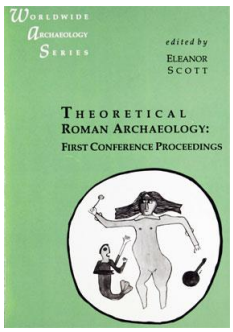

Paper Information:

Title: The Study of Roman Technology: Some Theoretical Constraints
Author: Kevin Greene
Pages: 39–47

DOI: http://doi.org/10.16995/TRAC1991_39_47
Publication Date: 01 April 1993

Volume Information:

Scott, E. (ed.) (1993) *Theoretical Roman Archaeology: First Conference Proceedings.* Worldwide Archaeology Series, vol. 4. Aldershot: Avebury/Ashgate.

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THE STUDY OF ROMAN TECHNOLOGY: SOME THEORETICAL CONSTRAINTS

Kevin Greene

This paper criticises attitudes to the history of technology exemplified by the Routledge Encyclopaedia of the History of Technology *(1990), which displays ignorance of the nature and achievements of archaeology, compounded by failure to distinguish between the materials and methods of archaeology and history. The* Encyclopaedia's *emphasis on individual inventions leads to linearity and diffusionism, while questions of gender are hardly addressed.*

This paper draws attention to technological change resulting from the reorganisation of existing skills and resources, and suggests that innovation must have been more important than invention in a Roman context, and rejects the judgement of Roman technology in terms of an unquestioned desire for economic growth. Fortunately, there *is* now genuine debate about the theory of the history of technology, and much potential for research exists in the Roman empire. This paper was delivered in outline at the TRAC conference in March 1991 as an unashamed tirade against prevailing attitudes to the history of technology. I do not attempt to provide a detailed account of any existing theoretical framework, let alone propose a new one. For those speakers at the conference who voiced routine criticisms of 'Romanists' and their supposedly deficient outlook and deafness to theoretical considerations, my paper has a simple message – you have not heard anything yet . . .

HISTORIANS OF TECHNOLOGY

A View from 1990

What I have to say in this section was provoked by reading *An Encyclopaedia of the History of Technology*, edited by Ian McNeil, published by Routledge in

1990 (hereafter *EHT*). *EHT* begins with an examination of the place of technology in history, which emphasises the role of individuals, and broadly equates technology with invention (p. 2) An interesting distinction is drawn between science and technology, based upon function; thus, because people who can be described as scientists *used* telescopes, they are left for another encyclopaedia; musical instruments are excluded on similar grounds, 'although the craftsmen who originally made them were undoubtedly technologists' (p. 4). Editorial convenience is the stated reason, rather than a theoretical functional classification based on different economic or social contexts.

By definition, any history of technology that perceives inventive individuals as prime movers will automatically skate over the entire undocumented prehistoric and protohistoric past; early historic periods lacking texts that 'name names' will also be relegated to an inferior position. The position is worsened by McNeil's ignorance of the nature and achievements of archaeology in the post-war period, compounded by his failure to distinguish between the raw materials and methods of archaeology and history, culminating in the following astonishing assertion (*EHT* p. 4):

> The neglect of technology, the near-contempt in which archaeologists and historians seem to hold it, is all the more surprising when one considers that it was one of the former who originated what is now the standard classification of the archaeological ages, and which is based on technological progress.

The archaeologist in question and the 'standard classification' turn out to be C. J. Thomsen and the three-age system. The only advance in archaeology in the twentieth century is credited to Childe, 'who was convinced that we should look upon pre-history primarily as a history of technology.' TRAC participants may or may not be reassured to learn that 'Of recent years more and more archaeologists have been adopting Professor Childe's approach' (p. 5).

McNeil then proposes 'the seven technological ages of man', which reveal even more about the attitudes that underlie the whole of *EHT*. The ages are defined very briefly (p. 5), and then used to structure thirty-eight pages of fuller discussion. I will summarise the seven ages from these definitions, and illuminate some with words from subsequent section headings, placed in parentheses:

1 the era of nomadic hunter-gatherers ('man, the hunter, masters fire');
2 the Metal Ages of the archaeologist ('the farmer, the smith, and the

wheel');
3 the first Machine Age;
4 the beginnings of quantity production ('intimations of automation');
5 the full flowering of the Steam Age;
6 the rapid spread of the internal combustion engine ('the freedom of internal combustion');
7 the present Electrical and Electronic Age ('electrons controlled').

