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WHO WAS LISBETH'S GREAT GRANDFATHER?

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Who Was Lisbeth's Great Grandfather?

Rob^{t.} Flanagan Stieglitz

There are several reasons for individuals to have their DNA evaluated by genealogy companies. The majority test for ethnicity results, others for genealogy matching and some for more personal reasons. Recently I was contacted by an individual regarding a genetic match on *MyHeritage DNA*. She wrote, "Hej. Mitt namn är Lisbeth, jag har en matchning med 4% med din DNA, som jag förstår på fäderna sida. Jag föddes 1940 i Arvika och undrar om din släkt har anknytning."¹ (English translation from *Google* – Hello, My name is Lisbeth, I have a 2.4% match with your DNA, which I understand is on my father's line. I was born in 1940 in Arvika, and I wonder if your family has a connection).² The match Lisbeth is referring to is with my wife Bette. The question then is, who was the common ancestor(s) of Lisbeth Behrens née Ahlén and Bette Stieglitz née Johanson?



According to genealogists Angie Bush and D. Joshua Taylor, "Genetic genealogy is the use of DNA testing in combination with traditional genealogical and historical records to infer relationships between individuals."³ It is important to emphasize that DNA analysis cannot be used alone, your matches need to have accurately sourced family trees.⁴ "By understanding basic patterns of genetic inheritance, genealogists can very effectively use DNA

(https://www.myheritage.com/inbox/thread/186339392 : accessed 27 Dec 2021).

¹"MyHeritage Message Inbox," *MyHeritage*, Lisbeth Behrens, 27 Dec 2021

²"Google Translate," 2001, *Google.com*, Swedish to English, 2001. <u>https://translate.google.com/</u> : 27 Dec 2021).

³ Alona Tester, "Beginners Guide to DNA and Genealogy," *FamilyHistory.link*, 12 December 2017, website (https://www.familyhistory.link/dna-genealogy-guide/ : accessed 25 May 2020).

⁴ Angie Bush and D. Joshua Taylor, "You Need Both! Uniting DNA and Traditional Research," *Devils Lake Library* (Devils Lake, ND, March 2019), online document (https://devilslakendlibrary.com/wp-content/uploads/2019/03/You-Need-Both-Uniting-DNA-and-Traditional-Research.pdf : accessed 17 April 2020).

testing to answer questions of kinship and identity, and in some cases, reconstruct kinships for which no records exist." ⁵

Family Trees

Bette's ancestry consists of four ethnicities, Norwegian, Swedish, German and Dutch. Only one of Bette's great grandparents, Adolf Olsson Nord, has Swedish ancestry and in fact emigrated from there to America in 1883.⁶

The ancestral line below was provided by Lisbeth indicating that she was never told who the father of her grandmother Signe was. As per Lisbeth's original correspondence, she believes her genetic connection with Bette is within her father's line but nothing definitive has been determined yet.⁷ Fortunately, Bette has multiple cousins that tested their DNA that descend from all four of her grandparents and Lizbeth matches only those from her Nord line. Therefore, this is the line we will research.

En	nma Lovisa Fryklund	Unknown
b:	22 Jul 1875 in Värmland, Swede	m = b:
d:	17 Oct 1933 in Karlstad, Värmla	nd, Sweden d:
	Signe	Klara Maria Johansson
	b: 2	1 Jan 1895 in Värmland, Sweden
	d: 0.	5 Mar 1966 in Kungsholmen, Stockholm
		1
	Gösta	Eugen Lundell (Örtendahl)
	b: 2	3 Jun 1917 in Glava, Värmland, Sweden
	d: 0	4 Aug 2003 in Enköping, Uppsala
	Lisbe	th
	b: A	rvika, Sweden
	d:	

Signe was born in Värmland County, Sweden located in west central Sweden.⁹ Bette's Swedish ancestors came from Högerud, Värmland.¹⁰

8

⁵ Angie Bush and D Joshua Taylor, "You Need Both! Uniting DNA and Traditional Research," *Lake Region Public Library-Great Stories Start Here...*, Mar. 2019 (https://devilslakendlibrary.com/wp-content/uploads/2019/03/You-Need-Both-Uniting-DNA-and-Traditional-Research.pdf : accessed 25 Dec 2020).

