red Barns, RB99/Tp1/115-U/s89	1897	2406	444	418	0	3712	123	1890	725	415	1473	595
0814bH*a	g014-1845.xls	Red Barns, RB99/Tp1/115-U/s89	1838	2343	445	424	70	3694	127	1840	734	427	1472	635
0814bH*c	g014-3964.xls	Red Barns, RB99/Tp1/115-U/s89	2067	2736	647	533	92	4941	198	2105	883	513	1813	755
0814bH*c	g014-3977.xls	Red Barns, RB99/Tp1/115-U/s89	2191	2855	689	561	91	5137	205	2177	912	509	1851	758
0815bF	g006-0304.xls	Red Barns, RB99/Tp1/115-U/s89	1345	850	295	128	0	2460	195	1566	476	342	1159	456
0815bF	g006-0322.xls	Red Barns, RB99/Tp1/115-U/s89	1334	850	288	127	0	2539	173	1530	475	356	1195	462
0815bH*a	g014-1940.xls	Red Barns, RB99/Tp1/115-U/s89	1959	2391	509	355	0	3869	133	1996	714	424	1636	699
0815bH*a	g014-1946.xls	Red Barns, RB99/Tp1/115-U/s89	1933	2386	507	340	0	3946	134	2002	706	420	1679	725
0815bH*c	g014-4065.xls	Red Barns, RB99/Tp1/115-U/s89	1926	2277	457	394	67	3902	168	2079	796	463	1836	801
0815bH*c	g014-4078.xls	Red Barns, RB99/Tp1/115-U/s89	2000	2284	475	407	60	3911	342	2117	799	459	1869	806
0816bF	g006-0405.xls	Red Barns, RB99/Tp1/115-U/s89	2255	909	348	299	0	5597	274	2594	745	653	1948	460
0816bF	g006-0423.xls	Red Barns, RB99/Tp1/115-U/s89	2236	903	341	316	0	5650	277	2563	713	637	1978	468
0816bH*a	g014-2041.xls	Red Barns, RB99/Tp1/115-U/s89	4501	4877	2238	1057	339	8759	683	3651	1605	1150	3721	1095
0816bH*a	g014-2047.xls	Red Barns, RB99/Tp1/115-U/s89	4341	4822	2219	1042	315	8685	683	3616	1564	1119	3634	1071
0816bH*c	g014-4166.xls	Red Barns, RB99/Tp1/115-U/s89	4815	5310	2022	1338	288	10643	900	4245	2263	1458	4370	1351
0816bH*c	g014-4179.xls	Red Barns, RB99/Tp1/115-U/s89	5007	5409	2083	1411	305	10802	1204	4312	2294	1457	4382	1382
0817bF	g006-0506.xls	Red Barns, RB99/Tp1/115-L/s93	1175	747	283	132	0	3068	193	1274	531	382	1074	354
0817bF	g006-0524.xls	Red Barns, RB99/Tp1/115-L/s93	1165	739	264	146	0	3239	193	1249	541	401	1116	372

0817bH*c	g014-4267.xls	Red Barns, RB99/Tp1/115-L/s93	1843	2146	520	319	96	4124	194	1722	893	587	1855	666
0817bH*c	g014-4280.xls	Red Barns, RB99/Tp1/115-L/s93	1873	2147	531	335	92	4191	368	1725	877	580	1854	648
0818bF	g006-0608.xls	Red Barns, RB99/Tp1/115-L/s93	1352	762	289	180	0	3503	218	1347	560	414	1189	376
0818bF	g006-0626.xls	Red Barns, RB99/Tp1/115-L/s93	1361	757	284	154	0	3326	198	1336	572	445	1236	424
0818bH*	g006-22B2.xls	Red Barns, RB99/Tp1/115-L/s93	2124	2166	445	416	0	4704	391	1789	1003	804	1859	744
0818bH*	g006-60B8.xls	Red Barns, RB99/Tp1/115-L/s93	2137	2161	439	439	0	4557	380	1773	1008	815	1839	750
0818bH*c	g014-4368.xls	Red Barns, RB99/Tp1/115-L/s93	2490	2798	788	539	131	5385	280	2054	1177	799	2149	903
0818bH*c	g014-4381.xls	Red Barns, RB99/Tp1/115-L/s93	2596	2863	813	552	122	5529	280	2069	1116	775	2134	857
0819bF	g006-0709.xls	Red Barns, RB99/Tp1/115-L/s93	1410	847	311	143	0	3626	218	1534	564	436	1233	439
0819bF	g006-0727.xls	Red Barns, RB99/Tp1/115-L/s93	1408	837	302	143	0	3471	197	1522	611	502	1225	481
0819bH*a	g014-2243.xls	Red Barns, RB99/Tp1/115-L/s93	2266	2545	691	409	112	4994	403	1989	958	655	1957	771
0819bH*a	g014-2250.xls	Red Barns, RB99/Tp1/115-L/s93	2222	2562	681	407	113	4869	228	1990	961	634	1992	758
0820bF	g006-0810.xls	Yeoman's Road, BH 2.6-2.8m	2036	540	451	375	0	3738	530	2473	944	371	975	394
0820bF	g006-0828.xls	Yeoman's Road, BH 2.6-2.8m	2026	543	441	405	0	3651	517	2460	965	445	1020	465
0820bH*c	g014-4469.xls	Yeoman's Road, BH 2.6-2.8m	5244	2801	975	1023	183	5948	1022	3768	2393	831	2190	1026
0820bH*c	g014-4482.xls	Yeoman's Road, BH 2.6-2.8m	5415	2867	1000	1052	185	5966	1435	3852	2423	839	2181	1032
0821bF	g006-0911.xls	Yeoman's Road, BH 2.6-2.8m	1935	514	444	383	0	3677	491	2378	891	375	798	365
0821bF	g006-0929.xls	Yeoman's Road, BH 2.6-2.8m	1920	509	436	393	0	3560	478	2368	910	419	852	395
0821bH*a	g014-2351.xls	Yeoman's Road, BH 2.6-2.8m	5175	2811	1045	965	176	5630	921	3582	2193	777	2127	935
0821bH*c	g014-4570.xls	Yeoman's Road, BH 2.6-2.8m	5159	2727	1057	1162	0	7793	874	3941	2463	1436	1989	930

0821bH*c	g014-4583.xls	Yeoman's Road, BH 2.6-2.8m	4801	2562	987	937	0	7727	843	3547	2283	1284	2003	856
0822bF	g006-1012.xls	Yeoman's Road, BH 2.6-2.8m	1970	523	461	398	0	3703	515	2386	907	372	840	377
0822bF	g006-1030.xls	Yeoman's Road, BH 2.6-2.8m	1947	523	452	395	0	3611	483	2373	960	444	915	421
0822bH*	g013-1539.xls	Yeoman's Road, BH 2.6-2.8m	4787	2536	953	987	188	5514	1309	3788	2104	774	2003	884
0822bH*	g013-1550.xls	Yeoman's Road, BH 2.6-2.8m	4979	2625	958	1025	180	5585	1301	3841	2217	785	2041	927
0822bH*	g013-1563.xls	Yeoman's Road, BH 2.6-2.8m	5027	2647	959	1036	178	5341	1302	3865	2257	796	2054	945
0822bH*a	g014-2452.xls	Yeoman's Road, BH 2.6-2.8m	5062	2728	934	1045	187	5299	925	3692	2278	784	2183	1004
0822bH*c	g014-4671.xls	Yeoman's Road, BH 2.6-2.8m	5902	3266	1205	1203	260	6135	1577	4299	2696	928	2481	1144
0822bH*c	g014-4684.xls	Yeoman's Road, BH 2.6-2.8m	5801	3204	1187	1196	235	6782	1545	4262	2632	914	2404	1101
0823bF	g006-1114.xls	Portfield Pit, main section, marine sand	3626	1303	1051	688	0	5745	1201	4726	1710	811	2099	957
0823bF	g006-1132.xls	Portfield Pit, main section, marine sand	3635	1298	1033	693	0	5706	1184	4662	1665	706	2089	874
0823bH*	g013-1640.xls	Portfield Pit, main section, marine sand	7913	5427	1653	1594	363	8407	2422	6216	3907	1645	4299	2206
0823bH*	g013-1651.xls	Portfield Pit, main section, marine sand	8272	5574	1681	1673	372	8635	2393	6352	4133	1705	4434	2325
0823bH*	g013-1664.xls	Portfield Pit, main section, marine sand	8384	5644	1714	1707	361	10054	2412	6491	4233	1718	4508	2382
0823bH*a	g014-2553.xls	Portfield Pit, main section, marine sand	8756	5868	1803	1669	329	8498	1635	6194	4000	1565	4157	2249
0823bH*c	g014-4772.xls	Portfield Pit, main section, marine sand	12786	8576	2479	2492	580	16850	2691	9929	6326	2537	6579	3613
0823bH*c	g014-4788.xls	Portfield Pit, main section, marine sand	13641	9355	2762	2674	535	16019	4541	10744	6515	2672	7052	3683
0824bF	g006-1215.xls	Portfield Pit, main section, marine sand	2809	1034	730	509	0	4627	1066	3808	1356	557	1548	685
0824bF	g006-1233.xls	Portfield Pit, main section, marine sand	2771	1027	724	485	0	4677	998	3797	1350	575	1592	649
0824bH*a	g014-2654.xls	Portfield Pit, main section, marine sand	8767	5985	1882	1658	290	9722	1696	6258	3947	1496	4121	2211

