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Demography and Archaeology

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COLIN RENFREW¹

In the field of archaeology, demography has sometimes seemed something of a phantom science. Many explanatory models in archaeology have taken population density as a central theme. But the quantitative precision and broad sweep of the resulting formulations, scientific enough in their intentions, have often been undermined by the difficulties in the practice of estimating population densities for the prehistoric or early historic past. Indeed, even for the Classical world, where historical and literary texts as well as inscriptions are available to supplement the settlement remains still visible on the ground, the estimation of population has been a field of controversy for more than a century (Beloch 1886). Problems of estimation have undermined those quantitative intentions of the would-be scientist. Yet despite these practical problems, the attractions of the explanations already proposed have been considerable.

When Gordon Childe (1936) outlined his two great revolutions in prehistory—the Neolithic revolution and the urban revolution—they were formulated with explicit reference to the demographic effects of what Childe took as his prototype: the Industrial Revolution. They have been greatly influential in much further work. For instance, in Lewis Binford's "Post-Pleistocene Adaptations" (Binford 1968), one of the pioneering articles of the new archaeology of 40 years ago, population density was explicitly regarded as the key parameter. In the years that followed, influenced partly by Esther Boserup's *Conditions of Agricultural Growth* (Boserup 1965), many archaeologists tended to take population increase as a prime mover for changes in the cultural system. So it is no surprise that, in the present volume, Richerson, Boyd, and Bettinger take Darwin's account of his reading of Malthus's *Essay on the Principle of Population* (Malthus 1798) for their epigraph in a paper in which increasing population density is again seen as a key variable.

More recently, broad formulations have been proposed that are explicitly quantitative. Indeed, since Ammerman and Cavalli-Sforza set out their wave of advance model for the spread of the Neolithic way of life to Europe (Ammerman and Cavalli-Sforza 1973), the coming of farming (especially to Europe) has become a locus classicus for demographic discussions in the field of archaeology. Indeed it remains so here in the papers of Shennan and Bentley, Layton, and Tehrani.

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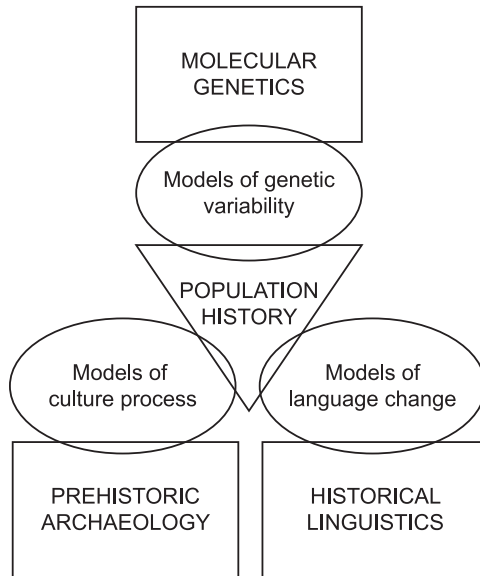


Figure 1. The central role of population history in the overlapping fields of molecular genetics, historical linguistics, and prehistoric archaeology.

The impact of molecular genetics, likewise, has brought demographic questions into clearer focus, for population history can now be recognized as the key area of overlap and interaction in the eagerly awaited (but not yet achieved) synthesis between the field of molecular genetics and the fields of prehistoric archaeology and historical linguistics (Figure 1) (see Renfrew 1992).

In interpreting molecular genetic data, and in particular the bearing of current DNA data (from living populations) on our understanding of earlier system states, the application of simulation studies has been particularly important (Matsumura et al. 2008). Several papers here, including those of Steele and Bocquet-Appel and Tuffreau, recognize that agent-based simulations can now take their place along with analytical studies (for instance, using differential equations) among the most promising avenues for progress.

The difficulty of producing valid and usable data for populations and population densities remains, however, a central theme in the present volume, notably in the paper by Andrew Chamberlain. An interesting approach, developed here by Felix Riede, is the use of radiocarbon dates as population proxies, a method suited to the investigation of population change, if not to the estimation of population density in absolute terms. The problem of evaluating population density recurs in Stephen Shennan's choice of the European early Neolithic for special study, for which the excellence of the data from the Aldenhovener Platte for the Danubian (LBK) early Neolithic is utilized. The same issue and data set appear again in the

interesting paper by Zimmermann, Hilpert, and Wendt, who confront the disturbing thought, originating with Herbert Jankuhn (1977), that the gaps on the archaeological distribution map often seen between well-documented areas may not simply be lacunae in the data, as is sometimes assumed. If they were the result of patchy preservation, they might be open to resolution by means of averaging procedures, using the “best” data as typical. Instead, they may be real gaps: genuinely empty spaces situated between competing tribal groups. The conflicting assumptions here are not easy to resolve. These concerns about the nature of the data perhaps suggest that caution is still needed in dealing with some of the more sophisticated mathematical modeling methods outlined in various papers in this special issue.

Nonetheless, and despite these cautionary lessons, there are original and stimulating approaches to quantitative thinking in several of the papers in this special issue. These range from the careful treatment of the effects of macroclimatic variations on Neanderthal hominins (Bocquet-Appel and Tuffreau) to the significance of increasing population density on innovation rates in the post-Pleistocene (Richerson, Boyd, and Bettinger).

One positive aspect is the attention being given to demographic factors in the modeling of language change, featured in the papers by Kandler, Vogt, and Wichmann and Holman. Only a decade ago Daniel Nettle, in his pioneering work *Linguistic Diversity* (1999), seemed a lone voice in this field with his emphasis on population sizes. It is encouraging to see the relevant factors being analyzed with both linguistic and computing competence. The application of quantitative methods in the field of historical linguistics has developed considerably in recent years (Forster and Renfrew 2006), and the central role of demographic questions for the understanding of historical linguistics is likely to become more apparent.

A notable feature in a number of the papers in this special issue is the effort to make agent-based modeling scenarios sufficiently complex to the extent that they can begin to model the considerable complexity of real-life situations. An excellent example is offered by the systematic introduction of kinship and marriage considerations into the modeling of DNA scenarios, as applied (once again) to the early Neolithic of Europe, by Bentley, Layton, and Tehrani. Only by consideration of such factors can the social realities that underlie patterns of demographic change be adequately modeled. There is much to celebrate here, and encouraging progress is being made to bridge the gaps between theory and data.

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