Although these ages are described as 'to some extent overlapping', it is clear from McNeil's fuller definitions that they are viewed entirely from a First World perspective, and that they are based on very inconsistent criteria which blur the distinction between causes and effects, events and processes. Nothing is made of potential comparisons between the social organisation and energy expenditure of hunter-gatherers and settled farmers, yet extraordinary claims are made for the social influences of copper and iron (p. 12); copper was divisive and created hierarchies, supposedly for the first time, whereas iron 'has rightly been called the democratic metal, the metal of the people'. These potentially fascinating ideas are not justified or explored in any way, however, and no archaeological sources (other than Oakley's *Man the Toolmaker*) are provided in the further reading section (p. 43).

Inventions: a First World Viewpoint

A further problem with most histories of technology is that only those items that led to modern western 'high' technology are considered really interesting. Anything military or mechanical is always valued above the ingenuity of ordinary ceramics, textiles or basketwork, despite the greater benefit of the latter to a larger number of people. Likewise, almost everything is judged in terms of saving time and labour, which are unlikely to have been conceptualised, let alone commoditised, in anything like the same manner in pre-industrial societies.

The history of technology and inventions also tends to be perceived as a score-chart of temporal 'firsts' divorced from their spatial and cultural contexts. Once again, the basis of information is primarily European, and governed by texts, although China always receives honourable mention on account of its early literary sources, explored by the indefatigable Joseph Needham. When the history of technology is text-centred and geographically restricted, and envisaged in terms of individual inventions, it tends towards linearity and diffusionism. If texts are absent, and

inventions cannot be located in a precise place or time, the linear model degenerates into an extremely naive sequence of causes and effects; thus, *EHT* manages to condense the origins of farming and the introduction of individual hand-tools into four sentences (p. 11–12):

> It started some time about 10,000 BC, when a great event took place – the end of the last Ice Age when the melting ice flooded the land and brought to life a host of plants that had lain dormant in seeds. Among these was wild wheat as well as wild goat grass. It was the accidental cross-fertilisation of these that led to the much more fruitful bread wheat, probably the first plant to be sown as a crop, which was harvested with a horn-handled sickle with sharpened flints set into the blade with bitumen.

Just like that. Exactly the same linear model is proposed for the 'invention' of containers (p. 15):

> The development of both tools and weapons increased the demand for containers in which to remove the spoil of excavation or to preserve or to cook the winnings of the hunt. Basketwork is characteristic of the Neolithic Age and is a development of the weaving of rushes to make floor coverings for mud huts. Such forerunners of the carpet date from some time before 5000 BC. The same weavers learned to work in three dimensions so as to produce baskets in which grain could be stored. By 3000 BC the skill was widespread.

I do not wish to labour this point any further, but it must be pointed out that this kind of simplistic reductionism is less obvious to the uninitiated when it is cloaked in the apparent respectability of literary texts from the Graeco-Roman world or early medieval Europe.

PROBLEMS OF PERCEPTION

The theoretical and interpretative ground has been shifting rapidly all around the general issue of technology, and many new factors affect traditional interpretations of Roman technology.

Ethnic Stereotypes: Greeks and Romans

At this point, I will turn to another problem affecting the study of Roman technology, which is well illustrated by a quotation from a book on ancient

pottery that encapsulates the traditional view of classical scholars. This interpretation of the relative merits of Greek and Roman culture permeated most branches of classical archaeology, and then progressed into the canons of the history of technology (Walters 1905 vol 2, 430):

> Roman vases are far inferior in nearly all respects to Greek; the shapes are less artistic, and the decoration, though not without merits of its own, bears the same relation to that of Greek vases that all Roman art does to Greek art.

What do we find eighty-five years later in *EHT* (p. 18)?:

> The Greeks were great builders but, apart from a few exceptions such as Archimedes, were theoretical scientists rather than practical technologists. . . . The Romans, although a far more practical people, invented little of their own but did much to adapt the principles, used by the Greeks only for their temple 'toys', to large-scale practical applications such as could be used 'for the common good' .