⁶ Adolf O. Nord, Declaration of Intention for United States Citizenship, 3 May 1888, No cert #, arrived 1883 in the port of Portland, County of Ramsey, Territory of Dakota, USA, Naturalization Records; *North Dakota State Archives*, 612 East Boulevard Ave. Bismarck, North Dakota.

⁷ Lisbeth Ahlen Behrens per Rikard Behrens, "Permission to Use DNA and Family Tree Information," received by Rob Flanagan Stieglitz, communication through email, 25 Apr 2022.

⁸ Robert Flanagan Stieglitz, "Lisbeth and Bette Tree," *Family Tree Maker*, personal computer database, Fargo, North Dakota, 1 May 2022.

⁹"Värmland County," *Wikimedia Foundation*, 22 Sep 2021 (<u>https://en.wikipedia.org/wiki/V%C3%A4rmland_County</u> : 1 May 2022).

¹⁰ "Riksarkivet - Sök I Arkiven," *Riksarkivet*, 2022, Olof Olsson and Inga Maria Andersdotter family (<u>https://sok.riksarkivet.se/folkrakningar?Fornamn=olof+&Efternamn=olsson&Fodelseforsamling=H%c3%b6gerud&Folk186</u> <u>0=false&Folk1870=false&Folk1880=false&Folk1890=true&Folk1900=true&Folk1910=false&Folk1930=false&Lan=17&A</u> <u>vanceradSok=False&page=7&postid=Folk_103530691&tab=post#tab</u> : 1 May 2022).

To begin, we will look at the shared DNA reported by *MyHeritage*. The amount of DNA is significant, meaning it is highly likely a common ancestor(s) can be determined.

The Shared cM Project 4.0 tool v4 found on *DNAPainter* is a collaborative data collection and analysis project created to understand the ranges of shared cM (centiMorgans) associated with various known relationships. The image below includes the entered total of shared DNA between Lisbeth and Bette. The total reported by *MyHeritage* is 171.9 cM and there is a 95% (51+32+12%=95%) probability it is a third cousin or closer relationship between Bette and Lisbeth. This means their most recent common ancestor(s) are more than likely great-great-grandparents or closer.



¹¹ Blaine Bettinger, "Version 4.0! March 2020 Update to the Shared CM Project!" *The Genetic Genealogist*, 27 Mar. 2020 (https://thegeneticgenealogist.com/2020/03/27/version-4-0-march-2020-update-to-the-shared-cm-project/ : accessed 11 Aug. 2021).

Bette's ancestral tree is seen below.¹²



Based on known family trees and the fact Bette's great grandfather immigrated to the United States in 1883, the relationhip is most likely third cousins. If this is the case then Lisbeth's unknown great-grandfather would have to be a brother to Bette's great-grandfather Adolf Olsson (Nord).

As previously mentioned traditional genealogical reseach has to coexist with genetic genealogy. Vital record search uncovered the 21 January 1895 birth record in Värmland for Lisbeth's grandmother Signe Klara Maria Johansson. Her mother, Emma Lovisa Fryklund was documented but although listed as an illegitamate birth, a father by the name of Emanual Johansson was reported.¹³ So if this is accurate, the hypothesis that Lisbeth's biological great-grandfather is Adolf Olsson Nord's brother is incorrect.

