

Who was Madame Calment?

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Abstract: Jeanne Calment is said to have died at 122 years old in 1997, holding the record for the oldest validated person who ever lived. However doubts have been raised that in fact her daughter Yvonne may have made an identity switch in 1934. In this discussion document I look at what new evidence may be sought to settle the question of her authenticity. In particular I propose that a test for autozygosity in the DNA of Mme Calment would distinguish Jeanne from Yvonne.

Introduction

In the United Kingdom in 2017 according to the Office for National Statistics there were 579,780 people aged 90 years and over, 134,670 aged 95 and over, 14,430 centenarians over 100, 390 aged over 105 and 20 supercentenarians aged over 110 [1]

Family records in the UK are generally very good but errors can be made and some elderly people may have been born overseas where records are not so complete. A few may have misrepresented their age when young in order to join the army or to marry. Others who were poorly educated may simply not have kept track of their age in early life. Very occasionally people deliberately assume the identity of another person of a different age for various fraudulent reasons.

Despite the rarity of such mistakes in the record archives, they can distort the statistics at extreme ages due to the fast decline of the number of survivors past 95 years of age. For example, if 1 in 2000 people were recorded to be ten years older than they are, then about 7 of the 20 supercentenarians would actually be ten years younger, and if one in 100,000 people were claiming to be twenty years older, then another 5 supercentenarians would be 20 years younger. It is unlikely that the error rates in the UK are so bad, but the true rates are hard to determine and on a global scale the situation is more uncertain.

Because of this effect, when gerontologists seek to list and count supercentenarians of the world they are carrying out a selection process that is naturally biased towards finding the small fraction of people who are thought to be older than they really are. The proportion of people on their list who have an incorrectly recorded age will be several orders of magnitude larger than the number of such people in the general population. They are aware of this and know to check records very carefully to eliminate errors and false accounts as part of their validation process. However, when they seek to validate people over 115 years of age the unavoidable selection bias becomes stronger.

The validation criteria for the validation of extreme ages require that the recorded chaining of events is devoid of ambiguity [2], but it is hard to be certain. After eliminating detectable errors, are validators left with genuine people of extreme age or simply the tiny number of cases where the errors are undetectable in the record?

Seeking the answer to this question is more than simple curiosity. For scientists who study human longevity, the ability of people to live beyond a great age is a crucial statistic. According to the Gompertz law of mortality the hazard function increases exponentially with age so that it would reach a point of certain death at an upper age limit. Although Gompertz fits well up to at least 90 years of age, demographic statistics suggest that there is a deceleration in mortality at extreme ages. The mortality rate appears to plateau at around a probability of death of around 0.5 per year making it possible to live to any age, if only very rarely. However, doubt exists that data errors may be distorting this conclusion [12]. Even single cases of extreme longevity can have a statistically significant bearing on this matter.

Jeanne Calment

Jeanne Calment died in 1997 at her home town of Arles in France at the record age of 122 years and 164 days. French genealogical records held by the church and local mairies are of exceptional quality. Marriage records in particular hold detailed information about the married couple's parents, and census records taken every five years can be accessed. Jeanne Calment's history was recorded in an

unbroken chain from her birth in 1875 [2]. Although her age was a statistical outlier at the time of her death, there was little reason for suspicion. As time progresses the availability of birth records and photographs improves and more people are living longer. There was no reason in 1997 to see Jeanne Calment as anything more than part of a remarkable trend in advancing human longevity.

Twenty years later her record has not been beaten by any validated supercentenarian. The runner up in the record books is Sarah Knauss of the US who died at 119 years and 97 days in 1999, more than three years younger. Third place was taken in 2018 by Nabi Tajima of Japan at just 117 years and 260 days with others just behind by a matter of a few weeks. The trend of increasing longevity records has therefore stopped and Mme Calment's age now appears as a more extreme outlier [3]. Even the age of Sarah Knauss is open to question because her birth record is not known. This places Mme Calment's age five years ahead of the main pack where validations are on firmer ground. Such an anomaly is far from impossible but no validation comes with absolute certainty. Circumstances now demand that her case be re-examined to determine if it could be an undetected error rather than an extraordinary record, no matter how unlikely that may seem.