0825bF	g006-1316.xls	Portfield Pit, P2 Unit III	2044	808	618	381	0	4762	166	2777	679	674	2131	371
0825bF	g006-13AZ.xls	Portfield Pit, P2 Unit III	1883	749	662	397	174	4194	170	3012	758	665	2231	367
0825bH*a	g014-2755.xls	Portfield Pit, P2 Unit III	3738	3765	1093	886	123	6664	319	3632	1210	796	3036	665
0825bH*c	g014-4873.xls	Portfield Pit, P2 Unit III	3887	3875	1111	1167	126	7658	439	4166	1601	1227	3869	882
0825bH*c	g014-4889.xls	Portfield Pit, P2 Unit III	3514	3673	1085	1019	0	7020	424	4109	1550	1222	3841	894
0826bF	g006-1417.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	1660	704	632	252	0	6968	338	1967	659	986	919	215
0826bF	g006-1435.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	1681	692	642	282	0	6300	357	2325	635	833	873	190
0826bH*a	g014-2856.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2427	2294	827	473	0	9148	277	2389	984	1237	1806	568
0827bF	g006-1518.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	1088	485	282	201	0	2977	102	1211	401	482	1139	207
0827bF	g006-1536.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	1088	480	281	194	0	2867	105	1309	394	434	1063	198
0827bH*	g013-1741.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2218	2005	537	476	143	5168	274	1857	823	764	2555	479
0827bH*	g013-1752.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2194	1954	531	483	153	5223	271	1847	841	785	2562	492
0827bH*	g013-1765.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2182	1938	525	488	148	4997	282	1842	856	788	2613	506
0827bH*a	g014-2995.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2649	2632	797	601	156	6268	337	2013	893	793	2624	542
0827bH*c	g014-4974.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2748	2544	620	579	144	7321	312	2089	1012	930	2825	570
0827bH*c	g014-4990.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2590	2486	630	572	108	7239	538	2097	1041	908	2763	568
0828bF	g006-1638.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2521	957	669	332	0	7196	360	3206	672	785	1803	240
0828bF	g006-1663.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	2489	922	646	325	0	6459	316	3092	660	951	1886	281
0828bH*a	g015-3001.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	4004	3926	1319	869	391	8054	649	3818	1195	916	3337	720
0828bH*c	g014-5075.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	4474	3996	1091	889	165	10249	857	4234	1457	1280	4152	883

0828bH*c	g014-5091.xls	Portfield Pit, PP/95, TrA, 0.86-0.95	4191	3893	1073	919	157	10064	699	4182	1375	1288	3961	873
0829bF	g006-1739.xls	Portfield Pit, Tr 31-10-96, Unit VII	1877	812	630	348	0	5318	226	2585	635	600	1841	359
0829bF	g006-1764.xls	Portfield Pit, Tr 31-10-96, Unit VII	1860	816	617	356	0	5015	221	2555	675	754	1901	422
0829bH*a	g014-3186.xls	Portfield Pit, Tr 31-10-96, Unit VII	3101	3331	1114	797	100	8378	466	3405	1043	913	3026	636
0829bH*a	g014-3193.xls	Portfield Pit, Tr 31-10-96, Unit VII	3030	3315	1053	797	84	8370	591	3379	1030	888	2959	608
0830bF	g006-1840.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	1359	598	487	213	0	4692	261	1557	520	598	867	208
0830bF	g006-1865.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	1343	579	469	207	0	4122	245	1514	536	659	866	258
0830bH*a	g014-3285.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2308	2231	899	543	155	7178	502	2152	834	822	1632	591
0830bH*a	g014-3292.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2173	2185	889	528	125	7078	499	2124	846	813	1583	563
0831bF	g006-1941.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	1016	481	303	210	0	2805	114	1254	406	447	1220	216
0831bF	g006-1966.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	1004	472	293	208	0	2462	135	1257	479	645	1236	302
0831bH*a	g014-3387.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2108	2072	552	462	102	3942	229	1664	704	659	1942	413
0831bH*a	g014-3394.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	1949	1950	549	464	92	3773	225	1666	698	662	1965	410
0832bF	g006-2042.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	883	429	251	170	0	2848	188	1178	403	545	1081	205
0832bF	g006-2067.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	745	360	262	155	0	2396	112	1177	430	517	1086	216
0832bH*a	h012-0104.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2181	1956	593	443	0	3895	274	1666	752	613	1729	440
0832bH*c	h012-1215.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2487	2419	758	652	330	10498	262	2198	1312	2206	3297	626
0833bF	g006-2144.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2384	907	659	323	0	6784	363	2822	769	835	1977	281
0833bF	g006-2169.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2372	881	643	350	0	5876	321	2779	701	1058	1901	377
0833bH*	g006-65B3.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2797	3007	1064	942	252	7492	480	3378	1277	1165	3322	837

0833bH*	g006-65B9.xls	Portfield Pit, PP/95, TrA, 0.97-1.05	2190	2334	1066	904	209	7389	478	3361	1297	1112	3367	860
0834bF	g006-2245.xls	Portfield Pit, PP/95, Unit III/IV	1211	554	434	225	0	3493	209	1447	451	424	1374	250
0834bF	g006-22B0.xls	Portfield Pit, PP/95, Unit III/IV	1234	557	383	223	0	2910	117	1463	480	525	1340	273
0834bH*a	h012-0205.xls	Portfield Pit, PP/95, Unit III/IV	2753	2829	724	549	0	5704	248	2016	943	757	2235	620
0834bH*c	h012-1316.xls	Portfield Pit, PP/95, Unit III/IV	2868	2918	644	483	0	6140	514	2148	1018	939	3011	668
0835bF	g006-2346.xls	Portfield Pit, PP/95, Unit III/IV	2450	884	604	324	0	6277	332	2927	621	654	1683	315
0835bF	g006-2371.xls	Portfield Pit, PP/95, Unit III/IV	2522	903	614	392	0	4661	170	3117	659	688	1656	381
0835bH*a	h012-0306.xls	Portfield Pit, PP/95, Unit III/IV	4015	3777	975	808	0	7162	542	3686	1205	924	3470	799
0835bH*c	h012-1418.xls	Portfield Pit, PP/95, Unit III/IV	4628	4361	1221	1013	0	9849	851	4274	1650	1551	4355	1120
0835bH*c	h012-1432.xls	Portfield Pit, PP/95, Unit III/IV	4724	4411	1218	990	0	8816	867	4315	1725	1534	4108	1032
0836bF	g006-2447.xls	Portfield Pit, PP/95, Unit III/IV	1440	663	506	274	0	4252	236	1388	540	512	984	318
0836bF	g006-2372.xls	Portfield Pit, PP/95, Unit III/IV	1451	665	502	244	0	3437	236	1473	570	486	953	348
0836bH*a	h012-0407.xls	Portfield Pit, PP/95, Unit III/IV	2818	2651	969	644	138	5333	394	2001	1039	799	1913	808
0836bH*c	h012-1519.xls	Portfield Pit, PP/95, Unit III/IV	3210	2862	924	742	75	6266	592	2261	1247	1071	2509	972
0836bH*c	h012-1533.xls	Portfield Pit, PP/95, Unit III/IV	3108	2779	909	727	0	5966	582	2228	1194	974	2276	880
0837bF	g006-2548.xls	Portfield Pit, PP/95, Unit III/IV	1215	597	427	172	0	4500	221	1421	553	539	1078	338
0837bF	g006-2573.xls	Portfield Pit, PP/95, Unit III/IV	1230	602	418	178	0	3774	222	1453	554	495	1011	343
0837bH*a	h012-0508.xls	Portfield Pit, PP/95, Unit III/IV	3486	4291	2368	1096	501	8454	895	2800	1622	1328	3163	1342
0837bH*a	h012-0534.xls	Portfield Pit, PP/95, Unit III/IV	3591	4344	2414	1159	557	7985	979	2867	1652	1362	3103	1279
0837bH*c	h012-1620.xls	Portfield Pit, PP/95, Unit III/IV	3063	2803	1042	489	0	12276	299	3007	1627	3652	1765	1315