Later, in the context of a section on weapons and armour, the same sentiment is echoed by Charles Messenger (*EHT* p. 970):

> Unlike the Greeks, the Romans were not innovators but very practical engineers, who applied the ideas of their predecessors .

I have explored elsewhere the question of 'Greek science', which was in fact largely Roman in date, developed in Alexandria, and extensively applied, for example in irrigation agriculture (Greene 1990). I also stressed the need to modify our concepts, as the classical world developed from city-states to a vast empire with very disparate needs, differing greatly in areas of dissimilar geography and economic development.

Gender

Questions of gender are (at last) of growing importance in archaeology, but have hardly been addressed in relation to the industry or technology of the Roman period. The function of women in this context is hardly touched upon by Dickinson, Hallett, or other contributors to Grant and Kitzinger's *Civilisation of the Ancient Mediterranean: Greece and Rome* (1988), in contrast to aspects such as social status, prostitution, and the enjoyment (or otherwise) of sex. The reason is that these accounts rely upon the same documentary and literary sources which neglect many other aspects of

economic life (Lefkowitz and Fant 1988). Work by Berg (1984; 1985) on recent industrial societies has underlined the fact that women remained a very important part of the labour equation, but it hardly needs to be said that they make little or no appearance in the 'roll of honour' of inventors. We can safely assume that many of the technical developments of the pre-industrial period were the result of women's endeavours, particularly in the context of food-processing and storage, and household industries such as ceramics and textiles (Westwood and Bhachu 1988).

In almost provocative opposition to late twentieth-century avoidance of conspicuously gender-specific language, it is depressing to find that *EHT* designates the period before farming as 'The first age: man, the hunter, masters fire' (p. 5), and to learn that 'Metal workers were a class of specialists . . . who depended for their sustenance on the labours of their fellow men.' (p. 13). Presumably the neglect of 'low' technology such as basketry, in contrast to the attention paid to machinery, also reflects feminine/masculine associations.

The Industrial Revolution

The lack of a Roman 'Industrial Revolution' in response to technical and infrastructural change need not worry us (Greene forthcoming), for Roman economic growth consisted primarily of proliferation and intensification, in the favourable circumstances of an expanding empire. The Industrial Revolution only happened once, initially in Britain and then in parts of Europe, and can therefore hardly be considered to be a 'normal' path of economic development. Technological change is now seen as more of a consequence than a cause of the Industrial Revolution of the eighteenth century, and the leading lights no longer appear to have been self-made craftsmen/entrepreneurs, but the very same rich industrialists and landowners of the pre-industrial period.

Technology Transfer

Experience of failures of high-technology investment in Third World economies has forced donor nations and banks in the First World to recognise the importance of the social context into which new technology is introduced, and to acknowledge the necessity for a suitable infra-structure. I have explored aspects of this phenomenon in a recent paper (ibid.) and drawn attention both to the diversity of forms of technology transfer, and the fact that change can take place purely in terms of the reorganisation of existing technical skills and resources, rather than new

equipment or inventions. This concept is likely to be particularly useful in a Roman context, where innovation must have been more important than invention (Greene 1986; Hopkins 1988).

Appropriate Technology

The concept of appropriate technology is inextricably bound up with the careful use of global resources, ideally from renewable sources, without ecological or social damage. Obviously, we cannot look for values such as these amongst Roman engineers or manufacturers, but they remind us to avoid the pitfall of judging Roman technology purely in terms of progress, led by an unquestioned notion of the desirability of economic growth. *EHT* is dedicated 'To the memory of THOMAS NEWCOMEN who built the first engine to work without wind, water or muscle power'. The final irony is that the 'liberation' of humans and animals by Newcomen's steam engine of 1712 simply helped to increase the number of other ways in which they could be exploited, and sealed the fate of the world's atmosphere and forest cover by accelerating the use of fossil fuels.

