

**A. Z17 (ca. 2300 BC)**

The SNP Tracker<sup>1</sup> shows the following picture of Z17:



The tracker locates the Z17 mutation in the Netherlands, which maybe the centre of gravity of Z17, if the sea is excluded. But it is obvious that this does not take the history of migrations into account. We know movements from Scandinavia to the British Isles, more than in the opposite direction. And we don't know much of migrations from the

Netherlands (or Frisia) in both directions. So it seems most plausible to locate the Z17 mutation in Scandinavia. This corresponds with the fact that U106 was already around in Scandinavia at that time. One of the oldest U106+ samples (RISE98) has been found at Lille Beddinge (near Malmö), buried circa 2275-2032 BC. The neighbour branches of Z17 (from Z18) show also in this direction, we find 27 Scandinavians, 10 Benelux (most of them south of the river Rhine), 7 Swiss and 4 German names, together with many English names (source: U106 list FTDNA).

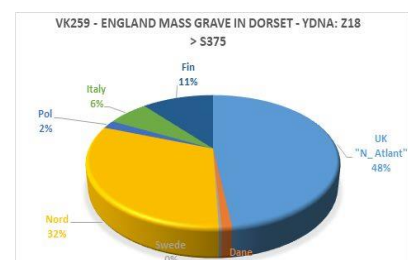
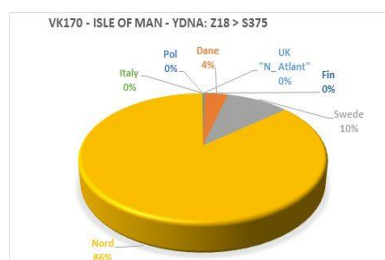
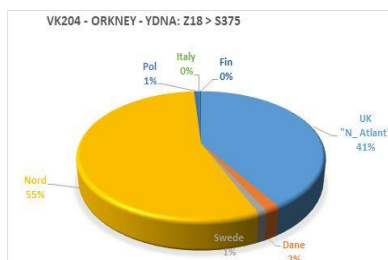
**B. Z372 (ca. 1400 BC)**

The biggest branch of Z17 is Z372, in the other branches we find on the FTDNA list 18 Scandinavian, 3 German and 15 English names. Therefore, it is plausible to suppose that the Z372 mutation occurred in Scandinavia. Also, a Swedish Viking with Z17-S17032 was found in Signatuna 10-12 century. The SNP Tracker locates the mutation of Z372 in Germany, probably using the same algorithm as in the former picture.



As pointed out, it is plausible to locate this mutation in Scandinavia, probably South Sweden/Norway. The migration to the British Isles may be due to the Viking age, although a component due to the Anglo-Saxon migration (400/500 BC) cannot be excluded.

Vikings with Z372 were buried in Orkney, Isle of Man and Dorset with the following autosomal DNA:



The brown colour is Norway, which can be expected in Orkney and Isle of Man (ca. 900 AD). But also the Dorset man (10-11<sup>th</sup> century) looks Norwegian, he does not show much Swedish or Danish DNA.

The middle picture (Isle of Man) shows a man with ca. 80% of his ancestors from Norway, mixed with some Swedish and Danish roots. He was a Viking leader, buried with his wife in an oak ship at Balladoole. The two other men have partly 'UK Atlantic' roots, which may be an indication that they lived already some generations outside Norway. Until we find more of old Viking DNA we have a strong indication that Vikings with Z372 DNA may have Norwegian roots.

### C. ZP91 (ca. 560 BC)

The SNP Tracker shows the following picture of ZP91:



It is not clear on which data the picture is based. In the U106 list of FTDNA, we find 5-7 Swedes, 4-6 Norwegians (not tested) and several members of a Danish/Norwegian family. This is not showed on the picture, suggesting that ZP91 is not Scandinavian.