According to Blaine Bettinger Ph.D., *The Genetic Genealogist*; "even the best documentary research can be wrong. Our ancestor's times were no simpler than our own and they were no less complex. Sometimes the relationships they reported on paper were not the same relationships they lived. We are the benefactors of the complex lives that our ancestors lived, and DNA testing can help unravel some of the complexity."¹⁴

¹² Robert Flanagan Stieglitz, "Lisbeth and Bette Tree," *Family Tree Maker*, personal computer database, Fargo, North Dakota, 1 May 2022

¹³ "Sweden, Indexed Birth Records, 1859-1947," *Ancestry.com*, Signe Klara Maria, 21 Jan 1895, Gunnarskog, Värmland, Sverige, Emanual Johansson, Emma Lovisa Fryklund, born 22 Jul 1875, Volume 1140, page 0/0 (<u>https://www.ancestry.com/discoveryui-</u>)

content/view/4209963:2262? phsrc=dzw3118& phstart=successSource&gsfn=signe&ml_rpos=14&queryId=d3fff513e9b3e a2159074c38fea6aabb : accessed 31 May 2022).

¹⁴ "3 Reasons Every Family Historian Should Take a DNA Test | Blog," *Findmypast - Genealogy, Ancestry, History Blog from Findmypast*, 2 Jan. 2020 (www.findmypast.com/blog/dna/why-every-family-historian-should-take-findmypast-dna-test : accessed 17 Dec 2022).

Further research into the life of Lisbeth's great-grandmother found three years after the birth of Signe, Emma gave birth to a son named Karl Martin in Gunnarskog, Värmland. His birth was also listed as illegitimate and this time no father was named.¹⁵

Research of birth records for the children born to Olaf Olsson and Inga Andersdotter of Högerud, Värmland between 1858 and 1880 found seven children that included five sons, including Adolf (below).¹⁶

- Christina Olsdotter born 08 Sep 1857 in Värmland, Sweden, died unknown
- Olaf Olsson born 26 Jun 1859 in Värmland, Sweden, died 14 Jun 1910 in Värmland, Sweden
- Adolf Olsson (Nord) born 29 Dec 1861 in Värmland, Sweden, died 21 May 1937 in North Dakota, USA
- Mathilda Olsdotter born 03 Oct 1865 in Värmland, Sweden, died 01 Dec 1948 in Värmland, Sweden
- Johan Olsson born 25 Jan1869 in Värmland, Sweden, died 13 Jan 1895 in Värmland, Sweden
- Lars Albin Olsson born 12 Feb 1872 in Värmland, Sweden, died 24 Jan 1890 in Värmland, Sweden
- Karl Emil Olsson born 14 Feb 1878 in Värmland, Sweden, died 1957 in North Dakota, USA

<u>DNA</u>

Was Emanual Johansson the biological father of Signe? DNA does not lie, but sometimes people do. So, to determine the genetic connection to Bette's great-grandfather, Adolf Olsson (Nord), more descendants of his parents, Olaf Olsson and Inga Andersdatter are needed to be found and genetically compared to both Bette and Lisbeth. Once located, the following tools will be used to analyze the data (shared DNA in cM).

- *DNA Painter* for a chromosome matching and for atDNA triangulation.¹⁷
- The Shared cM Project 4.0 tool v4 for relationship probabilities.¹⁸
- WATO (What Are The Odds) for relationship probabilities.¹⁹
- *Family Tree Maker* to construct hypothesized family trees (models)²⁰
- *Ethnicities* for comparison of *Genetic Groups*.²¹

"The GPS (*Genealogical Proof Standard*) is an adaptation of the scientific method applied to genealogical research questions."²² The scientific method involves collecting data, developing a hypothesis, building models, assessing these models, and drawing conclusions.²³ Combining the provided family trees and the relationship

¹⁵ "Sweden, Indexed Birth Records, 1859-1947," *Ancestry*, Karl Martin, birth 6 Jul 1898, Gunnarskog, Värmland, Sverige, mother Emma Fryklund, birth 23 Jul 1875, no father listed (<u>www.ancestry.com/discoveryui-</u>content/view/221642:2262? phsrc=OHb587&: accessed 27 Feb 2023).

¹⁶ "All Sweden, Indexed Birth Records - 1859-1947," *Ancestry DNA*, children of Olof Olsson and Inga Andersdotter (https://www.ancestry.com/search/collections/2262/?birth=1870_hogerud-varmland-sweden_1493148&birth_x=10-0-0_1-0&count=50&father=Olof&father_x=1&mother=Inga&mother_x=1: accessed 25 Apr 2022).

