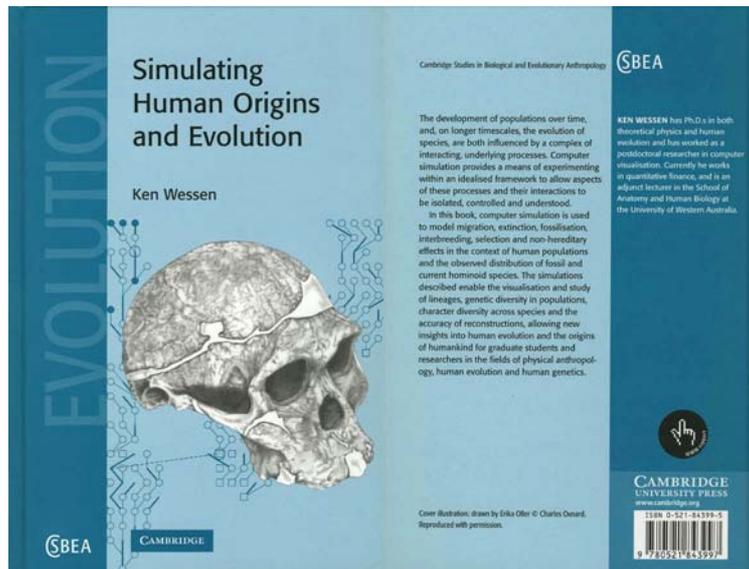


Wessen, K. 2005. *Simulating human origins and evolution.* – Cambridge, Cambridge University Press

Book review by M.C. van der Plas



When I first started reading this book, I expected it to be full of simulations of well known theories, such as the ‘Out of Africa’ model versus the ‘multi-origin’ model or an estimation of the time for Eve. I expected the computer models described in the book to be used to test these theories or to describe some new theories based on the outcomes of these models. However, it soon became clear that this was not the case. Instead of claiming to have yet another ‘fail proof’ method to reconstruct our human origins, Ken Wessen wants no more than to use simulations to investigate the effects normal day to day decisions can have on the evolutionary lineage of humans. The decision you may make some day or have already made to move to another country or to marry this person instead of that, such decisions can change what our descendants will look like in the far away future. In his book, he simulates the evolution of populations by varying migration, mating strategies, population demographics and fossilization to investigate the pitfalls of reconstruction of evolution.

The book is divided in two different parts, depending on the description of two different simulation programs (downloadable from his website). In the first simulation, called ‘Specialist’, the emphasis is on the problems of reconstruction of relatively simple lineages. For the mathematicians, he gives a detailed description of the mathematics used to make the calculations necessary to find the most recent common ancestors, to determine which fossils are from surviving lineages and the accuracy of the reconstructions. For the non-mathematicians, I recommend to skip these parts and move on to the explanations of the results, since that is completely comprehensible without the mathematical background. I should mention here that the presentation of the results is rather dry. Simulation follows simulation and points are made in percentage of right and wrong. Important here is to focus on the message. What the different mathematical approaches to reconstruction of the lineages clearly show, is that though not one of the approaches is completely wrong, none of them is completely right either. The biggest problem is of course (and I think we could all guess this) the fossilization rate; the more fossils, the more accurate the reconstruction will be. Unfortunately, in real life, fossilization is rare. Therefore, the results presented by Ken Wessen really force us to be skeptical about our human lineage. The amount of fossils placed on the surviving lineage, was consistently over exaggerated in all simulations. Personally, I think this reflects on all science publications revealing yet another missing link in our evolutionary past. Sadly, the truth apparently is that most of these so called ancestors are not our ‘mothers’ or ‘fathers’, but far more likely our ‘second cousin twice removed’. Still, this is not shocking news to most of the experts in the field. Another implication made clear in the book is that the demographics of a population as well as migrations can also distort the picture of the reconstructed tree. For example, if we want to find the most recent European common ancestor, we would not think of looking for it in let’s say China. However, if the most recent European common ancestor was a member of a more widely dispersed population, it could very well be, that due to the small fossilization rate, the closest fossilized specimen of this population will be found in China, and not in Europe! And I think we can all guess what the effect of a population bottleneck would be on the variation in following generations.

After having disillusioned his readers in the first part of the book by showing the amount of guess work in reconstructing lineages, the author moves on to the second simulation, called ‘Genie’. With this program, he investigates the influence of different life decisions in the development of a species. Factors are for instance:

population size, migration, mating strategies (monogamy, polygyny and polyandry), sex ratio, mating probability (100% for every female that can mate with every male), fecundity, infidelity and selection. This part of the book is somewhat more difficult to follow, because the figures are less easily interpreted as the trees in part I. Again, the author starts with describing the mathematics behind the simulations, so you can either read or skip that again as previously. In this section, the author simulates evolution, with the aim to investigate the influence of above-mentioned factors on the survival of different mutations in two paternal (Y-chromosome), two maternal (mitochondrial DNA) and two autosomal genes. For every simulation, the paternal, maternal and biological common ancestors are determined, if possible, for three populations, as well as the common ancestors for all these populations together. Again, the different parameters can give a great deal of different outcomes, based on chance (a single simulation can be very different for the average results of 1000 simulations, and as we know, evolution only happens once), but also on the relative timing of events. For instance, immigrants from another population have a more pronounced effect on the population they migrate into, when they arrive just after a population bottleneck. It is also possible that only males migrate (think of Viking settlement in England) or only females (for instance abduction of the women after a raid, or simply marriage, since in most cultures the women go and live with the husband's family). In summary, the simulations show the wide variety of outcomes when normal factors in life are taken into account. This makes it painfully clear, that any reconstruction of the human lineage will have to take all these factors into account as well as the times when they occurred. Therefore, after reading this book, I understand why the author is so reluctant to include any examples of current theories in his simulations.

In conclusion, Ken Wessen has made very interesting computer simulations to investigate the effects of a great number of factors on the evolutionary development of species. This book is a good read for everybody with an overly optimistic view of our knowledge of human history. It is a bit of a shame that the book reads a little bit like a manual. However, what he describes was, for me at least, an eye opener and I think his simulations are very valuable to the field of evolutionary science in general, not just for human evolution. In fact, human evolution may be the most problematic, if maybe most appealing, field for which these simulations can be used.

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