If we look at the neighbour branches of ZP91, we see a big branch S3207, expanding in Sweden and Norway (66 Scandinavians). Another big branch, L257, however is very international, its subbranch Z15 (1000 BC) has members all over Europe (S, N, DK, NL, GB, D, Est, GR, GB). Other L257-subbranches are strong in Scotland and England, possibly due to the Viking Age. A Swedish Viking with L257 was found in Skara (900-1150). Both subbranches seem to start in Scandinavia. We see no reason to suppose that mutation ZP91 occurred outside the Scandinavian region.

### D. S5970 (ca. 160 AD) and ZP161 (ca. 610 AD)

The SNP Tracker shows the following pictures of S5970 and its subbranch ZP161:



The pictures show the Wells family in England and the Harrelson family in Denmark. Also, the location in Holland shows the two families (Zuiderent and Michiels) in that country. The pictures however are far from complete. There are also S5970-proven list members in Austria, Ireland (?), Burns), Bulgaria, France, England, East-Prussia (Poland, formerly Germany), Sweden and Germany. One of the Dutch members (Michiels) is probably from Flemish origin.

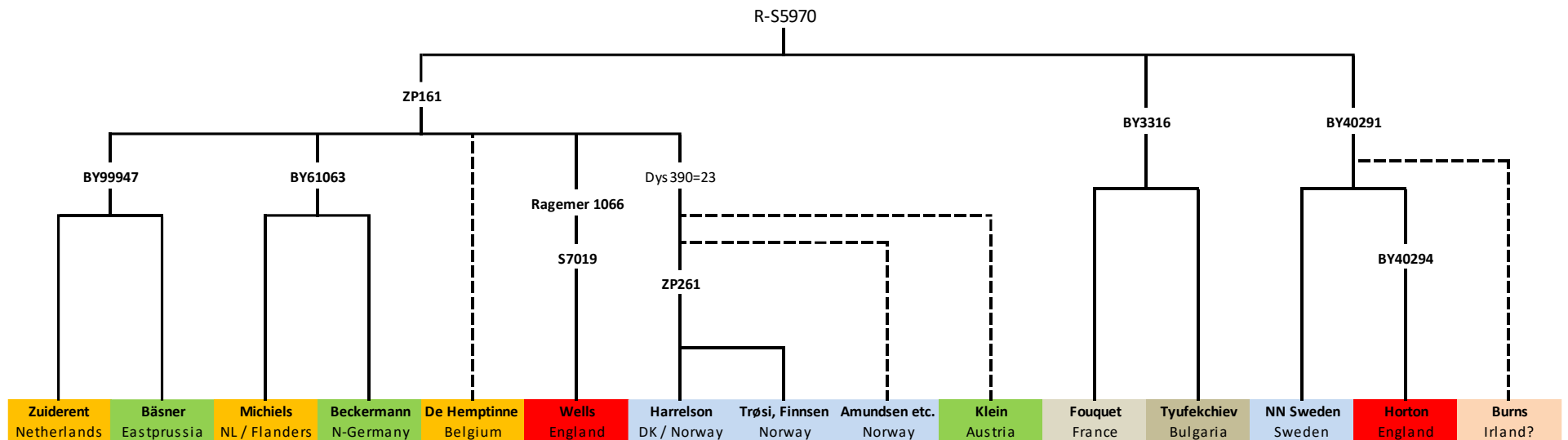
Furthermore 6 of the not proven S5970 members come from Norway. In the case of the Harrelson/Harrel family it looks like some are from Norway, others from Denmark. The case is not clear, but they turned out to have the same old roots.

The following table of FTDNA shows the proven and expected **members of R-S5970** (10/2019):<sup>2</sup>