¹⁷ "Chromosome Maps," DNA Painter (https://dnapainter.com/tools/sharedcmv4 : accessed April 17, 2020).

¹⁸ "Shared CM Project 4.0 Tool v4 with Relationship Probabilities," *DNA Painter* (<u>https://dnapainter.com/#profiles</u> : accessed April 17, 2020).

¹⁹ Andrew Millard and Mike Mulligan, "What Are the Odds?" *DNA Painter* (dnapainter.com/tools/probability : accessed 10 Nov. 2020).

²⁰ "Family Tree Maker," n.d., Software MacKiev (<u>https://www.mackiev.com/ftm/</u> : accessed 17 Feb 2022).

²¹ "What Are Genetic Groups?" *MyHeritage* (https://faq.myheritage.com/en/article/what-are-genetic-groups accessed May 1, 2022).

²² Angie Bush and D Joshua Taylor, "You Need Both! Uniting DNA and Traditional Research," *Lake Region Public Library-Great Stories Start Here...*, Mar. 2019 (https://devilslakendlibrary.com/wp-content/uploads/2019/03/You-Need-Both-Uniting-DNA-and-Traditional-Research.pdf : accessed 25 Dec 2020).

²³ Wikipedia Contributors, "Scientific Method," *Wikipedia*, Wikimedia Foundation, 4 Mar. 2019, (en.wikipedia.org/wiki/Scientific_method : accessed 25 Dec. 2020).

probabilities, a visual model depicting a hypothesized relationship between Lisbeth and Bette was constructed.²⁴ The process of how to apply the Scientific Method to solve genetic genealogical questions can be found in my article published in the 2023 July/August issue of *Family Tree Magazine*.²⁵

<u>Hypothesis</u>: Looking at the family trees the most reasonable ancestral connection would be a great grandfather to Lisbeth and therefore a sibling to Bette's great-grandfather, Adolf Olsson Nord, and a son of Olaf Olsson and Inga Maria Andersdotter.

<u>Model</u>: A Family Tree with hypothesis that Lisbeth's biological great grandfather was the son of Olaf and Inga was created. To develop a workable and testable model, the more data one can secure, the more accurate the predicable result will be. The data used to determine the most likely relationship will be additional shared DNA from matches to both Bette and Lisbeth that were found. The model includes, Bette, her daughters, Kristin, and Robin as well as five additional matches (descendants of Olaf and Inga) found on *MyHeritage*: Dale, Keith, Carolyn, Nolan and Ryan, all with established family trees.²⁶ Dale and Carolyn are also descendants of Adolf, Keith and Nolan descendants of his sister Mathilda and Ryan his sister Christina. To ensure accuracy of the hypothesized Swedish genetic connection, all the individuals are verified biological descendants of Olaf Olaf Olsson (1823-1904) and Inga Maria Andersdotter (1831-1916) of Tasebo, Högerud, Sweden.²⁷



²⁴ David Wood, "Scientific Models: Definition & Examples - Video & Lesson Transcript," *Study.com*, 21 Aug 2021 (study.com/academy/lesson/scientific-models-definition-examples.html : Accessed 30 Jan 2022).

²⁵ Robert Stieglitz, "6 Steps for Applying the Scientific Method to Genetic Genealogy," *Family Tree Magazine*, 21 Jun 2023 (familytreemagazine.com/dna/scientific-method-genetic-genealogy/ : accessed 24 Sep 2023).

²⁶ Dale Knutson, "Permission to Use DNA and Family Tree Information," received by Rob Flanagan Stieglitz, communication through email, 31 May 2022.

²⁷ Robert Flanagan Stieglitz, "Lisbeth and Bette Tree," *Family Tree Maker*, personal computer database, Fargo, North Dakota, 3 Feb 2023.

The model family tree is pictured above.²⁸ The relationship prediction of each individual to Lisbeth within the model are shown below.