0838bF	g006-2650.xls	Norton Farm, Unit 9 (8)	1351	544	414	283	0	4083	231	1418	553	521	1085	214
0838bF	g006-2675.xls	Norton Farm, Unit 9 (8)	1361	551	412	272	0	3672	231	1441	563	486	1057	208
0838bH*	g006-66B4.xls	Norton Farm, Unit 9 (8)	4060	5773	4768	2237	654	11634	1878	3586	2450	1620	4627	1557
0838bH*	g006-66BA.xls	Norton Farm, Unit 9 (8)	4032	5740	4712	2219	627	11408	1643	3575	2468	1552	4659	1509
0838bH*c	h012-1721.xls	Norton Farm, Unit 9 (8)	2412	2342	631	489	111	6406	467	1830	922	982	2799	685
0838bH*c	h012-1735.xls	Norton Farm, Unit 9 (8)	2482	2399	671	507	102	6110	482	1835	927	940	2631	654
0839bF	g006-2751.xls	Norton Farm, Unit 10 (7)	937	360	305	189	0	2934	166	1009	385	425	985	170
0839bF	g006-2776.xls	Norton Farm, Unit 10 (7)	937	364	301	175	0	2753	167	1006	390	408	956	179
0839bH*a	h012-0609.xls	Norton Farm, Unit 10 (7)	1879	1695	621	388	0	4159	219	1386	683	625	1765	480
0839bH*c	h012-1822.xls	Norton Farm, Unit 10 (7)	4623	6009	4347	1916	705	11059	1675	3402	2158	1782	4482	1737
0839bH*c	h012-1836.xls	Norton Farm, Unit 10 (7)	4564	5897	4245	1888	659	10177	1620	3387	2145	1696	4379	1683
0840bF	g006-2852.xls	Norton Farm, Unit 10 (7)	1121	459	296	205	0	3996	208	1182	443	475	1241	187
0840bF	g006-2877.xls	Norton Farm, Unit 10 (7)	1132	463	294	198	0	3812	209	1196	445	455	1226	212
0840bH*a	h012-0710.xls	Norton Farm, Unit 10 (7)	2163	2194	640	446	0	5828	326	1753	797	812	2287	566
0840bH*c	h012-1923.xls	Norton Farm, Unit 10 (7)	2528	2422	677	560	0	8661	498	1964	1088	1494	3184	823
0840bH*c	h012-1937.xls	Norton Farm, Unit 10 (7)	2649	2492	707	586	0	8224	533	2042	1080	1380	2944	745
0841bF	g006-2953.xls	Brooks Field North, 1986 Tp3	1211	515	198	137	0	2566	168	1077	490	386	960	316
0841bF	g006-2978.xls	Brooks Field North, 1986 Tp3	1226	527	194	137	0	2464	169	1079	499	366	948	317
0841bH*a	h012-0811.xls	Brooks Field North, 1986 Tp3	1742	1741	399	289	0	3516	212	1329	695	553	1347	518
0841bH*a	h012-0838.xls	Brooks Field North, 1986 Tp3	1758	1721	421	281	0	3375	286	1329	707	576	1337	472

0841bH*c	h012-2024.xls	Brooks Field North, 1986 Tp3	2068	1937	294	275	0	6762	0	1758	1165	2731	782	735
0842bF	g006-3054.xls	Oving, BH, 8-9m	1894	829	360	281	0	3147	864	2873	938	495	1144	415
0842bF	g006-3079.xls	Oving, BH, 8-9m	1914	865	350	255	0	2890	863	2880	908	434	1124	400
0842bH*	g006-67B5.xls	Oving, BH, 8-9m	6594	3397	946	1075	219	6645	2520	5118	3280	1329	3097	1328
0842bH*	g006-67BB.xls	Oving, BH, 8-9m	6639	3426	949	1093	202	6383	1668	5159	3278	1245	3168	1339
0842bH*c	h012-2125.xls	Oving, BH, 8-9m	6224	3735	1054	940	0	7370	1441	5357	3386	2124	4052	1618
0842bH*c	h012-2139.xls	Oving, BH, 8-9m	6299	3750	991	1104	314	7911	2110	5422	3507	1949	3815	1516
0843bF	g006-3156.xls	Oving, BH, 8-9m	1994	849	414	297	0	3509	479	3054	1103	495	1188	458
0843bF	g006-3181.xls	Oving, BH, 8-9m	2002	879	409	282	0	3161	891	3051	961	414	1170	434
0843bH*a	h012-0912.xls	Oving, BH, 8-9m	5851	3210	895	851	168	5561	1924	4344	2625	999	2650	1120
0843bH*c	h012-2226.xls	Oving, BH, 8-9m	6909	3664	1152	1181	232	5011	2345	5295	3379	1247	3298	1502
0843bH*c	h012-2240.xls	Oving, BH, 8-9m	7334	3934	1242	1242	254	6433	2515	5492	3562	1349	3623	1592
0844bF	g006-3257.xls	Oving, BH, 8-9m	2086	837	448	297	0	3565	875	3116	984	433	1185	454
0844bF	g006-3282.xls	Oving, BH, 8-9m	2068	856	441	294	0	3275	883	3105	1018	460	1215	464
0844bH*c	h012-2327.xls	Oving, BH, 8-9m	7374	4062	1158	1279	255	5973	2357	5616	3554	1332	3506	1629
0844bH*c	g015-5102.xls	Oving, BH, 8-9m	6608	3722	1051	1157	214	5746	2270	5298	3172	1153	3151	1380
0845bF	g006-3358.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	6713	1330	1158	1005	0	3893	274	6402	1534	640	1472	886
0845bF	g006-3383.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	6622	1345	1138	930	156	3507	293	6328	1530	580	1458	872
0845bH*a	h012-1114.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	19958	9489	2617	2881	120	7324	818	11618	3704	1062	3912	2529
0845bH*c	h012-2428.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	17291	8021	2016	2325	117	5906	870	10215	3359	923	3646	2416

0845bH*c	g015-5203.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	16553	7722	2041	2215	0	6942	889	10175	3222	851	3581	2282
0846bF	g006-3459.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	6978	1444	1258	1048	0	4025	281	6981	1610	622	1582	941
0846bF	g006-3484.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	6977	1416	1246	1017	117	3593	298	6955	1608	589	1579	920
0846bH*c	h012-2529.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	24385	11464	3006	3413	82	9226	1187	13847	4775	1448	5212	3478
0846bH*c	g015-5304.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	21944	10087	2800	3055	0	8578	1112	13057	4340	1192	4715	3057
0847bF	g006-3560.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	7105	1428	1220	1055	0	3934	273	6824	1544	605	1484	918
0847bF	g006-3585.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	6658	1324	1142	922	144	3120	301	6589	1491	529	1334	868
0847bH*c	h012-2630.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	20405	9798	2668	2819	0	7264	1096	12159	4106	1186	4671	3025
0847bH*c	g015-5405.xls	Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	16648	7729	2318	2566	0	6233	928	10551	3386	940	3869	2429
0949bF	G019-0102.xls	Pennington, Penn Marshes	7197	1218	4076	1795	461	9684	1100	8586	4106	1489	5177	1855
0949bF	G019-0102.xls	Pennington, Penn Marshes	7197	1218	4076	1795	461	9684	1100	8586	4106	1489	5177	1855
0949bH*	G021-2052.xls	Pennington, Penn Marshes	7580	7427	5157	2622	599	14603	1358	7376	4325	2462	5147	2277
0949bH*	G021-2069.xls	Pennington, Penn Marshes	7240	6999	4838	2486	507	14497	1424	7040	4098	2619	5002	2623
0950bF	G019-0203.xls	Pennington, Penn Marshes	6250	2541	23342	4339	5114	18478	551	8436	5154	3789	5254	3084
0950bF	G019-0203.xls	Pennington, Penn Marshes	6250	2541	23342	4339	5114	18478	551	8436	5154	3789	5254	3084
0950bH*	G021-3053.xls	Pennington, Penn Marshes	4799	8142	12957	3683	2562	22125	1512	9190	5221	11488	6305	4960
0950bH*	G021-3070.xls	Pennington, Penn Marshes	4976	8421	13396	3821	2295	23996	1575	7092	5347	11947	4611	7310
0951bF	G019-0304.xls	Pennington, Penn Marshes	6490	2482	4778	2274	1314	31547	1106	8211	6713	5971	7829	2214
0951bF	G019-0304.xls	Pennington, Penn Marshes	6490	2482	4778	2274	1314	31547	1106	8211	6713	5971	7829	2214
0951bH*	G021-3154.xls	Pennington, Penn Marshes	9272	11377	44514	4508	3427	72725	3098	32978	21174	13429	16932	26174

