



Populous Single-Origin Families: Computer Modelling



by **Dr. John S. Plant (Member 4890)**

and **Professor Richard E. Plant (Member 6100)**

As mentioned in our previous article (JoONS, volume 11(7), pp 12-13), an early DNA study claimed that the Sykes surname was single origin. This would imply that a single family could grow, under UK growth conditions, as large as this surname's UK population of 14,383 by 1881. Computer simulations using our 'basic' model do not allow a family to grow this large. We shall here add some features to our basic model. These allow more growth. Then, we will proceed to discuss the implications, comparing theoretically predicted family sizes with ones estimated from DNA studies, for Plant and Sykes in particular.

As an extension to our basic model, Table 1 displays the largest single-origin families predicted by 1881, for each of six historic (pre-1965) counties. The numbers represent reproductively-active males. They display the largest number, arising by random chance, within particular overall growth conditions. Instead of the all-England growth parameters of the basic model, we have here used ones derived from published county-wide population data.

Yorkshire	831	Staffordshire	1,246
Lancashire	658	Shropshire	332
Cheshire	577	Wiltshire	229

Table 1: Largest outcomes of a million simulations, giving the number of reproductively-active males in the family

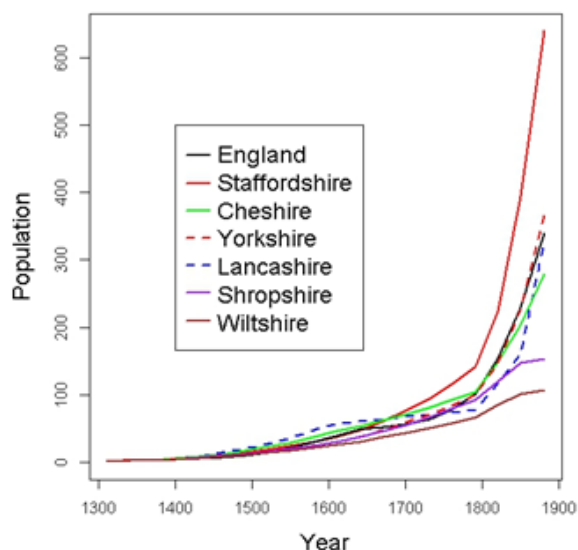


Figure 1: Growth of the largest 0.1% of the initial families under different county-wide growth conditions

The largest families, shown in Table 1, arise as very rare 'one in a million' events. They best serve to illustrate the differences between counties.

Figure 1 displays instead average growth curves, for the largest 0.1% of initial families. Since most families die out, these curves apply to about the largest 1.3% of surviving families. It can be seen that the fortuitously large families are predicted to grow in Cheshire, Yorkshire and Lancashire to around the same size as in the basic model for all England. There are some marked differences however. Predicted large families grow much larger for Staffordshire and much less for Shropshire and Wiltshire. Such differences are broadly in line with the observed evidence outlined in our previous article. This illustrates that, neglecting possible net migrations between counties, different growth conditions in different parts of England can have significant effects.

To compare these computer predictions with a specific surname, Plant is the second most populous Staffordshire surname that is a 'single-origin contender'. This is indicated by 1881 geographical distribution maps; and, our DNA results confirm the existence of a large main Plant family. The UK population of the Plants, in 1881, is around 6,600 of which it can be estimated that 1,100 to 1,650 are reproductively-active males. Around 730 to 1,100 of these can be taken to belong to a large single family. This is in range of our computed predictions for Staffordshire, which allow 1,246 active males as a one in a million event (Table 1). However, it is barely within range of the predictions of Figure 1 which are more appropriate to chance outcomes within a limited regional population.

Additional factors are particularly needed if we are to explain the size of the more populous surname Sykes. Geographical distribution maps in 1881 suggest that Sykes is the second largest 'single-origin contender' surname in West Yorkshire. To explain the exceptionally large size of this 'contender' surname, we might consider that the general growth conditions in pockets of West Yorkshire were as favourable as those of Staffordshire. There might have been local areas, within a large county such as Yorkshire, where growth was enhanced by a thriving local economy. This might have arisen with the long-standing wool wealth and the textiles revolution in West Yorkshire. Adopting a different hypothesis, George Redmonds and Bryan Sykes have suggested that the apparently large size of the Sykes family might be due to a genetic advantage being passed down its male line. We will hence consider the possibility of a still further enhancement of the growth rates beyond those of Staffordshire.