<b>[13B] Z372&gt; ZP91&gt;S5970</b>						
3286	412044	Joseph Klein 1869 Austria - 1921 PA	R-S5970	12	23	15
3287	226187	Ola Amundsen Sætersaga, 1815-1860, Sør-Odal, HED	R-M269	12	23	15
3288	500622	Ola Andersson Nord-Myrer b.c. 1735 Eidsvoll AKR	R-M269	13	23	15
3289	303292	Tarald Rasmusson V. Jøndal b.c.1615 Eidsvoll AKR	R-M269	13	23	15
3291	236836	Johan Knutsen Nordenga 1828-1914 Eidsvoll AKR	R-Z372	13	23	15
3292	359249	Gunner Knutsen Sjø-Sinkerud 1820-1901 Eidsvoll AKR	R-M269	13	23	15
3293	118305	Simon Schwerdtfeger, 1639-1677 Seega, Schwartzburg	R-M269	13	23	15
3294	223506	Guilford Burns b.1800, SC, USA, mother's surname	R-S5970	13	24	15
3296	N39386	Stassin de Hemptinne (1270-1346), Emptinne, Belgium	R-U106	13	24	15
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;BY33316&gt;</b>						
3857	493008	Ismail Tyufekchiev b.1833 Kochan (Pomak), Bulgaria	R-BY33316	13	24	15
	608128	Dausman-Neal, (Fouquet, France)	R-BY33316	13	24	15
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;BY40291</b>						
		Sweden (not in the list but on FTDNA Tree Flags)	R-BY40291			
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;BY40291&gt;BY40294&gt;</b>						
3297	331647	Aaron Horton b 1806 prob desc Barnabas son Caleb	R-BY40294	13	24	15
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;ZP161&gt;</b>						
3295	E17375	Bäsner, b. 1840 East Prussia, Heilsberg/Braunsberg	R-ZP161	13	24	15
3298	E2267	NN Zuiderent, d. 1040, Vlaardingen, Netherlands	R-ZP161	13	24	15
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;ZP161&gt;BY61063&gt;</b>						
23QMG	529720	Beckermann, Cuxhaven/ Schleswig/ Dalldorf?	R-BY61063	13	24	15
3299	142509	Evert Jans Michiels, b.c .1685, Steenwijkerl. NL. (BE?)	R-BY61063	13	24	16
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;ZP161&gt;S7019&gt;BY17958&gt;</b>						
3300	122883	Felder Lyd Wells, Sr 1902-1978 Marion County, FI	R-BY17958	13	24	15
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;ZP161&gt;S7019&gt;BY17958&gt;BY39564&gt;</b>						
3301	467822	Henry Wells b. 1672 d. 1714	R-BY39564	13	24	15
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;ZP161&gt;ZP261&gt;</b>						
3290	200378	Amund Hansen Trøsi 1704-1788 S-Odal HED, Norway	R-ZP261	13	23	15
	IN31420	Steinar Viken, Amund Finnsen Heberg 1545-1620 Heberg Nes AKR, Norway	R-ZP261	13	23	15
3302	50394	Jesse Harrelson b. abt 1785 SC	R-ZP261	13	23	15
3303	34705	Jesse Harrelson, b.c. 1785, SC	R-Z372	13	23	15
3304	65369	Jeremiah Harrell, b. 1756, d.ca.1834	R-ZP261	13	23	15
<b>[13B] Z372&gt; ZP91&gt;S5970&gt;ZP161&gt;ZP261&gt;ZP262&gt;</b>						
3305	83085	Andrew J Harralson b.abt 1820 NC d. abt 1880 TX	R-ZP262	13	23	15
3306	75489	Paul Harrelson, b.c. 1635-45, Denmark	R-ZP262	13	23	15

### Possible structure of S5970

To get an idea of the structure of S5970, including not 100% proven SNP's, we made a diagram based on the STR markers. To get the most likely structure we took the mutation rate of the STR's into account. This does not eliminate the fact that we have more possibilities to choose from, but in most cases the chosen structure turned out to be in line with new SNP's which were measured afterwards.<sup>3</sup> Together with the known SNP's the most plausible scheme looks as follows:



The right part of the schematic (not-ZP161) shows a very differentiated landscape. It may be the result of the Viking age, with S5970 as a base in Scandinavia. France, England and Ireland were goals of Viking raids and migration. Also, Bulgaria may be due to either Viking journeys via Russia to Constantinople or – at later time – to Norman members of the Crusades. The last version makes sense because Fouquet (France) is in the same sub branch; there could be a Normandy connection.