0951bH*	G021-3171.xls	Pennington, Penn Marshes	9295	11440	44338	4745	3074	72609	3171	23204	20079	#####	34691	36431
0952bF	G019-0405.xls	Pennington, Penn Marshes	932	359	452	252	73	2032	117	1238	436	419	927	330
0952bF	G019-0405.xls	Pennington, Penn Marshes	932	359	452	252	73	2032	117	1238	436	419	927	330
0952bH*	G021-3255.xls	Pennington, Penn Marshes	1065	889	1592	371	98	2460	245	1474	962	1666	1543	854
0952bH*	G021-3272.xls	Pennington, Penn Marshes	1079	896	1605	379	83	2375	186	1057	937	1356	1394	1278
0953bF	G019-0506.xls	Pennington, Penn Marshes	341	165	618	156	337	1639	55	444	332	364	320	168
0953bF	G019-0506.xls	Pennington, Penn Marshes	341	165	618	156	337	1639	55	444	332	364	320	168
0953bH*	G021-3356.xls	Pennington, Penn Marshes	1120	1701	2144	571	443	7514	531	1370	1764	2184	2827	2374
0953bH*	G021-3373.xls	Pennington, Penn Marshes	1113	1666	2161	574	420	7202	534	1375	1940	8950	2978	1131
0954bF	G019-0607.xls	Pennington, Penn Marshes	5058	2708	4246	1986	1952	23862	963	9005	5366	5053	5846	2884
0954bF	G019-0607.xls	Pennington, Penn Marshes	5058	2708	4246	1986	1952	23862	963	9005	5366	5053	5846	2884
0954bH*	G021-3457.xls	Pennington, Penn Marshes	15732	17982	28982	11583	5355	88680	3158	33396	23238	47426	19303	31817
0954bH*	G021-3474.xls	Pennington, Penn Marshes	16244	18073	30087	12469	6253	90455	6674	50997	24584	28017	16236	11046
0955bH*	G021-3558.xls	Pennington, Penn Marshes	755	750	757	371	88	3676	273	816	675	466	969	530
0955bH*	G021-3575.xls	Pennington, Penn Marshes	744	738	743	339	77	3042	271	954	699	382	1125	313
0959bF	G021-1445.xls	Selsey, West Street, WSS/03 2.1	1055	475	232	151	347	2546	89	1563	403	320	575	259
0959bF	G021-1463.xls	Selsey, West Street, WSS/03 2.1	1026	456	194	152	329	2117	93	1493	409	333	577	335
0959bH*	G021-2410.xls	Selsey, West Street, WSS/03 2.1	1390	1426	292	344	93	2289	152	1595	524	396	742	322
0959bH*	G020-2444.xls	Selsey, West Street, WSS/03 2.1	1391	1436	291	338	97	2516	153	1609	515	389	723	310
0960bF	G021-1546.xls	Selsey, West Street, WSS/03 9.1	672	304	123	85	111	1323	67	730	351	251	294	186

0960bF	G021-1564.xls	Selsey, West Street, WSS/03 9.1	635	284	114	74	103	1201	37	705	352	283	298	329
0960bH*	G021-2512.xls	Selsey, West Street, WSS/03 9.1	1155	1045	266	162	123	2117	116	1063	544	349	567	317
0960bH*	G020-2545.xls	Selsey, West Street, WSS/03 9.1	1147	1067	277	179	133	2491	120	1085	537	348	559	290
0961bF	G021-1647.xls	Selsey, West Street, WSS/03 9.1	411	209	87	43	0	878	46	469	240	230	217	141
0961bF	G021-1665.xls	Selsey, West Street, WSS/03 9.1	396	196	82	42	0	840	45	457	245	262	220	277
0961bH*	G021-2613.xls	Selsey, West Street, WSS/03 9.1	715	674	202	130	94	1388	87	701	372	344	448	234
0961bH*	G020-2646.xls	Selsey, West Street, WSS/03 9.1	674	664	208	124	102	1649	91	693	356	397	373	189
0962bF	G021-1741.xls	Selsey, West Street, WSS/03 9.1	508	243	85	48	0	875	29	563	289	241	249	169
0962bF	G021-1766.xls	Selsey, West Street, WSS/03 9.1	492	232	80	45	0	790	33	554	303	284	254	310
0962bH*	G021-2704.xls	Selsey, West Street, WSS/03 9.1	801	787	282	139	39	1265	70	737	409	305	396	214
0962bH*	G021-2714.xls	Selsey, West Street, WSS/03 9.1	769	756	273	136	37	1210	71	726	407	308	404	239
0963bF	G021-1849.xls	Selsey, West Street, WSS/03 9.1	1235	491	166	123	126	1717	117	1232	578	318	506	322
0963bF	G021-1867.xls	Selsey, West Street, WSS/03 9.1	1212	476	161	114	85	1684	125	1220	581	343	516	374
0963bH*	G021-2805.xls	Selsey, West Street, WSS/03 9.1	1513	1257	290	193	87	2168	156	1279	651	398	730	351
0963bH*	G021-2815.xls	Selsey, West Street, WSS/03 9.1	1511	1245	283	201	95	2097	159	1270	654	408	733	383
0964bF	G021-1950.xls	Lepe, Stone Point, 03 4.6	1590	569	444	216	579	5939	387	1975	703	692	1040	608
0964bF	G021-1968.xls	Lepe, Stone Point, 03 4.6	1517	546	433	209	552	6142	407	1960	709	721	1039	685
0964bH*	G021-2906.xls	Lepe, Stone Point, 03 4.6	2176	2124	610	364	136	5235	438	2283	1115	1199	1936	1132
0964bH*	G021-2916.xls	Lepe, Stone Point, 03 4.6	2581	2496	717	439	153	5864	508	2447	1145	1334	1818	1132