In fact it transpires that there is a possible opportunity for the Calment record to be false. The register of deaths shows that in 1934 Jeanne Calment's daughter Yvonne Calment-Billot died from pleurisy. This is confirmed by the funeral announcement in the local paper and the churches burial records. If it could somehow have been Jeanne that really died and Yvonne who assumed her identity then Mme Calment would really have been only 99 years old at her death. Should this be treated as an ambiguity or is the possibility of an ID switch too far-fetched?

This theory is not new but in the past it has been given short shrift by gerontologists close to the Calment validation. In 2018, mathematician Nikolay Zak looked at the hypothesis in more detail at the suggestion of gerontologist Valeri Novoselov [4,5]. Zak uncovered a potential motive for the identity switch. The Calment family ran a successful drapery business and they risked being hit by inheritance tax if Jeanne died. The tax could be evaded if Yvonne took her place. Further support came from gerontologist Yuri Deigin who examined photographs of Jeanne and Yvonne in more detail to make the case for the switch [6]. This work brought the matter sharply to the attention of the world's media and sparked a backlash from some members of the Gerontological Community.

Zak has described the evidence in favour of the identity switch hypothesis as inconclusive but compelling. On the other hand, French demographer Jean-Marie Robine who was one of the scientists responsible for the original validation compared it with fake news [7]. I do not agree fully with either and remain open-minded about what happened. Other gerontologists seem less defensive including Michel Allard who was Robine's collaborator in the validation [8]. The inhabitants of Arles and relatives to the Calment family have been running a counter enquiry to re-establish the authenticity of Jeanne Calment's age. They should be congratulated on their dignified approach, allowing their opponents to have a say while themselves carrying out high quality research into the family history. Special thanks are owed to relatives who have contributed photos and testimony to the cause.

To cut to the chase, there are two scenarios to choose from. In scenario A Jeanne Calment lived to a remarkable age of 122 after an extraordinary life. In scenario B Yvonne Calment pulled-off the perfect identity fraud under the noses of everyone she knew. Both are highly unlikely life stories but one is true. Now we must find the evidence that confirms one conclusively and rules out the other.

For the rest of this article I will play devil's advocate and consider how scenario B could most likely have played out if it is true. I stress once again that this does not mean that I support this outcome. I am undecided and open-minded, believing that more evidence is needed to settle the matter. At a personal level I hope Jeanne Calment is vindicated but I consider it important to establish the scientific truth without being led by bias. I am not making any allegations or supporting anybody's side. I am not providing any significant new evidence or claiming any credit. My only goal is to determine what further evidence could be sought in order to reach a satisfactory conclusion.

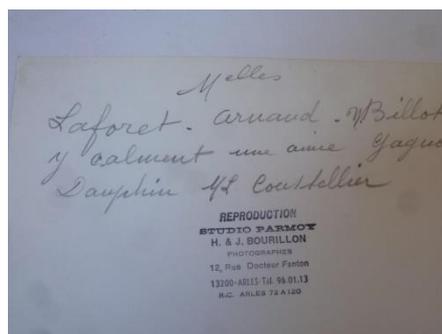
Photographs

The GRG maintains a gallery of photos of Jeanne Calment at <http://www.grg.org/icalmentgallery.htm>

Recently some new photographs of both Jeanne and Yvonne before 1934 have come forward on the internet and in news reports. The following dated photo was found in the collection of Mme Gilberte Mery, a living relative of Jeanne Calment. It was published in Paris Match and Le Journal du Dimanche [9]. The date is 8 April 1923 which was the Sunday following Easter.