On the left side of the schematic (ZP161), the Scandinavian members Trøsi, Finnsen, Harrelson, Harrell etc. have Dys390=23. This in opposite to all other known members of S5970 who have Dys390=24, which is also the mean value of the mother branch ZP91. Because the Norwegian families Amundsen, Knudsen, Rasmussen, etc. also have Dis390=23, it can be expected that they will also be positive for ZP161, which we found also in analysing the SRT-Diagram. Also the ancestors of Klein (only S5970 tested) seem to belong to this Scandinavian cluster, he could have landed in Austria in the Viking age (e.g. with Arnulf of Carinthia after the battle of Leuven/Dyle in 891 between East Francia and the Vikings).

### The origin of ZP161

The 6 columns on the left of the schematic exist of non-Scandinavian families with ZP161 and Dys390=24. The Wells family descends from Ragemer, a Norman knight, tenant of the Flemish nobleman Gilbert of Gent, who became Earl of Lincolnshire after 1066. Zuiderent descends from Van Oestgeest, a Dutch knightly family (mentioned 1201-1312). The Belgian noble family De Hemptinne descends from a knight Stassin de Hemptinne (mentioned 1263/67). The origin of the Dutch family Michiels seems to be in West-Flanders, near the French boarder. They all have their roots in the Low Countries.

Beckermann's ancestors were possibly located in East Frisia or Schleswig. The origin of the Bäsner family in Heilsberg, East Prussia, can be explained from Dutch missions to Prussia around 1241 (Teutonic Order), when Heilsberg was founded. So the whole cluster ZP161/Dys390=24 seem to have its roots in the Low Countries, the main part known as Frisia in ancient times.

The origin of ZP161 seems to be in Scandinavia because of the Harrelson branch with the whole Scandinavian cluster with Dys390=23. But as pointed out before, the left 6 columns seem to have a common ancestor in the Low Countries. This is also in line with the study of Richard B. Wells, who sees the origin of Ragemer in 'hirdmen' (members of the king's bodyguard in peacetime and core of his army in wartime) of Danish kings in Frisia, like Harald Klak or Rurik.<sup>4</sup> After the Viking domination in Frisia they assimilated into the Frisian population and some of them took service as warriors of the Nobility in the Low Countries. This could have been the case with Ragemer, man of Gilbert of Gent, but also with Van Oestgeest as men of the counts of Holland (a skeleton with his DNA was found in Vlaardingen 1040, with some healed dents on his braincase, possibly due to the battle of Vlaardingen of 1018)<sup>5</sup>. Also, Stassin de Hemptine fits in this picture.

### Viking rulers in the Low Countries

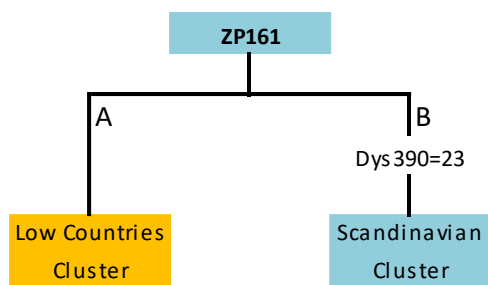
In 810 the Vikings start to attack Frisia. From 845 to 891 Viking counts and dukes ruled in parts of Frisia as vassals of the Franks.

Most Vikings who played a role in the Low Countries (Frisia) belonged to the family of the Danish kings of **Hedeby** (German **Haithabu**), the main Danish trade centre in Schleswig. The family descends from the Ynglings, the oldest known Scandinavian dynasty, originating from Sweden. In the Low Countries the following Vikings played an important role:

- **Harald Klak** (Harald Halvdansson Yngling), co-king of Hedeby, had to flee for his cousins in 814. He got asylum by Emperor Louis the Pious and was baptized with 400 followers in Mainz in 826. In 826 Harald got the county of Rürstringen in East Frisia, the first land granted by Franks to the Vikings. Harald's brother **Hemming** falls in 837 when he defends Walcheren in Zeeland together with the Franks against Viking raids. Harald is last mentioned in 829 and in 852.
- **Rorik of Dorestad**, who was likely a nephew of Harold Klak. He was between 841 and 873 Duke of West-Frisia, but was not present there over longer times in which Dorestad was attacked by Vikings. He lived in the period of several changes in the Carolingian Empire. He got lands from Louis the Pious, which were taken from him in 860, but returned to him in 870 by Charles the Bald. He was converted to Christianity by the Franks. After 861 he probably lived in Egmond in Kennemerland; in 873 he swore allegiance to Louis the German.
- **Godfrey the Sea-king** (a relative of Rorik) followed Rorik as Duke of Frisia under Emperor Charles the Fat, controlling most of Frisia between 882 and 885. Before that time he ravaged Flanders in 880, using Ghent as his base. In 882 he ravaged Lothringia and the cities of Maastricht, Liège, Stavelot, Prüm, Cologne, and Koblenz were devastated. After he was baptized with Charles the Fat as godfather, Charles gave him Gisela, daughter of Lothair II, as his wife. In 885 he was murdered by a group of Frisian and Saxon nobles. The local count Gerulf, ancestor of the later Counts of Holland, took over the West Frisian lands of Godfrey.
- **Siegfried "the Dane" of Guînes**, was a Danish Viking who became the first Count of Guînes (now in French Flanders, near Calais), as vassal of Count Arnulf I of Flanders. He married in 964 with Arnulf's daughter Elstrude and became the ancestor of the counts of Guînes. Siegfried is said to be a grandson of 'Harald the Dane', however it is not sure which Harald this may be.

In contrast to Godfrey, descendants of the hirdmen of Harald Klak and Rorik had a long time to assimilate in Frisia. Some of them will most likely have found a local lord to serve, probably Gerulf or other local nobles. Later on we see the Van Oestgeest knights (1040?, 1201) as men of the Counts of Holland and the Norman knight Ragemer (Wells) as a man of Gilbert of Gent in 1066, who had also familiar connections with the Counts of Holland and Flanders. The third member of the group of knights is Stassin de Hemptine (1267) in Belgium; he will also have been a vassal of one of the ruling

families. Michiels may have a link to Siegfried, because Guînes is in the neighbourhood of his place of origin in West-Flanders, near the French boarder.



### Structure of ZP161

The structure of ZP161 can be presented as follows: The mutation of Dys390=23 will have taken place not long after ZP161, because all known Scandinavians within ZP161 have this marker. But just before this mutation, branch A was born, with no known descendants in Scandinavia. The Low Countries Cluster can be seen as the descendants of one man (A), who went with the Vikings to Frisia. His brother (B) stayed in Scandinavia and got the mutation Dys390=23. This may have happened over several generations, but the principle should be clear.

### A Norwegian Viking among the hirdmen of a Danish king?

Because the Scandinavian cluster exists of mostly South-East-Norwegian families, A will probably be of Norwegian origin. Knowing that at least three knightly families in the Low Countries descent from this man, he will at least have been among the hirdmen of one of the Danish rulers. Nevertheless, he must not have been of Danish origin. In the Viking troops we often see a mixture of Norwegian, Danish, and sometimes Swedish Vikings; they all lived around the same sea and the country borders were not the same as nowadays. Scientist found that even in the same ship Vikings from several countries were mixed.

But there is another important point. We know that the kings of Hedeby are considered to be descendants of the Norwegian branch of the Ynglinger family, who were kings in Vestfold and Romerike.<sup>6</sup> So we can expect members of Norwegian origin among their hirdmen, which went with them to Hedeby. The Norwegians in the FTDNA-list which are expected to be positive for ZP161 (Amudsen etc.) just live in this region: in or near Eidsvoll in Akershus, which was a part of Romerike. It is a strong indication that ZP161 occurred in Norway, before the first Ynglinger, Sigurd and Harald I (grandfather of Harald Klak) moved to Denmark.