Location	Asx D/L	Glx D/L	Ser D/L	Ala D/L	Val D/L	Leu D/L	Ile D/L
Harnham, 1HRR02 (49) <13> 50-60	0.67	0.46	0.88	0.55	0.27		0.24
Harnham, 1HRR02 (49) <13> 50-60	0.67	0.45	0.89	0.51	0.28		0.21
Harnham, 1HRR02 (49) <13> 50-60	0.63	0.45	0.90	0.49	0.26		0.25
Harnham, 1HRR02 (49) <13> 50-60	0.51	0.22	0.34	0.47	0.19		0.20
Harnham, 1HRR02 (49) <13> 50-60	0.50	0.21	0.34	0.42	0.17		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.51	0.22	0.35	0.41	0.17		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.45	0.64	0.51	0.27		0.32
Harnham, 1HRR02 (49) <13> 50-60	0.67	0.46	0.65	0.46	0.33		0.53
Harnham, 1HRR02 (49) <13> 50-60	0.67	0.45	0.64	0.49	0.25		0.25
Harnham, 1HRR02 (49) <13> 50-60	0.55	0.27	0.37	0.44	0.22		0.54
Harnham, 1HRR02 (49) <13> 50-60	0.55	0.27	0.36	0.40	0.22		0.49
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.27	0.36	0.44	0.20		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.44	0.81	0.52	0.25		0.25
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.44	0.81	0.48	0.25		0.30
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.44	0.81	0.50	0.26		0.28
Harnham, 1HRR02 (49) <13> 50-60	0.61	0.34	0.60	0.46	0.21		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.64	0.34	0.60	0.44	0.20		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.63	0.34	0.63	0.46	0.18		0.19
Harnham, 1HRR02 (49) <13> 50-60	0.63	0.34	0.63	0.46	0.18		0.19
Harnham, 1HRR02 (49) <13> 50-60	0.57	0.31	0.51	0.42	0.21		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.32	0.52	0.39	0.19		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.57	0.32	0.53	0.42	0.20		0.20
Harnham, 1HRR02 (49) <13> 50-60	0.67	0.45	0.85	0.53	0.23		0.24
Harnham, 1HRR02 (49) <13> 50-60	0.68	0.45	0.86	0.55	0.24		0.24
Harnham, 1HRR02 (49) <13> 50-60	0.68	0.45	0.79	0.52	0.24		0.35
Harnham, 1HRR02 (49) <13> 50-60	0.55	0.31	0.45	0.42	0.19		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.31	0.40	0.51	0.22		0.23
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.30	0.45	0.42	0.20		0.21
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.30	0.45	0.42	0.20		0.21
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.46	0.90	0.52	0.27		0.26
Harnham, 1HRR02 (49) <13> 50-60	0.68	0.46	0.88	0.51	0.27		0.32
Harnham, 1HRR02 (49) <13> 50-60	0.68	0.45	0.91	0.50	0.26		0.28
Harnham, 1HRR02 (49) <13> 50-60	0.68	0.36	0.57	0.47	0.24		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.68	0.37	0.61	0.41	0.21		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.62	0.36	0.66	0.45	0.21		0.15
Harnham, 1HRR02 (49) <13> 50-60	0.59	0.34	0.62	0.44	0.23		0.00
Harnham, 1HRR02 (49) <13> 50-60	0.58	0.34	0.59	0.40	0.21		0.19

Harnham, 1HRR02 (49) <13> 50-60	0.58	0.34	0.59	0.40	0.21	0.19
Harnham, 1HRR02 (49) <13> 50-60	0.58	0.33	0.58	0.42	0.22	0.22
Harnham, 1HRR02 (49) <13> 50-60	0.70	0.47	0.68	0.51	0.23	0.24
Harnham, 1HRR02 (49) <13> 50-60	0.70	0.48	1.06	0.52	0.26	0.34
Harnham, 1HRR02 (49) <13> 50-60	0.70	0.47	0.79	0.50	0.25	0.32
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.29	0.30	0.44	0.18	0.00
Harnham, 1HRR02 (49) <13> 50-60	0.59	0.29	0.30	0.43	0.21	0.00
Harnham, 1HRR02 (49) <13> 50-60	0.59	0.29	0.31	0.43	0.18	0.13
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.45	0.84	0.55	0.25	0.24
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.44	0.81	0.52	0.26	0.25
Harnham, 1HRR02 (49) <13> 50-60	0.62	0.45	0.82	0.48	0.26	0.28
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.32	0.56	0.45	0.22	0.19
Harnham, 1HRR02 (49) <13> 50-60	0.57	0.32	0.48	0.42	0.20	0.00
Harnham, 1HRR02 (49) <13> 50-60	0.57	0.32	0.55	0.38	0.21	0.00
Harnham, 1HRR02 (49) <13> 50-60	0.67	0.46	0.73	0.56	0.27	0.27
Harnham, 1HRR02 (49) <13> 50-60	0.67	0.45	0.83	0.51	0.26	0.36
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.45	0.81	0.52	0.26	0.29
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.31	0.56	0.48	0.21	0.19
Harnham, 1HRR02 (49) <13> 50-60	0.55	0.31	0.55	0.48	0.20	0.17
Harnham, 1HRR02 (49) <13> 50-60	0.56	0.31	0.54	0.49	0.21	0.00
Harnham, 1HRR02 (49) <13> 50-60	0.67	0.40	0.71	0.59	0.19	0.37
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.38	0.71	0.58	0.20	0.25
Harnham, 1HRR02 (49) <13> 50-60	0.68	0.39	0.70	0.56	0.21	0.31
Harnham, 1HRR02 (49) <13> 50-60	0.54	0.30	0.56	0.52	0.17	0.16
Harnham, 1HRR02 (49) <13> 50-60	0.55	0.29	0.50	0.49	0.17	0.00
Harnham, 1HRR02 (49) <13> 50-60	0.58	0.30	0.64	0.46	0.16	0.17
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.43	0.68	0.64	0.23	0.28
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.43	0.69	0.62	0.25	0.49
Harnham, 1HRR02 (49) <13> 50-60	0.66	0.43	0.68	0.62	0.19	0.00
Harnham, 1HRR02 (49) <13> 50-60	0.55	0.25	0.43	0.47	0.17	0.32
Harnham, 1HRR02 (49) <13> 50-60	0.55	0.25	0.41	0.51	0.21	0.42
Harnham, 1HRR02 (49) <13> 50-60	0.54	0.24	0.41	0.47	0.17	0.13
Harnham, 1HRR02 (48) <10> 20-30	0.68	0.47	0.69	0.62	0.29	0.24
Harnham, 1HRR02 (48) <10> 20-30	0.68	0.45	0.69	0.58	0.26	0.00
Harnham, 1HRR02 (48) <10> 20-30	0.63	0.46	0.69	0.55	0.27	0.34
Harnham, 1HRR02 (48) <10> 20-30	0.55	0.31	0.41	0.56	0.18	0.15
Harnham, 1HRR02 (48) <10> 20-30	0.54	0.32	0.38	0.53	0.17	0.19
Harnham, 1HRR02 (48) <10> 20-30	0.57	0.32	0.41	0.51	0.17	0.17
Harnham, 1HRR02 (48) <10> 20-30	0.67	0.46	0.49	0.66	0.23	0.41
Harnham, 1HRR02 (48) <10> 20-30	0.67	0.44	0.48	0.62	0.23	0.36

Harnham, 1HRR02 (48) <10> 20-30	0.65	0.43	0.43	0.63	0.00		0.00
Harnham, 1HRR02 (48) <10> 20-30	0.52	0.24	0.29	0.42	0.16		0.71
Harnham, 1HRR02 (48) <10> 20-30	0.51	0.24	0.29	0.47	0.18		0.00
Harnham, 1HRR02 (48) <10> 20-30	0.52	0.23	0.26	0.43	0.22		0.44
Harnham, 1HRR02 (49) <72> 40-50	0.66	0.42	0.76	0.53	0.27		0.40
Harnham, 1HRR02 (49) <72> 40-50	0.66	0.41	0.76	0.50	0.24		0.19
Harnham, 1HRR02 (49) <72> 40-50	0.65	0.41	0.81	0.48	0.25		0.29
Harnham, 1HRR02 (49) <72> 40-50	0.55	0.31	0.57	0.47	0.22		0.16
Harnham, 1HRR02 (49) <72> 40-50	0.55	0.30	0.55	0.45	0.23		0.00
Harnham, 1HRR02 (49) <72> 40-50	0.58	0.31	0.58	0.43	0.21		0.19
Harnham, 1HRR02 (49) <72> 40-50	0.64	0.40	0.41	0.46	0.27		0.43
Harnham, 1HRR02 (49) <72> 40-50	0.63	0.38	0.34	0.41	0.31		0.66
Harnham, 1HRR02 (49) <72> 40-50	0.64	0.39	0.42	0.47	0.00		0.00
Harnham, 1HRR02 (49) <72> 40-50	0.49	0.27	0.33	0.38	0.19		0.26
Harnham, 1HRR02 (49) <72> 40-50	0.50	0.27	0.32	0.39	0.20		0.19
Harnham, 1HRR02 (49) <72> 40-50	0.50	0.27	0.32	0.34	0.19		0.29
Red Barns, RB99/Tp1/115-U/s89	0.68	0.42	0.70	0.57	0.25	0.68	0.39
Red Barns, RB99/Tp1/115-U/s89	0.68	0.42	0.74	0.56	0.24	0.78	0.34
Red Barns, RB99/Tp1/115-U/s89	0.56	0.30	0.37	0.44	0.33	0.46	0.20
Red Barns, RB99/Tp1/115-U/s89	0.56	0.30	0.37	0.44	0.30	0.48	0.19
Red Barns, RB99/Tp1/115-U/s89	0.64	0.37	0.85	0.53	0.26	0.68	0.39
Red Barns, RB99/Tp1/115-U/s89	0.64	0.37	0.84	0.52	0.24	0.77	0.36
Red Barns, RB99/Tp1/115-U/s89	0.54	0.28	0.53	0.40	0.26	0.48	0.26
Red Barns, RB99/Tp1/115-U/s89	0.54	0.28	0.51	0.40	0.25	0.50	0.24
Red Barns, RB99/Tp1/115-U/s89	0.51	0.26	0.31	0.38	0.22	0.45	0.20
Red Barns, RB99/Tp1/115-U/s89	0.52	0.26	0.33	0.37	0.22	0.43	0.21
Red Barns, RB99/Tp1/115-U/s89	0.64	0.39	0.79	0.52	0.27	0.67	0.40
Red Barns, RB99/Tp1/115-U/s89	0.64	0.39	0.80	0.51	0.26	0.75	0.37
Red Barns, RB99/Tp1/115-U/s89	0.54	0.28	0.44	0.42	0.27	0.51	0.25
Red Barns, RB99/Tp1/115-U/s89	0.52	0.28	0.43	0.42	0.25	0.51	0.25
Red Barns, RB99/Tp1/115-U/s89	0.55	0.30	0.51	0.42	0.26	0.52	0.25
Red Barns, RB99/Tp1/115-U/s89	0.57	0.30	0.52	0.41	0.26	0.49	0.25
Red Barns, RB99/Tp1/115-U/s89	0.69	0.42	0.88	0.65	0.31	0.74	0.28
Red Barns, RB99/Tp1/115-U/s89	0.69	0.42	0.90	0.65	0.25	0.80	0.26
Red Barns, RB99/Tp1/115-U/s89	0.38	0.20	0.11	0.39	0.13	0.33	0.12
Red Barns, RB99/Tp1/115-U/s89	0.37	0.20	0.10	0.39	0.13	0.33	0.11
Red Barns, RB99/Tp1/115-U/s89	0.44	0.22	0.14	0.42	0.12	0.39	0.11
Red Barns, RB99/Tp1/115-U/s89	0.46	0.22	0.14	0.41	0.12	0.35	0.11
Red Barns, RB99/Tp1/115-L/s93	0.70	0.43	0.79	0.58	0.26	0.70	0.40
Red Barns, RB99/Tp1/115-L/s93	0.70	0.43	0.88	0.58	0.25	0.80	0.36