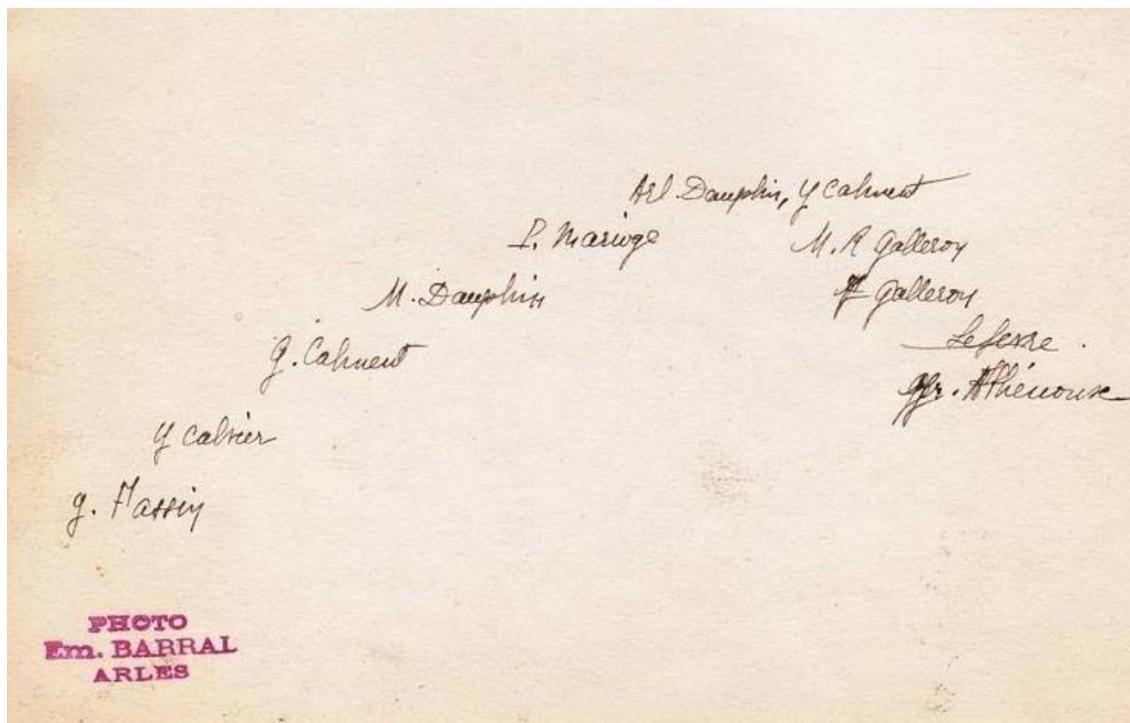
The lady sitting in the middle is Yvonne Calment. This is verified by an identical but undated copy of the photo for sale on ebay which is annotated on the back



In another picture from the collection of Mme Remy we see Yvonne in a different but similar traditional costume.



Another copy of this photo is also annotated in reverse on the back



Again Yvonne is identified and the lady third from the left is named as G Calment. Initially there was some hope that this was actually Jeanne Calment but it is more likely to be a younger cousin Genevieve Calment from Marseilles. Germaine Fassin who appears furthest right also appeared in another photo from the costume festival from 1923, but there she was dressed in the Mireille costume reserved for younger girls. That means that this photo is later and most probably 1925.

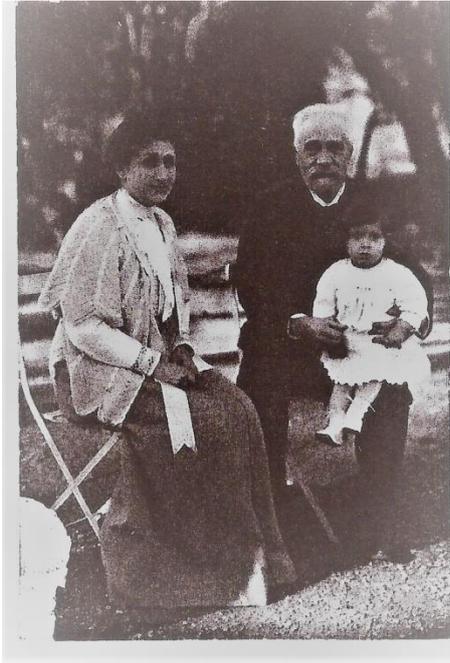
Another image recovered from a newspaper article shows Yvonne wearing the same neck choker as



in the 1923 dated photo but without the head ribbon. Comparing these pictures from around the same time shows that Jeanne and Yvonne looked superficially similar despite their age difference, but anyone well acquainted with the family would not have confused them.

