SCHOOL OF HUMANITIES
DEPARTMENT OF ARCHAEOLOGY

V62206 The Archaeology of Technology and Production
REASSESSMENT 2012-13

Submission of reassessment coursework

The deadline for receipt of reassessment coursework is **Wednesday 21 August 2013 at 12.00 noon**. Please submit two hard copies of your essay to the Coursework Box in the Humanities Building (unless otherwise stated), each with a coversheet; one copy will be returned to you with feedback. You must also submit an electronic copy to Turnitin on the Moodle page for the module.

Students can if they wish post their work to the Taught Courses Administrator: Rosina Pennington, Humanities Building, University Park, Nottingham, NG7 2RD to arrive on or before the deadline date.

If you choose to do this, please bear in mind the following:

- We strongly recommend that you use recorded mail as non-receipt of coursework due to it being lost or delayed in the post is not considered a valid reason for missing a deadline.
- All coursework must have a coversheet attached, completed and signed in the usual way.

The usual lateness penalties will apply, i.e. 5% per working day that the coursework is late, so please allow enough time for your work to get here.

Assessment Regulations

Rules on presentation, marking, referencing and bibliographies and other assessment regulations remain the same as for standard assignments. You can find these in the Undergraduate Handbook: http://www.nottingham.ac.uk/archaeology/documents/ug/current/archaeology-undergraduate-handbook-1213-final.pdf

The University deals very harshly with plagiarism. For more detailed information on thorough referencing, follow the detailed rules in the main University guide: http://www.nottingham.ac.uk/is/documents/about/inductionguides/references.pdf

Illustrations

Consider carefully how illustrations can contribute to the overall presentation and content of your essay. If you can easily scan a diagram or other illustration into your essay, or download it, definitely consider it. Alternatively, photocopy the illustration, cut it out and glue it in. Hand-drawn illustrations are fine, but they can take a lot of time if they are to look reasonably neat. But however you present your illustrations, make sure you indicate the source. Refer to the book, article, or website you got it from, or indicate if it is entirely your own work (see above on referencing).

Write a 3000 word essay on one of the following topics

Do not write an essay on the topic you have already written an essay on.

1. Explain the principles of flint working. Explain how a knowledge of these principles contributes to an understanding of developments in flint technologies from the Oldowan through to the end of the Palaeolithic.

2. What archaeological information can be produced by the scientific analysis of obsidian? Illustrate your answer with archaeological examples.

3. Outline the stages in the production, from selection of clay to finished article, of a Roman kiln-fired, wheel-made (unglazed) pot. Explain the scientific evidence for these stages, if this is appropriate.

4. Describe how a blown plant ash glass vessel made was made, starting with the raw materials, including colorants, and finishing with the blowing process.

5. What primary raw materials were used for making glass before 1000AD? What colorants and opacifiers were used and how did ancient glassworkers modify glass colours?

6. Compare the main elements of pyrotechnology involved in pottery firing with that of smelting and melting of copper. Indicate whether developments in pottery firing can be used to explain the appearance of the earliest smelting and melting of copper.

7. Copper to Bronze; Bronze to Iron. Discuss the technological, economic, and cultural aspects of ONE of these two material transitions in the archaeological record of Western Asia.

8. What were the metals and alloys known in antiquity? Why were these common rather than others? Why were some (e.g. gold and copper) regularly used before others (e.g. bronze and iron)?

9. Using a case study, describe how ethnographic research has aided our understanding of ancient technology and production.

10. Use archaeological case studies of stone, pottery, metal, or glass production to illustrate how knowledge of the organisation of production can be important for our understanding of past societies.

11. What kinds of technological information can we learn about production processes from the physical examination of ancient finished artefacts? What analytical techniques or approaches might we use? Give examples from the archaeological record to demonstrate your ideas.

Bibliography

General textbooks

Bowman, S. 1991: *Science and the past*, London: The British Museum Press. Good on ceramics, glass and metals.
Brothwell, D.R. and Pollard, A.M. 2001 *Handbook of Archaeological Sciences*, New York: Wiley. Good chapters on materials and archaeology, pottery, metals, glasses etc.
Craddock, P.T. 1995 *Early Metal Mining and Production*, Edinburgh: Edinburgh University Press. Excellent for mining and metals.
Freestone, I.C. and Gaimster 1997 Pottery in the making, London: The British Museum Press. Good for a range of pottery technologies.
Henderson, J. 2000 *The Science and Archaeology of materials*, London and New York: Routledge. It covers what you need to know about ceramics, glasses, metals and obsidian.
Lambert, J. 1997 *Traces of the Past*, Addison Wesley. An interesting discussion of a range of materials.
Pollard, A.M. and Heron, C. 1996 *Archaeological Chemistry*, London: The Royal Society of Chemistry. Good chapters on obsidian and glass.