Red Barns, RB99/Tp1/115-L/s93	0.57	0.34	0.38	0.49	0.29	0.53	0.22
Red Barns, RB99/Tp1/115-L/s93	0.59	0.34	0.39	0.48	0.28	0.53	0.23
Red Barns, RB99/Tp1/115-L/s93	0.65	0.40	0.87	0.56	0.24	0.67	0.38
Red Barns, RB99/Tp1/115-L/s93	0.65	0.40	0.87	0.56	0.24	0.76	0.33
Red Barns, RB99/Tp1/115-L/s93	0.57	0.30	0.59	0.44	0.30	0.47	0.23
Red Barns, RB99/Tp1/115-L/s93	0.57	0.30	0.59	0.43	0.29	0.44	0.21
Red Barns, RB99/Tp1/115-L/s93	0.50	0.27	0.27	0.42	0.23	0.46	0.18
Red Barns, RB99/Tp1/115-L/s93	0.53	0.27	0.28	0.41	0.20	0.43	0.19
Red Barns, RB99/Tp1/115-L/s93	0.68	0.42	0.88	0.57	0.29	0.76	0.39
Red Barns, RB99/Tp1/115-L/s93	0.68	0.41	0.90	0.57	0.36	0.77	0.31
Red Barns, RB99/Tp1/115-L/s93	0.53	0.29	0.34	0.43	0.24	0.46	0.24
Red Barns, RB99/Tp1/115-L/s93	0.52	0.29	0.34	0.43	0.24	0.48	0.23
Yeoman's Road, BH 2.6-2.8m	0.71	0.38	0.91	0.54	0.27	0.66	0.49
Yeoman's Road, BH 2.6-2.8m	0.71	0.39	0.92	0.54	0.27	0.75	0.39
Yeoman's Road, BH 2.6-2.8m	0.45	0.22	0.40	0.34	0.16	0.32	0.20
Yeoman's Road, BH 2.6-2.8m	0.46	0.22	0.41	0.34	0.16	0.30	0.19
Yeoman's Road, BH 2.6-2.8m	0.71	0.38	0.89	0.53	0.26	0.62	0.39
Yeoman's Road, BH 2.6-2.8m	0.71	0.38	0.89	0.54	0.26	0.74	0.36
Yeoman's Road, BH 2.6-2.8m	0.42	0.20	0.43	0.33	0.19	0.37	0.26
Yeoman's Road, BH 2.6-2.8m	0.43	0.21	0.45	0.35	0.18	0.30	0.17
Yeoman's Road, BH 2.6-2.8m	0.43	0.21	0.44	0.33	0.17	0.38	0.19
Yeoman's Road, BH 2.6-2.8m	0.71	0.38	0.87	0.53	0.27	0.62	0.41
Yeoman's Road, BH 2.6-2.8m	0.71	0.38	0.88	0.54	0.25	0.77	0.39
Yeoman's Road, BH 2.6-2.8m	0.45	0.23	0.49	0.35	0.18	0.29	0.19
Yeoman's Road, BH 2.6-2.8m	0.45	0.23	0.49	0.35	0.18	0.29	0.19
Yeoman's Road, BH 2.6-2.8m	0.45	0.23	0.49	0.35	0.18	0.30	0.19
Yeoman's Road, BH 2.6-2.8m	0.44	0.22	0.49	0.34	0.18	0.36	0.29
Yeoman's Road, BH 2.6-2.8m	0.45	0.21	0.37	0.33	0.18	0.29	0.20
Yeoman's Road, BH 2.6-2.8m	0.45	0.21	0.37	0.34	0.17	0.28	0.18
Portfield Pit, main section, marine sand	0.75	0.35	0.98	0.60	0.29	0.70	0.50
Portfield Pit, main section, marine sand	0.75	0.34	0.95	0.59	0.31	0.78	0.48
Portfield Pit, main section, marine sand	0.45	0.21	0.57	0.38	0.18	0.29	0.19
Portfield Pit, main section, marine sand	0.45	0.21	0.56	0.38	0.19	0.29	0.19
Portfield Pit, main section, marine sand	0.46	0.21	0.56	0.38	0.19	0.30	0.19
Portfield Pit, main section, marine sand	0.44	0.20	0.54	0.36	0.18	0.30	0.20
Portfield Pit, main section, marine sand	0.49	0.22	0.60	0.40	0.19	0.32	0.22
Portfield Pit, main section, marine sand	0.48	0.22	0.61	0.40	0.18	0.31	0.20
Portfield Pit, main section, marine sand	0.74	0.35	0.95	0.61	0.30	0.74	0.45
Portfield Pit, main section, marine sand	0.73	0.35	0.94	0.61	0.30	0.81	0.47
Portfield Pit, main section, marine sand	0.44	0.20	0.50	0.36	0.18	0.31	0.20