At Yvonne's wedding to Joseph Billot in 1926 the groom's father Paul Emile Billot is said to have mistaken Jeanne for Yvonne (see [4]). This confirms that Jeanne looked young enough to pass for her daughter, or vice versa, but it also suggests that at least some of the Billot family were not very well acquainted with their in-laws at that time. Paul Emile Billot also became the godfather of Yvonne's son Frederick born a year later so he must have seen them at the baptism. Sadly he died three years later at the age of 72. The role as the godfather is socially important for French Catholics and one of Joseph's brothers might have been a better choice in that respect. I think it would be valuable to check all records of baptisms and marriages on either side of the family to see if there are any other examples of the Billot and Calment families acting as witnesses or godparents for each other. If they did it would mean that the Billot's would have been party to any identity switch making it more unlikely.

The cause of death for Yvonne Calment in 1934 was given as pleurisy. This condition is usually a complication of another underlying disease. At the time, tuberculosis was prevalent and often fatal. It is therefore the most likely cause [10]. Gilberte Mery has indicated that this was the case [9]. Untreated tuberculosis would take five to ten years to kill a previously healthy individual. Tuberculosis was a notifiable disease and during this time the patient would have been isolated or even quarantined. If we assume that it was really Jeanne Calment who contracted TB it would have been natural for the family to keep the matter quiet. Most likely she would have retreated to the family's farm in Saint Martin de Crau. According to the testimony of Mme Calment she was in hospital during the final stages of her illness but returned to Arles in December a few weeks before her death (see [4]). There is no reason to doubt this account of events if it was Jeanne rather than Yvonne who was ill. It is possible that records of infections and quarantining could identify Jeanne or Yvonne as having had the disease.



This picture which came from a facebook group may show Jeanne in the early stages of her illness. She appears to be with her husband and her grandson Frederick who might be about 2 years old. This would date it to 1929. Unfortunately the photo is unclear and its provenance is uncertain. It has been suggested that the dress and hair style dates this as earlier. All we can say with certainty is that it is later than 1889 when the patent for the bistro chairs they are sitting on was filed. It would help the inquiry if a clearer copy could be found and verified.

Some people have suggested that a longer illness makes an identity switch less likely but this is not necessarily the case. If Jeanne did spend several years away from her home in Arles it is easier to understand how it could have come about. Yvonne could have spent some time caring for her mother and would have learnt many details about her early life. This would help her mimic her mother. Yvonne's absence was explained with the story that she travelled with her husband Joseph who was in the army.

When Yvonne returned to Arles and was seen in the shop or near her home she could be mistaken for her mother by those who had not known the family very well. The Calment's would not deny this because it helped hide Jeanne's illness. The absence of Jeanne and Yvonne is consistent with the Arles census of 1931 in which they were not noted, although the inclusion of a second record for Maria Calment leaves some room for doubt [2]. It is possible that they were recorded at another location and it would be helpful to check this in the census returns for other property they owned or any other location.

In normal circumstances an identity switch as proposed by Zak and others would be unthinkable and almost impossible to carry out. However, if Jeanne had been absent from Arles for some time and Yvonne was regularly taken for her mother it would have been much easier. Indeed it might have been difficult to explain the truth by time the death occurred. It is possible that only the closest members of the family were aware of the switch.

It has been claimed that the Calment's had an open-casque wake that would have made it easy for those paying their respects to notice the fraud by recognising Jeanne Calment's body. In fact the announcement for the funeral does not indicate how the funeral would be conducted. It would be normal to keep the coffin closed in certain circumstances such as the body being in poor condition or a risk of infection as would have been the case after a death from tuberculosis. Even if the coffin was open it is not certain that people would have recognised Jeanne after several years under these conditions.