- Carolyn 2nd Cousin Once Removed
- Bette, Dale and Keith 3rd Cousin
- Kristin, Robin and Nolan 3rd Cousin Once Removed
- Ryan 3rd Cousin Twice Removed

DNAPainter and Triangulation

- 4 30,652,525 38,509,827 8.6cM 3,840 SNPs Lisbeth with Bette & Ryan
- 4 7,639,550 35,558,460 36.9cM 14,976 SNPs Lisbeth with Bette and Carolyn
- 4 82,122,122 102,936,592 18.9cM 9,472 SNPs Lisbeth with Bette and Carolyn
- 10 48,331,883 62,320,330 17.3cM 7,296 SNPs Lisbeth with Bette and Keith
- 10 92,008,807 108,686,065 14.5cM 8,576 SNPs Lisbeth with Bette and Carolyn

The bullet points above contain the location on the chromosome, the size and SNPs (Single nucleotide polymorphisms) within the shared segments of DNA for those listed on chromosomes #4 and #10.²⁹ "Triangulated segments are segments that all the selected DNA Matches (three in this case) share with each other. This capability is important for understanding DNA Matches' relationships because triangulated segments are more likely to be inherited from a common ancestor."³⁰

DNAPainter chromosome painter will map the locations of the shared DNA on Bette's 23 chromosomes with each individual match. The shared DNA is separated by paternal or maternal inheritance. The images of the triangulated segments on Bette's chromosomes #4 and #10 are seen below. On chromosome #10 for example, Bette, Keith and Lisbeth share a 17.3 cM segment whereas Bette, Carolyn and Lisbeth share a 14.5 cM segment, confirming descent from a common ancestor(s).



²⁸ Ibid.

(https://faq.myheritage.com/en/article/what-are-triangulated-segments-in-the-chromosome-browser-%E2%80%94-one-tomany : accessed 21 May 2022).

²⁹ "23andMe - Genetics 101: What Are SNPs?" 23&Me, (<u>www.23andme.com/gen101/snps/</u> : accessed 5 Apr 2023).

³⁰ "What Are Triangulated Segments in the Chromosome Browser — One To M23&Meany?" MyHeritage

³¹ "DNA Painter | Chromosome Mapping," *DNAPainter*, maternal chromosome #4 (dnapainter.com/profile/210933 : accessed 7 Feb 2023).

Match ³²	Bette	Kristin	Robin	Dale	Carolyn	Ryan	Keith	Nolan	Lisbeth
Bette		3,517.1	3,528.3	290.4	294.5	48.9	91.4	35.1	171.9
Kristin	3,517.1		2,792.7	241.3	173.1	23.8	55	0	38.2
Robin	3,528.3	2,792.7		85.3	221.9	17	14.9	0	53.2
Dale	290.4	241.3	85.3		495.1	45.7	192.4	67.5	72.2
Carolyn ³³	294.5	173.1	221.9	495.1		17.5	106.8	0	190.6
Ryan ³⁴	48.9	23.8	17	45.7	17.5		41.9	0	50.1
Keith ³⁵	91.4	55	14.9	192.4	106.8	41.9		155.9	145.7
Nolan ³⁶	35.1	0	0	67.5	0	0	155.9		110.0
Lisbeth	171.9	38.2	53.2	72.2	190.6	50.1	145.7	110.0	

DNA A	Analysis –	Shared DNA	between each	individual	measured in	centiMorgans ((cM).
						0 1	

Evaluating the Model – Relationship histograms from *The Shared cM Project 4.0 tool v4*

The histograms for 2C1R, 3C, 3C1R and 3C2R from *The Shared cM Project 4.0 tool v4* are pictured below. The model's relationship predictions of 2C1R for Carolyn, 3C for Bette, Dale and Keith, 3C1R for Kristin/Robin/Nolan and 3C2R for Ryan are placed within the appropriate histograms and indicated with an arrow. For all eight matches to Lisbeth, their actual shared cMs were placed in the appropriate predicted relationship histograms. Your data points on the histogram should follow the *Empirical Rule* to support your hypothesis. The *Empirical Rule* states that a normal distribution of data follows a specific pattern.³⁷ The pattern is 68% of your data will fall within one standard deviation (SD) of the mean, while 95% and 99.7% within two and three standard deviations, respectively. For our hypothesis, six of the eight fall with one SD of the mean and two fall in the upper second SD. This means 75% fall in the first SD.