Portfield Pit, P2 Unit III	0.61	0.32	0.92	0.54	0.20	0.62	0.20
Portfield Pit, P2 Unit III	0.62	0.32	0.91	0.55	0.21	0.57	0.20
Portfield Pit, P2 Unit III	0.46	0.22	0.54	0.39	0.15	0.41	0.14
Portfield Pit, P2 Unit III	0.54	0.24	0.60	0.40	0.12	0.39	0.13
Portfield Pit, P2 Unit III	0.48	0.24	0.59	0.40	0.11	0.39	0.13
Portfield Pit, PP/95, TrA, 0.86-0.95	0.60	0.31	0.78	0.52	0.00	0.57	0.00
Portfield Pit, PP/95, TrA, 0.86-0.95	0.60	0.31	0.76	0.59	0.00	0.48	0.00
Portfield Pit, PP/95, TrA, 0.86-0.95	0.48	0.23	0.54	0.41	0.15	0.57	0.00
Portfield Pit, PP/95, TrA, 0.86-0.95	0.66	0.28	0.81	0.46	0.17	0.72	0.30
Portfield Pit, PP/95, TrA, 0.86-0.95	0.68	0.28	0.83	0.50	0.17	0.60	0.34
Portfield Pit, PP/95, TrA, 0.86-0.95	0.48	0.21	0.46	0.33	0.14	0.35	0.12
Portfield Pit, PP/95, TrA, 0.86-0.95	0.48	0.21	0.46	0.33	0.14	0.35	0.12
Portfield Pit, PP/95, TrA, 0.86-0.95	0.48	0.21	0.45	0.33	0.14	0.36	0.12
Portfield Pit, PP/95, TrA, 0.86-0.95	0.45	0.18	0.32	0.31	0.13	0.34	0.12
Portfield Pit, PP/95, TrA, 0.86-0.95	0.52	0.21	0.49	0.35	0.14	0.36	0.13
Portfield Pit, PP/95, TrA, 0.86-0.95	0.49	0.21	0.45	0.35	0.11	0.37	0.13
Portfield Pit, PP/95, TrA, 0.86-0.95	0.63	0.36	0.84	0.61	0.19	0.66	0.00
Portfield Pit, PP/95, TrA, 0.86-0.95	0.64	0.35	0.85	0.61	0.18	0.78	0.00
Portfield Pit, PP/95, TrA, 0.86-0.95	0.45	0.23	0.36	0.44	0.10	0.39	0.12
Portfield Pit, PP/95, TrA, 0.86-0.95	0.53	0.27	0.54	0.47	0.14	0.48	0.13
Portfield Pit, PP/95, TrA, 0.86-0.95	0.49	0.27	0.53	0.47	0.11	0.43	0.12
Portfield Pit, Tr 31-10-96, Unit VII	0.60	0.31	0.91	0.52	0.15	0.65	0.23
Portfield Pit, Tr 31-10-96, Unit VII	0.60	0.30	0.93	0.52	0.19	0.73	0.17
Portfield Pit, Tr 31-10-96, Unit VII	0.49	0.23	0.48	0.44	0.11	0.49	0.14
Portfield Pit, Tr 31-10-96, Unit VII	0.49	0.23	0.52	0.44	0.10	0.49	0.14
Portfield Pit, PP/95, TrA, 0.97-1.05	0.61	0.32	0.82	0.50	0.15	0.46	0.00
Portfield Pit, PP/95, TrA, 0.97-1.05	0.61	0.32	0.83	0.49	0.15	0.48	0.00
Portfield Pit, PP/95, TrA, 0.97-1.05	0.49	0.22	0.38	0.39	0.12	0.36	0.13
Portfield Pit, PP/95, TrA, 0.97-1.05	0.47	0.22	0.38	0.39	0.10	0.36	0.13
Portfield Pit, PP/95, TrA, 0.97-1.05	0.68	0.29	0.85	0.46	0.17	0.61	0.26
Portfield Pit, PP/95, TrA, 0.97-1.05	0.68	0.28	0.86	0.46	0.21	0.66	0.17
Portfield Pit, PP/95, TrA, 0.97-1.05	0.45	0.20	0.42	0.31	0.16	0.34	0.17
Portfield Pit, PP/95, TrA, 0.97-1.05	0.45	0.20	0.42	0.31	0.15	0.36	0.17
Portfield Pit, PP/95, TrA, 0.97-1.05	0.68	0.29	0.82	0.49	0.14	0.63	0.00
Portfield Pit, PP/95, TrA, 0.97-1.05	0.68	0.28	0.80	0.47	0.17	0.58	0.00
Portfield Pit, PP/95, TrA, 0.97-1.05	0.45	0.20	0.40	0.32	0.18	0.43	0.18
Portfield Pit, PP/95, TrA, 0.97-1.05	0.48	0.21	0.46	0.31	0.18	1.02	0.00
Portfield Pit, PP/95, TrA, 0.97-1.05	0.62	0.35	0.78	0.58	0.16	0.69	0.00
Portfield Pit, PP/95, TrA, 0.97-1.05	0.62	0.35	0.78	0.58	0.17	0.61	0.00
Portfield Pit, PP/95, TrA, 0.97-1.05	0.50	0.22	0.37	0.45	0.10	0.34	0.11

Portfield Pit, PP/95, TrA, 0.97-1.05	0.50	0.22	0.37	0.43	0.10	0.35	0.11
Portfield Pit, PP/95, Unit III/IV	0.66	0.30	0.52	0.47	0.18	0.63	0.25
Portfield Pit, PP/95, Unit III/IV	0.67	0.30	0.64	0.48	0.18	0.57	0.27
Portfield Pit, PP/95, Unit III/IV	0.47	0.21	0.39	0.32	0.17	0.41	0.20
Portfield Pit, PP/95, Unit III/IV	0.53	0.23	0.50	0.35	0.15	0.51	0.14
Portfield Pit, PP/95, Unit III/IV	0.65	0.37	0.90	0.60	0.24	0.73	0.37
Portfield Pit, PP/95, Unit III/IV	0.65	0.36	0.89	0.62	0.23	0.68	0.33
Portfield Pit, PP/95, Unit III/IV	0.49	0.26	0.57	0.45	0.14	0.46	0.16
Portfield Pit, PP/95, Unit III/IV	0.54	0.27	0.50	0.44	0.13	0.60	0.14
Portfield Pit, PP/95, Unit III/IV	0.54	0.27	0.51	0.42	0.13	0.46	0.12
Portfield Pit, PP/95, Unit III/IV	0.59	0.37	0.85	0.46	0.19	0.57	0.36
Portfield Pit, PP/95, Unit III/IV	0.59	0.36	0.84	0.48	0.20	0.54	0.34
Portfield Pit, PP/95, Unit III/IV	0.45	0.23	0.43	0.33	0.19	0.37	0.18
Portfield Pit, PP/95, Unit III/IV	0.51	0.24	0.53	0.34	0.17	0.48	0.12
Portfield Pit, PP/95, Unit III/IV	0.51	0.25	0.52	0.33	0.17	0.36	0.14
Portfield Pit, PP/95, Unit III/IV	0.63	0.40	0.89	0.51	0.21	0.68	0.32
Portfield Pit, PP/95, Unit III/IV	0.62	0.39	0.91	0.51	0.20	0.57	0.33
Portfield Pit, PP/95, Unit III/IV	0.27	0.13	0.12	0.24	0.11	0.28	0.12
Portfield Pit, PP/95, Unit III/IV	0.28	0.13	0.12	0.23	0.11	0.22	0.08
Portfield Pit, PP/95, Unit III/IV	0.57	0.32	0.53	0.43	0.00	0.00	0.00
Norton Farm, Unit 9 (8)	0.66	0.30	0.82	0.46	0.19	0.68	0.00
Norton Farm, Unit 9 (8)	0.65	0.30	0.84	0.46	0.20	0.61	0.00
Norton Farm, Unit 9 (8)	0.28	0.10	0.05	0.22	0.05	0.18	0.04
Norton Farm, Unit 9 (8)	0.28	0.10	0.05	0.21	0.05	0.19	0.05
Norton Farm, Unit 9 (8)	0.50	0.22	0.36	0.33	0.14	0.52	0.10
Norton Farm, Unit 9 (8)	0.50	0.22	0.36	0.31	0.14	0.42	0.10
Norton Farm, Unit 10 (7)	0.65	0.29	0.50	0.43	0.16	0.64	0.00
Norton Farm, Unit 10 (7)	0.65	0.29	0.50	0.43	0.16	0.59	0.00
Norton Farm, Unit 10 (7)	0.47	0.19	0.26	0.31	0.18	0.44	0.15
Norton Farm, Unit 10 (7)	0.24	0.09	0.05	0.17	0.07	0.23	0.04
Norton Farm, Unit 10 (7)	0.24	0.09	0.04	0.18	0.07	0.20	0.05
Norton Farm, Unit 10 (7)	0.66	0.30	0.84	0.45	0.16	0.66	0.00
Norton Farm, Unit 10 (7)	0.66	0.29	0.88	0.46	0.17	0.62	0.00
Norton Farm, Unit 10 (7)	0.48	0.20	0.37	0.32	0.14	0.47	0.12
Norton Farm, Unit 10 (7)	0.53	0.22	0.37	0.32	0.10	0.70	0.09
Norton Farm, Unit 10 (7)	0.52	0.22	0.40	0.31	0.11	0.52	0.12
Brooks Field North, 1986 Tp3	0.68	0.47	0.80	0.54	0.25	0.78	0.34
Brooks Field North, 1986 Tp3	0.67	0.45	0.84	0.54	0.26	0.74	0.35
Brooks Field North, 1986 Tp3	0.57	0.33	0.40	0.41	0.26	0.64	0.24
Brooks Field North, 1986 Tp3	0.59	0.33	0.39	0.41	0.26	0.67	0.21