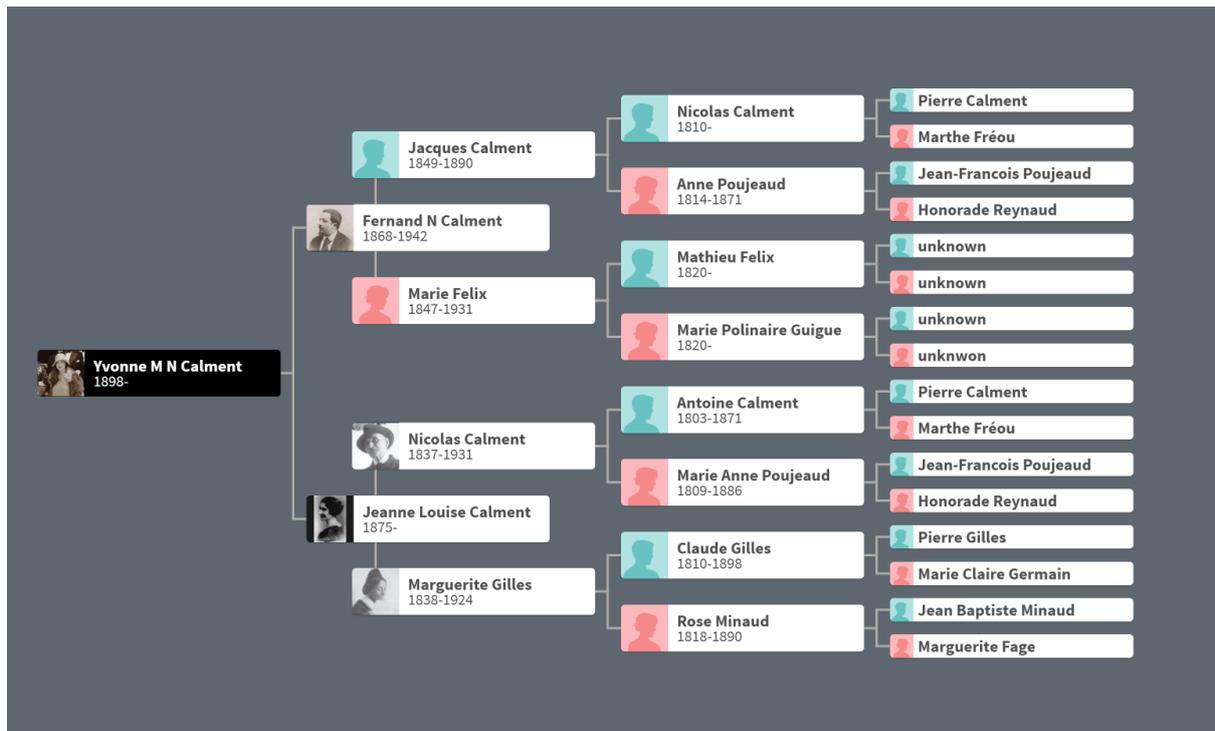
At age 60

For many years only this one picture from between 1934 and 1975 was publicly known and its authenticity was doubted. Recently more pictures have kindly been made available by the family and these make it clear that that this one is genuine. Although this picture was labelled "At age 60" from the GRG website, its actual date is unknown.

The formal pose and background suggests a professionally taken photograph, most likely taken for an identity card. The subject's skin on the face and neck appears youthful. An age over 70 seems unlikely.

What is most surprising about this picture is that her hair appears to have turned almost completely white. At 51 Jeanne's hair was still dark. If this picture actually shows Yvonne as we must assume if we are to accept the identity switch hypothesis, then her greyed hair is even more surprising as she would have still been young. It is also true that she took out her "en viager" deal with a notary in 1965. This means Yvonne would have fooled him into believing she was 90 years old when she was in fact 67. This is really only plausible if she looked older than her age. Although this seems surprising there is actually a triple consistency in the hypothesis that she looked older than her age starting around 1930. It would explain her appearance in this photo, explain how people thought she was Jeanne rather than Yvonne while Jeanne was ill, and explain how the notary was fooled into agreeing the "en viager" deal.

Premature greying of the hair known as canities can occur for a number of reasons including congenital defects. In her interviews Mme Calment let it be known that when she was twenty she was diagnosed with an incipient cataract after visiting her doctor for conjunctivitis. She was never treated for this yet she did not lose her sight until her final years. This suggests a misdiagnosis. An alternative possibility is that she suffered from heterochromia iridis so that one eye appeared darker than the other. This could be another congenital condition. It is also noticeable in pictures above that Yvonne Calment's eyes were spaced more widely apart from her mother's and that she had a broader nose. These are genetic traits that may be connected to canities in some congenital conditions such as Waardenburg's syndrome, although in this case there is no reason to regard Yvonne's features as abnormal.