Carolyn with Lisbeth

³² "Chromosome Browser – Shared DNA Segments?" 2022, *Myheritage.com*, Bette Johanson (Stieglitz) and Dale Knutson share 13 DNA segments (https://www.myheritage.com/dna/match/D-7FCDE737-B56B-453B-B9A5-5BAD7A17FD07-D-2821EF4F-609D-452C-9C58-28912B2BF3C1/324729771?p : accessed 21 May 2022).

³³ Carolyn Johnson Vacek, email confirmation to Rob Stieglitz, authorizes use of her name and DNA data, 29 Dec 2022.

³⁴ Ryan Rath, email confirmation to Rob Stieglitz authorizes, use of his name and DNA data, 6 Nov 2022.

³⁵ Keith, email confirmation to Rob Stieglitz authorizes, use of his name and DNA data, 7 Dec 2022.

³⁶ Nolan, email confirmation to Rob Stieglitz authorizes, use of his name and DNA data, 9 Feb 2023.

³⁷ "Empirical Rule" Basic-Mathematics.com (www.basic-mathematics.com/empirical-rule.html : accessed 15 Mar 2023).

³⁸ Blaine Bettinger, "The Shared cM Project Version 4.0 (March 2020)," *The Genetic Genealogist*, Second Cousin-once removed, page 32 of 56 (https://thegeneticgenealogist.com/wp-content/uploads/2020/03/Shared-cM-Project-Version-4.pdf).



Bette, Dale, Keith with Lisbeth



Kristin, Robin and Nolan with Lisbeth

3C2R (Grouping #9)	965	0	36	166	27	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
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Ryan with Lisbeth

³⁹ Bettinger, "The Shared cM Project Version 4.0 (March 2020)," *The Genetic Genealogist*, Third Cousin, grouping #7, page 34 of 56 (<u>https://thegeneticgenealogist.com/wp-content/uploads/2020/03/Shared-cM-Project-Version-4.pdf</u> : access 13 May 2022).

⁴⁰ Blaine Bettinger, "The Shared cM Project Version 4.0 (March 2020)," *The Genetic Genealogist*, Third Cousin Once Removed, grouping #8, page 36 of 56 (https://thegeneticgenealogist.com/wp-content/uploads/2020/03/Shared-cM-Project-Version-4.pdf : access 13 May 2022).

⁴¹ Bettinger, "The Shared cM Project Version 4.0 (March 2020)," *The Genetic Genealogist*, Third Cousin Twice Removed, grouping #10, p 38 of 56 (https://thegeneticgenealogist.com/wp-content/uploads/2020/03/Shared-cM-Project-Version-4.pdf).

WATO (What Are The Odds)

"This tool (WATO) is designed to help you work out how one person, the "target", is related to a family group of people who have taken atDNA tests." The target is Lisbeth (hypothesis) where the WATO tool will calculate the most likely relationship with the family group consisting of Bette, Kristin, Robin, Dale, Keith, Carolyn, Nolan and Ryan by entering their shared DNA in cM (centiMorgans). Each relationship tree will contain three hypotheses, beginning with Adolf being the sibling of the target's ancestor. A score is then calculated for each relationship level. "The scores indicate how your hypotheses compare to one another. First, any hypothesis that is not possible given the data gets a score of zero. Then the possible hypotheses are ranked, starting with a score of 1. When more than one hypothesis is possible, they are ranked with higher scores being direct comparisons to the score = 1 hypothesis. For example, if you have three hypotheses with scores 100, 5, and 1, the highest is one hundred times more likely than the lowest and twenty times more likely than the second-place hypothesis."⁴²