Flint-working

General Introduction:

*Henry Hodges 1989:
Artifacts, *an introduction to early materials and technology* [3rd ed.]. London : Duckworth, chap 7: "Stone". See esp. pp.98-105. [Good introduction to the basic properties of stone and methods of flaking flint.] CC77.H6
Kenneth Oakley 1972 (6th edition):
Man the Toolmaker. [Useful sections: human and natural (e.g. thermal alteration) flint flaking contrasted; the processes involved in stone tool manufacture; sequence of Palaeolithic tool-making traditions. Title and some ideas rather old fashioned, but basically sound.] CC170.O2
*Inizan, Marie-Louise *et al*. 1999:
Technology and terminology of knapped stone translated by Jehanne Féblot-Augustins. Nanterre : CREP. OversizeCC170.T4 [better than Hodges; much more up to date than Oakley]
Jacques Bordaz:
Tools of the Old and New Stone Age. [A basic text. Possible alternative to Oakley.] CC170.B6
Francois Bordes:
The Old Stone Age. [A possible alternative to Bordaz or Oakley.]
[C] Robert Spier:
"Stoneworking" in *From the Hand of Man. Primitive and Preindustrial Technologies*. New York: Houghton Mifflin. [Not in Nottingham library system]
John W. Lord 1993:
The Nature and Subsequent Uses of Flint. Vol 1. *The Basics of Lithic Technology*. Published by the author. [A readable small booklet which really does give the basics.]
John C. Whittaker 1994:
Flintknapping. Making and Understanding Stone Tools. Austin, TX: U of Texas Press. [Many American examples but also Old World material]
William Andrefsky Jr 1998:
Lithics. Macroscopic Approaches to Analysis. Cambridge: Cambridge University Press, chap. 1 and esp. chap. 2.
George H. Odell 2000:

"Stone tool research at the end of the millennium: procurement and technology" *Journal of Archaeological Research* 8 (4), 269-331 [North American orientated, but a good overview of recent developments. Quite a lot of Old World material as well]
J. Jeffrey Flenniken 1984:
"The past, present and future of flintknapping: an anthropological perspective" *Annual Review of Anthropology* Vol 13, 187-203.

Techniques and terminology of flint-working:

*William Watson 1950:
Flint Implements. An Account of Stone Age Techniques and Cultures. London: British Museum. Especially good section on formation of flint, its physical properties, and terminology involved in its flaking. [Despite useless dates (N.B. date of publication) overview of the development of flintworking is useful - especially illustrations at end.] (CC170.B7)
[C] Sir Francis H.S. Knowles 1953:
Stone-Worker's Progress. A Study of Stone Implements in the Pitt-Rivers Museum. [Not easy to understand and dates of cultures/stages are hopeless (N.B. date of publication). But diagrams are useful and sections of chapters VII & VIII informative (flakes and hammers, tools used by modern peoples). Not in Nottingham library system]

Flint-working: case studies:

*Nicholas Toth 1985:
"The Oldowan reassessed: a close look at early stone artifacts" *Journal of Archaeological Science* Vol 12 (2), 101-120. [Concludes: 1) many Oldowan core forms probably by-products of flake manufacture - not stylistic types. 2) flakes and retouched flakes main tools in Oldowan. 3) this technology doesn't necessarily reflect makers' cognitive ability.]
*M.H. Newcomer 1971:
"Some quantitative experiments in handaxe manufacture" *World Archaeology* Vol 3 (1), 85-94. [Description of methods and materials used to reproduce flint handaxes. Main observations: 1) very large number of waste flakes. 2) possibility of defining stages in handaxe manufacture from study of waste alone.]
[C] *M.H. Newcomer 1975:
"'Punch technique' and Upper Palaeolithic blades" in Earl Swanson (ed): *Lithic Technology. Making and Using Stone Tools* The Hague: Mouton, 97-101. [Argues that it is impossible to prove existence of punched blades. Blade removal seems to have been by soft hammer "mode": within this "mode", several techniques, including punch technique, can successfully reproduce these blades. Not in Nottingham Library system]
*Katsuhiko Ohnuma and Christopher Bergman 1982:
"Experimental studies in the determination of flaking mode" *Bulletin of the Institute of Archaeology* No. 19, 161-170. [Develops a series of criteria useful for determining kind of flaking tool used on worked flint.]
Pierre-Jean Texier 1984:
"Un debitage exérimental de silex par pression pectoral à la béquille" *Bulletin de la Société prehistorique française* Vol 81 (1), 25-27. [Demonstrates possibility of using chest punch on flint - not just obsidian. Argues that it is quite easy once skill has been developed. Method involves a wooden clamp and a copper-tipped punch.]
Peter Kelterborn 1984:
"Towards replicating Egyptian Predynastic flint knives" *Journal of Archaeological Science* Vol 11 (6), 433-453. [Manufacturing sequence of neolithic knives: 6 basic stages, employing different technologies - e.g. percussion, grinding, large pressure flaking and microflaking. Suggests that separate people with separate skills were involved in production & that very strong cultural pressure produced extreme regularity of finished product quality.]
P. Harding1987:

"An experiment to produce a ground stone axe" in G. de G.Sieveking and M.H. Newcomer (eds) *The Human Uses of Flint and Chert. Proceedings of the Fourth Internationmal Flint Symposium Held at Brighton Polytechnic 10-15 April 1983*, 37-42. [Self-explanatory]
Sophie A. de Beaune 1997:
Les galets utilisés au Paléolithique supérieur: approche archéologique et expérimentale Paris: CNRS éditions
*Mark R. Edmonds 1995:
Stone Tools and Society: Working Stone in Neolithic and Bronze Age Britain London: Batsford

Scientific analysis of obsidian:

Allan, R.O., Luckenbach, A.H. and Holland, C.G. 1975:
'The application of instrumental neutron activation analysis to a study of prehistoric steatite artifacts and source materials' *Archaeometry* 17, 1: 69-83.
*Ammerman, A.J. 1979:
'A study of obsidian exchange networks in Calabria', *World Archaeology*' 11: 95-110.
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*Cann, J.R. and Renfrew, C. 1964:
'The characterization of obsidian and its application to the Mediterranean region', *Proceedings of the Prehistoric Society* 30: 111- 133.
Francaviglia, V. 1988:
'Ancient obsidian sources on Pantelleria (Italy)' *Journal of Archaeological Science* 15: 109-122.
*Gratuze, B. 1999:
'Obsidian Characterization by Laser Ablation ICP-MS and its Application to Prehistoric Trade in the Mediterranean and the Near East: Sources and Distribution of Obsidian within the Aegean and Anatolia', in J. Henderson, H. Neff and T. Rehren (eds.) Proceedings of the International Symposium on Archaeometry, University of Illinois at Urbana-Chamaign (UIUC), Urbana, Illinois, 20-24 May 1996, *Journal of Archaeological Science* 26, 8: 869-882.
*Hallam, B.R., Warren, S.E. and Renfrew, A.C. 1976:
'Obsidian in the western Mediterranean: characterization by Neutron Activation Analysis and Optical Emission Spectroscopy', *Proceedings of the Prehistoric Society* 42: 85-110.
Hughes, R.E. 1994:
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*Renfrew, C. 1975:
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*Tykot, R.H. 1997:
'Characterization of the Monte Arci (Sardinia) Obsidian Sources', *Journal of Archaeological Science* 24: 467-479.

* = highly recommended
[C] = copy in box file.
# = Available via electronic journals on Library home page on University website.

Glass and Glass technology

The Journal of glass studies in the Hallward Library has many articles about glass from every aspect.

Biek, L. and Bayley, J. 1979 'Glass and other vitreous materials', *World Archaeology* 11, 1: 1-25.
Bimson, M. and Freestone I.C. 1983 'An Analytical Study of the Relationship Between the Portland Vase and Other Roman Cameo Glasses', *Journal of Glass Studies* 25: 55-64.
Cable, M. 1998 'The operation of wood fired glass melting furnaces' in P. McCray (ed.) *The Prehistory and History of Glass and Glass technology*, Ceramic and Civilisation, Columbus, Ohio: The American Ceramic Society: 315-330.
Charleston, R. J. 1978 'Glass furnaces through the ages', *Journal of Glass Studies* 20: 9-34.
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Henderson, J. 1991 'Industrial specialisation in Late Iron Age Europe: organisation, location and distribution', *Archaeological Journal* 148: 104-148.
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Henderson, J. 1999 'Archaeological and Scientific Evidence for the Production of Early Islamic Glass in al-Raqqa, Syria', *Levant* 31: 225-240.
Henderson, J. 2000 'Chemical analysis of ancient Egyptian Glass and its interpretation' p. 206-224 in P.T. Nicholson and J. Shaw (eds.) *Ancient Egyptian Materials and Technology*, Cambridge: Cambridge University Press.
**Henderson, J. 2000 Chapter 3 on Glass in J. Henderson *The Science and Archaeology of Materials*, Routledge.
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**Nicholson. P.N. (1995) 'Glassmaking and Glassworking at Amarna: Some new work', *Journal of Glass* Studies 37: 11-20.
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Sanderson, D. C. W., Hunter, J. R. and Warren, S. E. (1984) 'Energy dispersive XRF analysis of first millennium A.D. glass from Britain', *Journal of Archaeological Science* 11: 53-69.
Sayre, E.V. and Smith, R.W. (1961) 'Compositional categories of ancient glass', *Science*, 133, June 9th: 1824-26.
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_____ (2000) 'Raw materials of glass from Amarna and implications for the origins of Egyptian glass', *Archaeometry* 42,1: 141-152.
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Ceramic technology