The genealogical tree for Yvonne shows that her parents were double second cousins. This level of inbreeding means that one in 32 of her genes would inherit the same allele from her two grandfather's grandparents. This increases her genetic homozygosity and augments the risk of autosomal recessive traits including rare congenital defects. When homozygosity is due to inbreeding it is called autozygosity. In this case there will be long runs of homozygosity in the autosomes. It should be possible to test for this if her DNA is available. This would distinguish Yvonne from Jeanne who had no known common ancestors. It means the identity switch hypothesis can be tested with only Mme Calment's DNA.

The presence of rare genetic conditions may seem unlikely but we must remember that by selecting the oldest person in the world we are focusing on very rare circumstances where an unlikely combination of coincidences may be an equally likely outcome. If premature greying of the hair would have made an identity switch much more natural then it needs to be seriously considered.

It is understandable that people will be sceptical that the above scenario B could have taken place. How many friends and relatives could support and hide such a lie? It is important to remember that the political situation of the time was very different from now. Mme Calment hated socialists and communists. At the time of these events Stalin was in power in Russia and closer to home socialism was a very different political movement from what we see today. Those that called themselves socialists included the fascist Nazi regimes under Hitler and Mussolini as well as the anarchists who revolted in Spain. Arles is only 100 miles distant from both Italy and Spain.

A great depression hit France from 1931 and continued into wartime. France was politically divided after the Dreyfuss affair and the divisions could split families and friends. Bourgeoisie families like the Calments would have felt threatened. Such was the backdrop as Yvonne Calment married and had her only child. Her husband as a soldier would be often away and could be in danger if war broke out. Their finances may have been threatened by rising inheritance taxes. If the ill health and

suffering of Yvonne's much loved mother was added to her circumstances then she and her family were under unimaginable pressure. I think it is hard for us now to imagine what actions this could have made possible and acceptable to the family and those that knew them.

Checklist

It is hoped that the gerontological community will try to settle these doubts by seeking new evidence. For what it is worth I make some suggestions of places to look based on the foregoing speculations which I summaries below. It has to be understood that the need for privacy will affect how much of this information can be made public. However it is important that as much as possible is published in order to reassure that any conclusion is valid. If the case rests on information that cannot be made public then it is imperative that an independent expert referee with no conflict of interest acting under a confidentiality clause is allowed to check the evidence and verify its validity.

- 1) Try to verify all known photos of Jeanne Calment from before the age of 100 and obtain the best quality scans from originals where possible.
- 2) Seek further early photos from friends, relatives and newspaper archives.
- 3) Ask living relatives such as Gilbert Mery and Renee Billot if the Jeanne Calment that they knew is recognisable from the pictures of the younger Jeanne Calment or Yvonne Calment.
- 4) Check marriage and baptism records from between the two world wars to see if the Calment-Billot families acted as witnesses or godparents to other families who would therefore have known them well before and after 1934.
- 5) Check 1931 census records from around property they owned, and hospital records from the wider area to see if Jeanne or Yvonne can be located from 1927 to 1933
- 6) Form a more complete family tree for Yvonne as well as Jeanne to locate any close living relatives who could help with DNA matching, photographs or testaments.
- 7) Check Mme Calment's medical history for any indications of congenital abnormalities which might be autosomal recessive traits.
- 8) Look for records of tuberculosis notifications and quarantining that could include Jeanne or Yvonne Calment.
- 9) Check records from the insurance company that sold an annuity to Mme Calment to establish when it took place and whether they ever had any evidence of age related fraud.
- 10) Gather any financial and property records that would clarify the family's financial status and property ownership from about 1920 to 1940.
- 11) Find out if any biological samples of Mme Calment have been preserved. If they have, the DNA could be sequenced and tested for
 - a) elevated homozygosity consistent with double second cousin inbreeding
 - b) any genetic abnormalities connected to premature greying of the hair
 - c) Consanguinity with known living relatives

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