# How Many Ancestors do I Have?

Exploring the Wind Chime Model of Genealogy Studies

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"That in blessing I will bless thee, and in multiplying I will multiply thy seed as the stars of the heaven, and as the sand which *is upon* the sea shore; and thy seed shall possess the gate of his enemies..."

... Genesis 22.17 (KJV)

The books written by my mother and father (see References) contain appendices with genealogy charts going back several generations, as far as they could trace them using the tools they had at their disposal. Reading those charts is a dizzying experience: they don't all fit onto one page, so you have to follow seemingly endless lines of offspring and husbands and wives to keep track of "who's who in the past," so to speak. There must be an easier way.

As I looked at all those charts, I thought to myself that if I could trace them all the way back to the beginning (!), there would surely be millions of ancestors lining my past. I began to calculate, based on the standard formula:

for n generations, Ancestors =  $2^{(n+1)} - 2$  (for Adam & Eve).

However, the "plus one" seems to be redundant, given the "minus two" for Adam and Eve, so for the purposes of this study I will use a simple mathematical formula:

for n generations, Ancestors = 
$$2^{(n-1)}$$
.

In other words, in the second generation, I have 2 parents. In the third, I have 4 grandparents. In the fourth, I have 8 great-grandparents, and so on. And so on?

How many generations am I from the beginning? One study shows that the British Royal Family trace their lineage back through the Kings of England, beginning with James I (14 generations), the Kings of Scotland (25 generations), the Kings of Argyll in northern Scotland (13 generations), the Kings of Ireland (54 generations), the Kings of Israel/Judah (18 generations), the Post-Diluvian Kings (23 generations), and the Ante-Diluvian Kings (9 generations): a total of 158 generations to Prince George. As I am nearly an exact contemporary of Prince Charles (George's grandfather), I can reckon myself to be approximately 156 generations from Adam. The formula gives us an impossible number of ancestors:

$$2^{156-1} =$$
  
4,5671,926,166,590,716,193,865,151,022,383,844,364,247,891,968  
or = 4,5 x 10<sup>45</sup>

How can this be? Most estimates of the TOTAL number of people who have ever lived on earth are in the range of 108 billion! The exponential figure derived above must be wildly exaggerated! To solve this strange but imminently practical mathematical problem, let us examine a more manageable segment of the human population – all the generations from Adam to Noah.

Noah was the tenth generation from Adam. Therefore, according to our formula, he should have had 512 ancestors (2<sup>9</sup>). However, if we look at Table 1 below, we can see that in many instances Noah's ancestors married their sisters or their cousins, increasing the chances that they would have *shared* ancestors, and reducing the total number of Noah's (and our) ancestors.

Instead of 512 ancestors, we see from the chart that Noah had only 23 known ancestors. Add these together with the "question mark" spouses, which make 28 ancestors. Thus, Noah's ten generations can be grouped together into a "wind chime," that is, a closely knit group of people – a tribe – who intermarry, only occasionally breaking the pattern to marry into another tribe.

In the case of Noah's sons (Shem, Ham, Japheth), the number of ancestors increases significantly, because their mother Na'amah came from a different "wind chime" – the line of Cain (it is ironic that the line of Cain is continued through Na'amah). If the pattern of intra-tribal marriage in that family was similar to that of Noah, then Shem, Ham and Japheth would probably have double the number of ancestors as their father Noah: 56.

Table 1. Descendants of Adam and Eve.



Genesis 4:1-22

Genesis 4:25-32

Granted, there is a lot we do not know about those original ancestors of Shem, Ham and Japheth. It was likely that the line of Cain was *anathema* to the line of Seth, so inter-marriage was frowned upon. However, the model that arises from intra-clan marriage tends to limit the number of ancestors that any one person might have. They lived in a closed system.

In an open system, things are much different. According to our (simplified) mathematical model, we can see the following hypothetical ancestry chart, of Xs and Ys, in an open system:

Table 2. A five-generation genealogy chart.



In this scheme, it took me only four generations to chalk up more ancestors than Noah did in nine generations! Over the course of *twelve* generations, one would have 4,096 ancestors. (If you use this model for twenty generations, you will have more than a million ancestors!) I will use this figure (4,096) throughout the following discussion.

## The Wind-Chime Model: A Longitudinal Study

Table 1 above illustrates the wind-chime model in a tightly knit society. This could only be possible under the conditions that the Patriarchs experienced. Control was maximized. Population was minimal. As time went on, however, and population increased, control began to slip away, and extra-tribal marriage became more commonplace.