Brooks Field North, 1986 Tp3	0.59	0.36	0.00	0.43	0.00	0.00	0.00
Oving, BH, 8-9m	0.71	0.33	0.89	0.63	0.38	0.83	0.48
Oving, BH, 8-9m	0.70	0.31	0.91	0.63	0.33	0.79	0.52
Oving, BH, 8-9m	0.47	0.22	0.58	0.39	0.21	0.36	0.25
Oving, BH, 8-9m	0.47	0.22	0.58	0.40	0.19	0.36	0.24
Oving, BH, 8-9m	0.48	0.24	0.51	0.41	0.18	0.76	0.23
Oving, BH, 8-9m	0.47	0.24	0.49	0.40	0.21	0.60	0.22
Oving, BH, 8-9m	0.70	0.33	0.90	0.63	0.38	0.83	0.43
Oving, BH, 8-9m	0.70	0.31	0.91	0.63	0.31	0.81	0.47
Oving, BH, 8-9m	0.44	0.22	0.57	0.39	0.22	0.42	0.33
Oving, BH, 8-9m	0.45	0.22	0.44	0.39	0.19	0.34	0.24
Oving, BH, 8-9m	0.45	0.22	0.45	0.37	0.19	0.38	0.23
Oving, BH, 8-9m	0.71	0.33	0.84	0.63	0.31	0.84	0.46
Oving, BH, 8-9m	0.71	0.31	0.86	0.62	0.35	0.81	0.46
Oving, BH, 8-9m	0.46	0.23	0.55	0.38	0.20	0.35	0.23
Oving, BH, 8-9m	0.45	0.23	0.55	0.40	0.19	0.34	0.24
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.76	0.43	0.93	0.50	0.22	0.78	0.30
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.76	0.40	0.95	0.50	0.23	0.77	0.31
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.54	0.21	0.49	0.31	0.14	0.35	0.17
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.56	0.23	0.51	0.34	0.15	0.34	0.14
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.56	0.24	0.50	0.35	0.14	0.33	0.15
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.76	0.42	0.90	0.50	0.23	0.76	0.31
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.76	0.40	0.90	0.50	0.23	0.74	0.31
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.55	0.22	0.49	0.30	0.14	0.33	0.14
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.55	0.22	0.49	0.32	0.13	0.31	0.14
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.76	0.43	0.93	0.51	0.22	0.76	0.28
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.76	0.44	0.91	0.52	0.24	0.60	0.33
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.55	0.22	0.47	0.32	0.14	0.31	0.15
Brighton, Civic Centre, TH, ex J. Cooper coll, 17.04.85	0.55	0.23	0.46	0.33	0.13	0.30	0.14
Pennington, Penn Marshes	0.72	0.23	0.98	0.32	0.17	0.47	0.24
Pennington, Penn Marshes	0.72	0.23	0.98	0.32	0.17	0.47	0.24
Pennington, Penn Marshes	0.44	0.12	0.30	0.20	0.11	0.30	0.07
Pennington, Penn Marshes	0.45	0.11	0.30	0.21	0.10	0.39	0.05
Pennington, Penn Marshes	0.06	0.37	0.01	0.08	0.08	0.06	0.07
Pennington, Penn Marshes	0.06	0.37	0.01	0.08	0.08	0.06	0.07
Pennington, Penn Marshes	0.11	0.05	0.02	0.31	0.00	0.00	0.00
Pennington, Penn Marshes	0.12	0.05	0.02	0.15	0.00	0.00	0.00
Pennington, Penn Marshes	0.50	0.15	0.28	0.35	0.11	0.58	0.00
Pennington, Penn Marshes	0.50	0.15	0.28	0.35	0.11	0.58	0.00
Pennington, Penn Marshes	0.21	0.08	0.07	0.45	0.00	0.00	0.00

Pennington, Penn Marshes	0.21	0.07	0.07	0.25	0.00	2.56	0.05
Pennington, Penn Marshes	0.55	0.25	0.69	0.37	0.18	0.51	0.27
Pennington, Penn Marshes	0.55	0.25	0.69	0.37	0.18	0.51	0.27
Pennington, Penn Marshes	0.43	0.18	0.11	0.49	0.00	0.00	0.00
Pennington, Penn Marshes	0.43	0.18	0.10	0.28	0.26	0.78	0.00
Pennington, Penn Marshes	0.25	0.07	0.08	0.25	0.12	0.64	0.00
Pennington, Penn Marshes	0.25	0.07	0.08	0.25	0.12	0.64	0.00
Pennington, Penn Marshes	0.09	0.05	0.03	0.33	0.00	1.19	0.00
Pennington, Penn Marshes	0.09	0.05	0.02	0.36	0.00	1.61	0.00
Pennington, Penn Marshes	0.48	0.18	0.28	0.54	0.25	0.62	0.11
Pennington, Penn Marshes	0.48	0.18	0.28	0.54	0.25	0.62	0.11
Pennington, Penn Marshes	0.16	0.08	0.05	0.34	0.00	0.00	0.00
Pennington, Penn Marshes	0.16	0.08	0.06	0.61	0.00	0.00	0.00
Pennington, Penn Marshes	0.33	0.12	0.10	0.23	0.15	0.30	0.02
Pennington, Penn Marshes	0.33	0.12	0.10	0.35	0.32	0.29	0.00
Selsey, West Street, WSS/03 2.1	0.70	0.31	0.39	0.40	0.16	0.58	0.18
Selsey, West Street, WSS/03 2.1	0.72	0.32	0.47	0.43	0.17	0.66	0.15
Selsey, West Street, WSS/03 2.1	0.51	0.24	0.29	0.32	0.13	0.35	0.13
Selsey, West Street, WSS/03 2.1	0.51	0.24	0.29	0.32	0.12	0.33	0.14
Selsey, West Street, WSS/03 9.1	0.67	0.32	0.42	0.42	0.17	0.82	0.19
Selsey, West Street, WSS/03 9.1	0.68	0.33	0.40	0.45	0.16	0.99	0.10
Selsey, West Street, WSS/03 9.1	0.54	0.25	0.22	0.37	0.18	0.39	0.17
Selsey, West Street, WSS/03 9.1	0.53	0.25	0.22	0.37	0.16	0.35	0.15
Selsey, West Street, WSS/03 9.1	0.64	0.31	0.34	0.42	0.15	0.99	0.14
Selsey, West Street, WSS/03 9.1	0.67	0.32	0.32	0.45	0.14	1.15	0.07
Selsey, West Street, WSS/03 9.1	0.53	0.24	0.18	0.38	0.15	0.57	0.12
Selsey, West Street, WSS/03 9.1	0.52	0.24	0.18	0.38	0.14	0.32	0.12
Selsey, West Street, WSS/03 9.1	0.68	0.33	0.41	0.43	0.18	0.96	0.18
Selsey, West Street, WSS/03 9.1	0.70	0.33	0.39	0.46	0.16	1.11	0.08
Selsey, West Street, WSS/03 9.1	0.51	0.23	0.13	0.32	0.16	0.39	0.17
Selsey, West Street, WSS/03 9.1	0.51	0.23	0.12	0.34	0.16	0.46	0.15
Selsey, West Street, WSS/03 9.1	0.69	0.31	0.58	0.41	0.19	0.71	0.23
Selsey, West Street, WSS/03 9.1	0.70	0.31	0.56	0.44	0.17	0.79	0.17
Selsey, West Street, WSS/03 9.1	0.54	0.25	0.27	0.37	0.18	0.40	0.19
Selsey, West Street, WSS/03 9.1	0.54	0.25	0.27	0.38	0.17	0.43	0.18
Lepe, Stone Point, 03 4.6	0.69	0.29	0.70	0.40	0.20	0.50	0.16
Lepe, Stone Point, 03 4.6	0.69	0.29	0.70	0.41	0.19	0.53	0.13
Lepe, Stone Point, 03 4.6	0.51	0.22	0.38	0.40	0.28	0.41	0.43
Lepe, Stone Point, 03 4.6	0.51	0.22	0.37	0.35	0.22	0.40	0.20

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