General:

** Henderson, Julian 2000:
Ceramics, chapter 4 in *The Science and Archaeology of Materials*, London and New York: Routledge.
**Hodges, Henry 1989:
Artifacts: an introduction to early materials and technology [3rd ed.]. London : Duckworth, 19-41.
Hodges, H.1970:
Technology in the Ancient World, London: Allen Lane. Sections on pottery. [Science Library]
Shepard, Anna O. 1956:
Ceramics for the Archaeologist Washington DC: Carnegie Institution of Washington - esp. chaps. I & II.
Gonen, Rivka 1973:
Ancient Pottery. London : Cassell.
van der Leeuw, Sander E. and Alison Pritchard (eds) 1984:
The Many Dimensions of Pottery. Amsterdam: Universiteit van Amsterdam.
Rye, Owen S.1981:
Pottery Technology: Principles and Reconstruction Washington D.C: Taraxacum.
*Scott, Sir Lindsay:
"Pottery" in C. Singer, E.J. Holmyard and A.R. Hall (eds): *A History of Technology Vol 1. From Earliest Times to Fall of Ancient Empires*, 376-412.

Archaeological studies:

Peacock, D.P.S.
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Symbols of Power at the Time of Stonehenge; Edinburgh : HMSO for National Museum of Antiquities of Scotland. "Pottery", pp.193-203.
Gibson, Alex M. and Ann Woods 1997:
Prehistoric Pottery for the Archaeologist 2nd ed. London: Leicester University Millett, M. (ed) 1979: *Pottery and the Archaeologist*. London: Institute of Archaeology Press.

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Swan, Vivien G.:1984
The Pottery Kilns of Roman Britain. London : HMSO
Webster, Peter 1983:
Roman Samian Ware Cardiff: Department of Extra-Mural Studies, University College. See esp. pp.4-7.
Weissman, Sarah U. 1994:
"From pots to people: ceramic production in the ancient Mediterranean" in Sarah U. Weissman and Wendell S. Williams (eds) *Ancient Technologies and Archaeological Materials* Amsterdam: Gordon and Breach.

Practical descriptions of hand built pot-making:

Tyler, Keith:
Pottery Without a Wheel. [This is preferable to:-]
Winterburn, Mollie:
Hand Built Pottery. [Read if Tyler unavailable: "arty"]
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A. Livingstone Smith 2001:
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"The 'traditional' craftsman as entrepreneur: a potter in Ermioni" in Susan Buck Sutton (ed) *Contingent Countryside. Settlement, Economy and Land Use in the Southern Argolid Since 1700*, 275-289.

** = essential reading
* = highly recommended
[C] = offprint in Prehistoric Technology box-file.

General Works on Archaeological Materials Analysis and Early Metallurgy

Works should be available in the library.

* Craddock, P. T.
1989 The scientific investigation of early mining and metallurgy. In *Scientific Analysis in Archaeology*, edited by J. Henderson, pp. 178-212. Oxford University Committee for Archaeology Monograph No. 19. Oxford University Committee for Archaeology, Oxford.
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Copper-Base Metallurgy

General Works

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Arsenical Copper

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1973 An examination of the arsenic-rich coating on a bronze bull from Horoztepe. In *Application of Science in Examination of Works of Art*, edited by W. J. Young, pp. 96-102. Museum of Fine Arts, Boston.

Tin and Tin-Bronze

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1999 Analytical investigation of archaeological powders from Göltepe, Turkey. *Archaeometry* 41:81-89.
* Alimov, K., N. Boroffka, M. Bubnova, J. Burjakov, J. Cierny, J. Jakubov, J. Lutz, H. Parzinger, E. Pernicka, V. Radililovksiy, V. Ruzanov, T. Sirinov and G. Wesigerber
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