Anthropologists tell us that early peoples were hunter-gatherers, only evolving into farmers about 8,000 years ago. However, Genesis tells us that already in the second generation (Cain), people were tilling the soil. That makes for a fairly "grounded" society. In addition, sheepherders (such as Abel) are by no means nomads; they keep to a well-defined territory, tending not to stray, for fear of wolves (or their murderous brothers). For the sake of example, I will consider a rather sedentary, theoretical population of farmers and herders over many, many generations, to illustrate the windchime model.

Given the physical limitations of farming, and the presumed lack of efficient transportation, early people most likely grouped themselves into tribes, or other social units. Marriage within one's tribe would have been preferred, but occasionally a person might venture outside that group and marry into another tribe. Nearby tribes would be the most likely destination:

Tribe A	Tribe B	Tribe C					
Tribe D	Tribe E	Tribe F					
Tribe G	Tribe H	Tribe I					

Table 3. Neighboring Tribes

Over twelve generations, marriage within one's tribe would produce 4,096 members. However, if a person married *outside* his or her tribe, that would effectively double the number of ancestors, depending on which generation he belonged to. Not knowing that precise information, we might be able to average the number to 2,048 (the eleven-generation mark) for any tribe in which the marriage took place. Within these neighboring nine tribes, therefore, we may calculate that over twelve generations a person would have 18,432 potential ancestors.

Table 4. The wind-chime model.



Returning to our earlier mathematical model, we have seen what can happen (in an open system) over one hundred fifty-six generations! With this new wind-chime model, we are able to expand our twelve-generation estimate thirteen times ( $12 \times 13 = 156$  generations). We may then calculate a new (theoretical) number of ancestors:  $13 \times 18,432 = 239,616$ . This model allows for inter-tribal marriage, considering an average number of ancestors for each twelve generations, but also accounting for the number of *shared* ancestors that tribal societies would possibly produce.

## Scotland and Ireland: A Cross-Sectional Study

Now let us move on to the area from which many of my ancestors came – Scotland and Ireland. Among the first settlers to the region were the colonists of the Milesian migration.\* Assuming that these 150 colonists became farmers or herders, it behooves us to know how many people the land could support, at most.

A "hide" (120 acres) was the measure of land that was necessary to support a farmer and his family for a year. (Forests and mountains are suitable for hunting.) Here are some statistics:

# Scotland =

7,800,000 hectares divided by 100 = 78,000 hunter-gatherers; 5.7 million hectares = 14,085,007 acres of arable land; 14,085,007 acres divided by 120 = 117,375 farming families.

# Ireland =

6,900,000 hectares divided by 100 = 69,000 hunter-gatherers;
4.5 million hectares = 11,119,742 acres of arable land;
11,119,742 divided by 120 = 92,664 farming families.

The Irish Genealogies list no fewer than 139 clans, or family groups, which existed in ancient Ireland. Although we do not know the exact size of these clans, their average numbers can be deduced by dividing a population of roughly 740,000 (assuming each family had eight members\*\*) by 140 (taking into consideration possibly one missing clan), which results in an average of 5,300 members for each clan. If it takes 15 acres of farmland to support each person, then one clan would require an area of nearly 75,000 acres (approximately 10 miles square) to support life. If we think about the physical limitations of inter-clan marriage, we see an interesting trend:

\* These came from Spain after 1699 B.C.. Milesius was the 36th generation from Adam, a contemporary of Solomon.

\*\* People in those days tended to have seven or eight children, some of whom may not have lived to adulthood. In Ireland, 92,000 families x 8 members each = 736,000 population.

Table 5. An Irish Example

Clan A	Clan B				Clan C		
O'Toole	Connor				Riley		
Clan D		Clan E			Clan F		
Duffy	 	Meller —				Flynn	
Clan G	Clan H				Clan I		
Quinn	Ryan					Kelly	

If members of Clan E (Meller) marry within their own clan according to the "wind chime" model, as seen in Noah's ancestry, they may share the same ancestors 25 out of 28 times over a course of twelve generations. A person seeking a marriage partner from a different clan may have to look five to ten miles away to find a husband/wife.