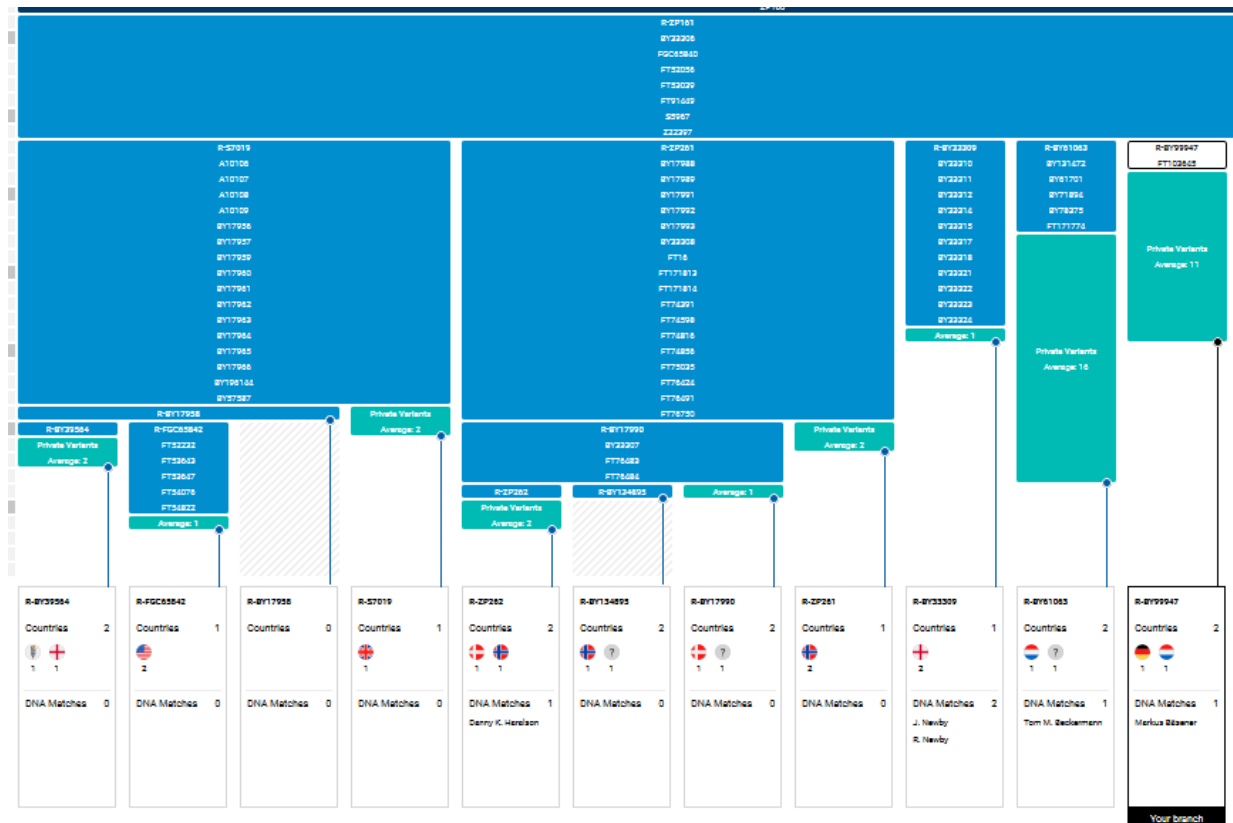
### Timetable

The mutation times mentioned before are taken from the SNP-Tracker. Possibly ZP161 may have happened later, which would be within the tolerance. But we take the Tracker value as a reference.

- ca. 610 mutation ZP161 in Norway
- ca. 750 mutation Dys390=23 in Norway in line B; link to families Harralson etc.
- ca. 770 Norwegian Viking (NV) born (line A).
- ca. 800 NV settles in Hedeby, Denmark.
- ca. 815-840 NV may be hirdmen of Harald Klak in Rüstingen; perhaps link to Beckermann.
- 845-891 Vikings ruled in parts of Frisia.
- ca. 840-873 (grand-)sons of NV may be hirdmen/warriors of Rorik in Frisia.
- 885-1000 Descendants of NV enter as warriors into service of local rulers of the Low Counties.
- ca. 965 Siegfried "the Dane" becomes the first Count of Guînes; perhaps warriors as descendants of the hirdmen of Harald Klak; link to Michiels who has a nearer link to Beckermann.
- 1018 'Vlaardinger warrior', in service of Dirk III of Holland (993/1039), is hurt in Battle of Vlaardingen.