CONCLUSIONS

Fortunately, there *is* genuine debate about the theory of the history of technology. Whether implicitly or explicitly, all modern prehistorians are involved in exploring the implications of technology (in its broadest sense), and Childe has not been alone in according technology a central determining role in human society.

In 1979, Bugliarello and Doner published a collection of papers on the history and philosophy of technology originally presented at a symposium held at Chicago in 1973. The symposium was prompted by unease amongst the participants about the impact of contemporary technology, and its retrospective implications ('Are we so bemused by our own age of anxiety that we have become insensitive to the impact caused by technological innovations in earlier times? How has man absorbed the technology of his own time in all the ages past?' (p. xi)).

The World Archaeological Congress held at Southampton in 1986 included a theme session entitled 'The social and economic contexts of technological change', subsequently published under the rather more dynamic title *What's New? A closer look at the process of innovation* (Leeuw and Torrence 1989). In the editors' preface, they describe the session as 'the only main theme . . . that was conceived of as being in the non-fashionable,

functional and technological sphere' (p. xix). The reason for the change of title is interesting in the light of my comments on the First World orientation of *EHT*: 'Many scholars emphasised the continuous production of innovations in all social settings and protested against the prevailing attitude that non-western peoples are backward and unchanging, and depend entirely on the developed world for their ideas and technology' (p. ix).

The many contributions to *What's New?* raise the subject of the *context* of technology and innovation to a sophisticated level, which succeeds in combining theory and observation in case-studies from all over the world. Set alongside recent work on the Industrial Revolution and Third World economics, I hope that it is apparent that the attitudes displayed in *EHT* in 1989 are in fact the bones of a very large, but almost extinct, dinosaur. More than ten years previously, Kranzberg had already stated that 'innovation most nearly resembles an ecological process and requires a dynamic systems model.' (Bugliarello and Doner 1979, xx). This biological metaphor has been extended by Basalla's recent book *The Evolution of Technology* (1988), which argues against the role of individuals.

I hope that these concluding remarks give some indication of the vitality of this 'non-fashionable, functional and technological sphere', and the potential for research that exists in the Roman empire – a relatively sophisticated society with a significant element of information-flow through literacy.

Bibliography

Basalla, G. 1988 *The Evolution of Technology*. Cambridge; Cambridge University Press.

Berg, M. 1984 *The Coming of Industry: Innovation and Work 1700–1820*. London; Fontana.

Berg, M. 1985 *The Age of Manufactures: Industry, Innovation and Work in Britain 1700–1820*. Oxford; Blackwell.

Bugliarello, G. and D. B. Doner, (ed.) 1979 *The History and Philosophy of Technology*. Urbana; University of Illinois Press.

Dickinson, S. K. 1988 'Women in Rome' in M. Grant and R. Kitzinger, (eds) 3, 1319–1332.

Grant, M. and R. Kitzinger, (eds) 1988 *Civilisation of the Ancient Mediterranean: Greece & Rome* 3 vols. London; Collier Macmillan.

Greene, K. 1986 *The Archaeology of the Roman Economy*. London; Batsford.

Greene, K. 1990 'Perspectives on Roman technology' *Oxford Journal of Archaeology* 9.2, 209–219.

Greene, K. forthcoming 'How was technology transferred in the Roman Empire?' in M. Wood et al. (eds).

Hallett, J. P. 1988 'Roman attitudes toward sex' in M. Grant and R. Kitzinger (eds) 2, 1265–1278.

Hopkins, K. 1988 'Roman trade, industry, and labour' in M. Grant and R. Kitzinger (eds) 2, 753–777.

Leeuw, S. van der and R. Torrence (ed.) 1989 *What's New? A Closer Look at the Process of Innovation.* London; Unwin Hyman.

Lefkowitz, M. R. and M. B. Fant B. 1988 *Women's Life in Greece and Rome: a source book in translation.* Duckworth.

Walters, H. B. 1905 *History of Ancient Pottery: Greek, Etruscan and Roman* 2 vols. London.

Westwood, S. and P. Bhachu 1988 *Enterprising Women: Ethnicity, Economy and Gender Relations.* Cambridge; Polity Press.

Wood, M. et al. (eds) forthcoming *Opposition or Opportunity?: Romanisation in the West.*