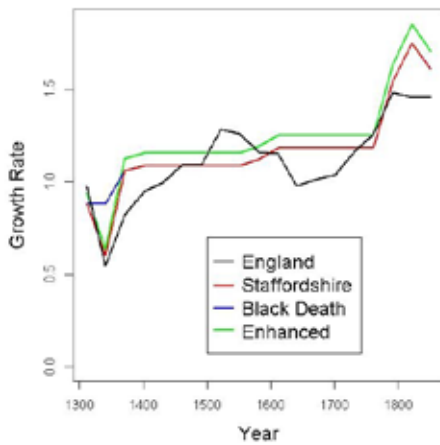


Figure 2(a)

Figure 2: (a) growth rates for England and Staffordshire and (b) population growth curves for fortuitous families

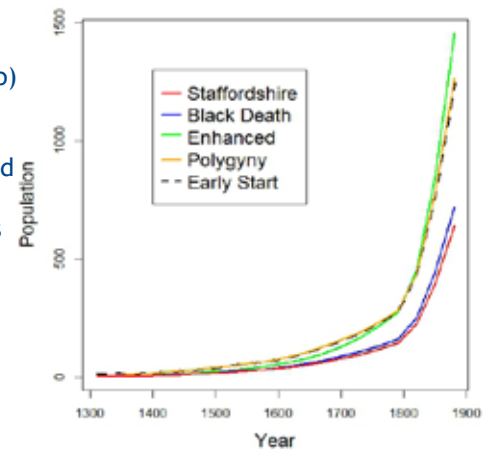


Figure 2(b)

The green lines in Figure 2 correspond to simulations with an enhancement of 6% over the overall Staffordshire growth rates. We also consider a family's supposed resilience to the mid fourteenth-century Black Death. This hypothetical resilience (blue lines) has little effect on a large family's predicted population by 1881 (Figure 2(b)) whereas the persistent 6% enhancement from 1311 to 1881 (green lines) is much more effective.

Figure 2(b) shows similar effects from two other favourable factors: fourteenth-century polygyny (yellow line) or an early start to the surname (broken black line). These can similarly increase the growth of a family's population substantially. In the polygyny model, the extra growth is achieved by either the first male of the family having seven mistresses or he and his sons each having three. The polygyny model requires that all of the resulting offspring carry the same surname. Alternatively, in the early-start model, much the same growth is achieved by there being twelve active males in a single family bearing a shared surname by 1311. This could arise by a surname having originated ten generations (around three centuries) earlier; or, by that many *related* men adopting the surname in 1311. For example, these twelve male-line related men might have acquired the same surname by living near the same system of ditches (Sykes) or a medieval fertile enclosure (Plant).

There seems little doubt that the Sykes name is locative but it is more debatable whether the Plant surname derived from the name of a place. We shall first outline some debate of whether the surname of specifically the main Plant family is locative. We will then relate possible meanings of the Plant surname to our computer modelling. Finally, we will go on to describe our way of resolving the apparent Sykes anomaly.

Our simulations and DNA evidence, along with medieval records, suggest that Plant is plural-origin, albeit with one dominant family. This does not rule out different meanings for the name's origins in different places. There was a gardener with the Plant by-name, as an isolated instance in East Yorkshire in 1377. It would be an example of an "availability error", however, to envisage plants only in modern gardens. The by-name sometimes has a locative form: for a landholder Eimeric *de la Planta* in Anjou in 1202; for three Rouen merchants called *de la Plaunt* and *Plaunt* in 1273; and, for Henry *de Plantas* in Huntingdonshire in 1282. Identifying specific places for their locative origins is not without problems, though

there are the place names Le Plantis in Normandy and La Planteland in the Welsh Marches. In French, plante can mean a vegetable bed, perhaps giving rise to minor place names. In Welsh, the word's senses extend however to procreation and the offspring of animals and humans. Such extended meaning is apparent also in the context of Medieval Latin and Middle English, for which the nutritive, augmentative and generative powers of the medieval plant soul were believed to exist in vegetables, animals, humans and even minerals.

For the main Plant family, we might consider that, before the industrial sense, the Plant name could have been associated with all of the medieval plant powers of feed, growth and breeding at the Plants' earliest known location in their main homeland. This was at the Black Prince's vaccary (cattle station) at Midgeley on the Cheshire-Staffordshire border where, in 1373, Thomas Plontt had failed to pay the fine for pasturing a bullock. When the Black Prince's administrators at the Macclesfield Court ascribed the Plants a surname, they might have had the Midgeley "plant" in mind. Some such locative origin is accordingly possible for the main Plant family, though other possible meanings exist.