1066 Norman knight Ragemer, in service of Gilbert of Ghent, is fighting in Hastings.  
 ca. 1100/1150 descendant of 'Vlaardinger warrior' becomes Lord of Oestgeest.  
 1201 Willem van Oestgeest mentioned as witness for Count Dirk VII of Holland.  
 1241 NN van Oestgeest is involved in a battle of the Teutonic Order in East Prussia – link to Bäsner, who has a nearer link to Zuiderent (Oestgeest).  
 1263 Stassin de Hemptine is mentioned as rebuilder of the Abby of Boneffe under Count Gwijde de Dampierre of Flanders and Namur.<sup>7</sup> He will be the grandfather of Stassin (1270-1346).  
 ca. 1300 Adam de Welles, descendant of Ragemer becomes 1. Lord of Welles.

**Block diagram ZP161 (BigY Test FTDNA)**



|----- Wells -----|----- Harrelson -----|Trøsi,Finns-I- Newby\*)-|Mich./Beck.| Zui./Bäs.-|

\*) Newby, England, is not on the List. Possible origin via the Normand Invasion?

**Age estimations**

SNPs are used to determine the shape of the genealogical tree, as showed in the block diagram above. However, the diagram shows also that the time to most recent common ancestor (*TMRCA*) is not a linear function of the number of mutations. This number of mutations varies between 12 and 26 during the same period in the different branches. A so called 'molecular clock', used to estimate *TMRCA* for periods of thousands of years, is not usable for historical times. Mutations over a short period appear in a very irregular way; they converge only after a long time. Remembering that stochastic theories are based on the laws of the large numbers, we cannot take a small number of stochastic events – like by rolling a simple dice – as representative for a longer process. A recent study made by Iain McDonald<sup>8</sup> shows even differences of 3 versus 11 SNP mutations over a period of 700 years. Over a 3400- or 4000-years period we see a good convergence, which can be

used to calculate the TMRCA. Considering the STR mutations, McDonald gets better estimations for shorter periods, but the uncertainty remains very high. These findings are important to judge the plausibility of our timetable in relation to the DNA data. Comparing the timetable with the SNP block diagram, considering the SNP uncertainties mentioned before, the times look plausible. Also, considering our STR data, the timetable looks realistic.

## Notes

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<sup>1</sup> <http://scaledinnovation.com/gg/snpTracker.html>

<sup>2</sup> <https://www.familytreedna.com/public/U106?iframe=ycolored> with some corrections

<sup>3</sup> This was first done in 2017 without knowing ZP261, see [Structure S5970](#) (corrected version)

<sup>4</sup> On the Dark AgeAncestry of the Wells Family,

<http://www.mrc.uidaho.edu/~rwells/techdocs/Dark%20Age%20Ancestr20of%20Wells.pdf>

<sup>5</sup> [http://www.zuiderent.ch/DNA.htm#\\_Toc438471380](http://www.zuiderent.ch/DNA.htm#_Toc438471380)

<sup>6</sup> The exact connection is not known. The most realistic option seems to me that Harald I of Hedeby, grandfather of Harald Klak, was a younger son of Eystein Halfdansson, king of Romerike and Vestfold, whose elder son Halfdan 'the Mild' followed him in Norway, while the younger sons Sigurd and Harald settled in Hedeby. More information in [Origin of ZP161](#) (A. Zuiderent 2 Dec. 2019).

<sup>7</sup> B. van Butsele, De Abdij van Boneffe, Vlaamse nalatenschap in 't graafschap Namen. (Familia et Patria 1974)

<sup>8</sup> Iain McDonald, *Improved models of coalescence ages of Y-DNA haplogroups*, accepted by the journal Genes, 2 June 2021.