Match name & Shared cM		Hyp. 1	Нур. 2	Нур. З	Hyp. 4	Match name &	Shared cM	Hyp. 1	Нур. 2	Нур. З	Hyp. 4
Carolyn	190.6	2C1R 48.76%	Half 2C1R 7.07%	3C1R 0.00%	Half 3C1R 0.00%	Carolyn	190.6	2C1R 48.76%	Half 2C1R 7.07%	3C1R 0.00%	Half 3C1R 0.00%
Bette	171.9	3C	Half 3C	4C	Half 4C	Keith H	145.7	3C 17.88%	Half 3C 5.70%	4C 1.10%	Half 4C 0.00%
		3C	Half 3C	4C	Half 4C	Nolan	110	3C1R 16.68%	Half 3C1R 4.30%	4C1R 0.00%	Half 4C1R 0.00%
Keith H	145.7	17.88%	5.70%	1.10%	0.00%	Dale	72	3C	Half 3C	4C	Half 4C
Nolan	110	3C1R	Half 3C1R	4C1R	Half 4C1R			28.41%	31.65%	14.64%	4.09%
		16.66%	4.30%	0.00%	0.00%	Robin	53	3C1R 29.75%	Half 3C1R 20.65%	4C1R 23.28%	Half 4C1R 23.28%
Dale	72	3C 28.41%	Half 3C 31.65%	4C 14.64%	Half 4C 4.09%	Ryan	50.1	3C2R 21.85%	Half 3C2R 24.46%	4C2R 24.46%	Half 4C2R 24.46%
Ryan	50.1	3C2R 21.85%	Half 3C2R 24.46%	4C2R 24.46%	Half 4C2R 24.46%	Krisitn	38	3C1R 18.71%	Half 3C1R 18.41%	4C1R 49.58%	Half 4C1R 49.58%
Combined odds ratio		319.07	1.00	0.00	0.00	Combined od	ds ratio	98.45	1.00	0.00	0.00

 ⁴² "WATO - Frequently Asked Questions," *DnaPainter.com* (dnapainter.com/help/wato-faq : accessed 26 Dec. 2020).
⁴³ "What Are the Odds? – Original," *DNA Painter*, Lisbeth and Bette relationship hypothesis (<u>https://dnapainter.com/tools/probability/146822</u> : accessed 3 Feb 2023).

WATO predicts a ~319 to 1 probability that the relationship between Adolf and Lisbeth's great grandfather is a full sibling and therefore Lisbeth a third cousin to both Bette, Dale and Keith second cousin once removed to Carolyn, Kristin/Robin/Nolan third cousins once removed, and Ryan third cousin twice removed. This *WATO* tree does not consider the shared values of Bette's daughters, therefore a second *WATO* was prepared that removes Bette, so that daughters Kristin and Robin shared cM values are calculated. The prediction is the same with a probability ratio of ~99 to 1.

Ethnicities

"DNA cannot detect ethnicity, but there is sometimes an overlap with a person's genetic ancestry. For example, people who share the same heritage will often live in the same places and marry people from similar backgrounds."⁴⁴ With this understanding *MyHeritage* has created genetic groups. "Descendants of a group originated from the same location, at a specific point in time, have shared DNA segments that they inherited from the group's founding fathers and mothers."⁴⁵ The image below indicates both Bette and Lisbeth belong to the same Genetic Group – Sweden (Värmland) #2. Dale, Keith, Nolan and Carolyn also have ethnicity results that indicate their DNA is part of the Värmland Genetic Group.⁴⁶



⁴⁴ Debbie Kennett, "How Can DNA Tests Determine Ethnicity?" *Who Do You Think You Are Magazine*, 2 Nov 2021 (<u>https://www.whodoyouthinkyouaremagazine.com/tutorials/dna/what-do-dna-test-results-mean/</u> 1 May 2022).

⁴⁵ "What Are Genetic Groups?" *MyHeritage* (https://faq.myheritage.com/en/article/what-are-genetic-groups accessed May 1, 2022).