Moreover, in any one generation, the number of eligible marriage partners (those within five years of age of any given person) would be about one-fifth of the total population. In a clan of 5,300 persons, this would be 1,060 persons, of whom 530 would be of the opposite sex. In the total cluster represented by Clans A-I in Table 5, the total persons who would be possible spouses would be 530 x 9 = 4,770 per generation. Over a period of twelve generations, the total would be 57,240. From Adam to Edward, Duke of Kent (contemporary with my Irish ancestor, John W. Milor) there are one hundred fifty generations, or 12.5 windchime cycles. Therefore, the total of *possible* ancestors (limited to the geographical area occupied by Clans A-I) would be 12.5 x 57,240 = 715,500 persons. Of course, this is a very conservative average estimate. The actual number may have been much different.

#### Europe

In the Grand Scheme of Things, Scotland and Ireland play their parts, but there is more than meets the eye. After the Flood, descendants of Noah began to migrate to the far reaches of the earth. In the course of this migration, we can trace our roots back to two of Noah's sons, Shem and Japheth.

Japheth's descendants Gomer and Magog went northward, into Europe. Gomer, then, would be the patriarch of the Angles, Saxons and Jutes who colonized England, and eventually Scotland. Magog, on the other hand, went into Scythia. Milesius (generation #36) then reversed this trend and went into Spain. From there he led the most long-lasting colonization of Ireland, driving out the Tuatha da Danaan and other early inhabitants.





# North America

In the case of immigrants to North America, the resulting demographic would constitute a limited open system. It was *limited* in the sense that most (though not all) marriages took place among English speakers; none involved non-European descendants. It was *open* in the sense that a mobile society eliminated the windchime effect.

In most cases (Banta, Passmore, Alberti), I am an eleventh-generation American. I am a tenth-generation Stewart, and a fifth generation Milor (see Table 7, below). I am a one hundred fifty-sixth generation son of Adam.\* For the most part, then, there were twelve cycles of twelve generations that lived before the great migration to North America, after which ten or eleven generations fanned out in a migratory pattern in an open system.

# Conclusion

According to the data I have hitherto laid out, the twelve-generation windchime cycle serves as a reasonable model for ancestry study, over a course of twelve cycles (144 generations). We have seen that in a very closed system such as that of Noah, its average of 2,048 ancestors per cycle is greatly overstated, but over several cycles, the additive nature of the windchime model accounts for the phenomenon of shared ancestry much more efficiently than does the mathematical (exponential) model.

In my own case, the issue of shared ancestors becomes readily apparent. My mother's father's mother's maiden name was Stewart. There have been several other instances, among my progenitors, of men marrying women having the same surname as their ancestors. Moreover, my great-great grandfather "Old" John Banta married a woman named McDonald, whose ancestors ultimately trace their roots back to Margaret Stewart, scion of the original High Stewards of Scotland. Such instances greatly reduce the number of my ancestors.

Twelve cycles, according to the additive longitudinal windchime model, produces  $12 \times 2,048 = 24,576$  ancestors. Multiply this by five-and-a-half "windchime" lines (Stewart + shared Stewart, Passmore, Milor, Banta, Houck) and you get  $5.5 \times 24,576 = 135,168$  ancestors over twelve cycles. Add to that the eleven generations using the exponential formula for the North American open system, and you get the total number of ancestors for me: 135,168 + 2,048 = 137,216 ancestors. This is a very conservative estimate, so we may consider it as a "minimum" number.

In the above cross-sectional study, the maximum number of ancestors for 144 generations x 530 eligible spouses x 9 nearby clans x 5.5 "chimes" = 3,777,840 + 2,048 (N. American open system) = 3,779,888 ancestors. Consider this a "maximum" number of ancestors.

<sup>\*</sup> Other reckonings show my case to be "only" 122 generations.



Table 7. North American Exponential Model

Incidentally, these numbers are *not* more than all the stars in the heavens, nor all the grains of sand on the seashore. Estimates of the former are something on the order of  $1 \ge 10^{24}$ ; of the latter, 5.6  $\ge 10^{21}$ . The exponential model used by most genealogists today renders a number that would be roughly the number of stars *times* the number of grains of sand (2.8  $\ge 10^{45}$ ), a figure which is clearly impossible, given the estimated total number of people (1.08  $\ge 10^{11}$ ) that have occupied the earth since the beginning.

In answer to the question, "How many ancestors do I have?" the additive "windchime" system offers a much more realistic estimate than the totally unrealistic model of the traditional, exponential formula used by many students of genealogy today. The "windchime" number would lie somewhere between the minimum (137,216) and the maximum (3,779,888). And I may safely say that they are fewer than the stars of the heaven, or the grains of sand on the seashore.

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