Among the various proposals for the origin of the Plant surname, two of the published claims have since suffered from conflicting evidence. First, it was considered in the mid twentieth century that the Plants were multi-origin gardeners; but, now, nearly all newly discovered occupations for the early Plants disconfirm this (JoONS 11(2), 8-9). Secondly, our latest Y-DNA results for a better-accredited male-line Plantagenet descendant do not ratify a nineteenth-century claim that the Plants were the Plantagenets' illegitimate descendants (cf. JoONS 10(8), 14-15). There are also two early twentieth-century claims: Plant meant a 'young offspring' or it was locative. These two meanings can be related to our modelling of a large family size.

For the dominant Plant family, the sense 'many offspring' is compatible with our early polygyny model and a locative origin is compatible with our early start model, since we can conjecture for example that there was a pre-existing family at the location before the formation of the surname. Either model is compatible with the documentary evidence, such as that several Plants have been found in the earliest local pannage lists, which begin in the 1360s. Both models (yellow and broken black lines in Figure 2(b)) allow that all of the Plants found in the early Macclesfield Court Rolls could have belonged to a single family.

Returning to the Sykes surname, the initial DNA study indicated that there was an abnormally large Sykes family in the counties around West Yorkshire, where the Sykes population was around 11,000 in 1881, of which it can be estimated that around 1,800 to 2,750 were reproductively-active males. It was claimed that the whole Sykes family is 'single origin' though this has been doubted, not least by those considering more recent Sykes DNA results for North America.

In the initial Sykes study, 21 out of 48 of the DNA tested men matched one another. False paternity events (NPEs) arise when a surname is not passed on in the same way as the biological father's Y-chromosome. The 27 mismatches for Sykes were ascribed solely to NPEs from a single family, with a stated NPE rate of 1.3% per generation; but, using a more standard back-calculation of the NPE rate, it is 3.53%. All in all, the 27 mismatches in the initial Sykes DNA study can be ascribed to both NPEs and some typically-sized smaller families accompanying the large one, whose size is then within range of our simulations. As alternatives to the claimed male-line genetic advantage for Sykes (green line in Figure 2(b)), other contentions (yellow and broken black lines) can explain the largest Sykes family in West Yorkshire.

The initial Sykes DNA result is hence explained in our computer modelling by a fortuitously large family together with around ten typically sized families drawn at random from the simulation results. Figure 3 shows the number of DNA matches expected from ten typical families, surviving in England, along with the large one. From this, it can be seen that the most likely outcome peaks at around 25 DNA matches with a moderately wide spread of uncertainty. This is in keeping with the initial Sykes DNA study.

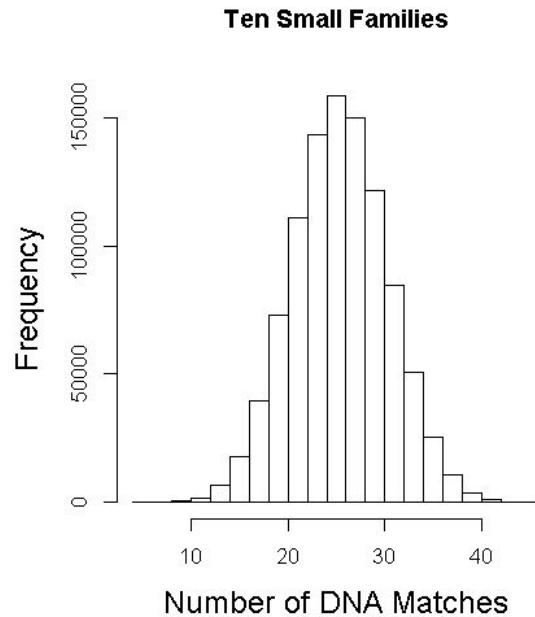


Figure 3: Predicted chances of different numbers of DNA matches amongst the 48 tested Sykes men

More details relating to this article are given on the Guild web-site at <http://www.one-name.org/GettingTheMost-Guild.pdf> where updated editions are being posted. ■

Scottish Association of Family History Societies

25th Anniversary Conference and Family History Fair

“A Matter of Life and Death”

Carnegie Conference Centre, Halbeath Road, Dunfermline, Scotland
Saturday 26th April 2014, 9.30 am - 4.45 pm.

A one-day family history Conference and Fair in Dunfermline, the historic ancient capital of Scotland. There will be four main talks, for delegates, and a series of other talks and workshops during the day which can be booked on arrival. There will also be a children's Family History Workshop. The extensive Family History Fair will feature Family History Societies, Local History Groups and many Commercial Stands.

The cost for delegates is £32, which includes access to all lectures, morning coffee, lunch and afternoon tea. Admission to the Family History Fair will be £2, at the door.

Full details can be found on the SAFHS website at www.safhs.org, and booking forms can be downloaded from the website.

The event is part of the Homecoming Scotland 2014 programme and has received Awards for All Lottery funding.