⁴⁶ Shared Ethnicities and Genetic Groups," *MyHeritage.com*, Bette Johanson, Dale Knutson, and Carolyn Johnson, Värmland genetic group in common (<u>https://www.myheritage.com/dna/match/D-7FCDE737-B56B-453B-B9A5-5BAD7A17FD07-D-2821EF4F-609D-452C-9C58-28912B2BF3C1/324729771?p</u> : accessed 21 May 2022).

⁴⁷ "Shared Ethnicities and Genetic Groups," *MyHeritage.com*, Bette Johanson and Lisbeth Behrens, two ethnicities and one genetic group in common (<u>https://www.myheritage.com/dna/match/D-7FCDE737-B56B-453B-B9A5-5BAD7A17FD07-D-AFD0704D-92A4-445E-8325-</u>

<u>8B9898BC5451/324729771?p=1&ps=10&sort=total_shared_segments_length_in_cm&siteId=324729771&individualId=750</u> 0008 : accessed 13 May 2022).

Conclusion

One cannot conclusively state with 100% certainty the identity of Lisbeth's great grandfather although the combination of historical records, family trees and DNA provide solid indirect evidence that the connection was in Värmland. According to *AncestryDNA* the accuracy of genetic relationships is extremely high for seeing if two people are related at the 3rd or 4th cousin and closer level.⁴⁸ The sizes of the shared DNA establish the most likely relationship level, the shared matching of the descendants of the three siblings (Adolph, Christina and Mathilda) confirm the genetic connection to Olaf Olsson and Inga Marie Andersdotter. There were two sons that could be the biological great-grandfather of Lisbeth, Olaf (1859-1910) or Johan (1869-1895). Both were unmarried and living in the same location as Emma in 1894 at the time of conception. Emanuel Johansson was also in the same area at the time. It is then plausible Emma had multiple partners which included one of the family connection too close not to conclude Johan or Olaf were most likely the father of Signe Klara Maria Johansson and not Emanuel Johansson.

One more issue must be addressed and that is endogamy. According to DNA Educator, Diahan Southard, "Endogamy is the practice of marrying within the same group of people for several generations. Genetically, what this means is that instead of only sharing DNA with the relatively few people in the world with whom you share a recent common ancestor, you share DNA with hundreds of people who are a wider part of your population. This means that those from endogamous communities will often share more DNA with each other than we would expect given their relationship."⁴⁹ The shared DNA found within the research group is on the higher side for each relationship level, indicating that endogamy is likely.

Genealogy, including genetic genealogy, is an unfinished project that is still being added to or developed. Just as all scientific research, it is "a work in progress."⁵⁰ Further research would than be directed in finding information on Emanuel Johansson, specifically confirmed descendants, if any, for DNA comparison.

Dedication

This narrative is dedicated to the memory to Ryan Rath, a young man I never met. Ryan, 45 years old, passed away unexpectedly in December of 2022. The use of genetic genealogy in solving ancestral mysteries requires a significant amount of luck. The most important would-be having individuals related to you on the specific ancestral lines you are researching test with any of the "big four" DNA testing sites. If fortunate enough to find a significant match (large enough shared atDNA that finding a common ancestor is possible) contacting them and securing their permission to use their raw data is a major challenge. This was not the case with Ryan. From the moment we connected regarding a common ancestral history, his excitement and epistemic curiosity to establish Lisbeth's relationship inspired me never give up reaching out.

⁴⁸"AncestryDNA® Test Accuracy | AncestryDNA® Learning Hub," *Ancestry.com* (<u>https://www.ancestry.com/c/dna-learning-hub/ancestrydna-test-accuracy</u> : accessed 26 May 2022).

⁴⁹ https://www.yourdnaguide.com/ydgblog/endogamy-dna-test-jewish

⁵⁰ "Science: A Work in Progress," *Smithsonian Science Education Center* (<u>https://ssec.si.edu/science-work-progress</u> : , accessed 8 Jan 2024).