

# February 29

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Being born on February 29 I have always had an interest in the calendar and the mechanics of Leap Year. Since I am sure everyone knows about Leap Year, I will just rattle off a few trivia questions to stimulate the memory. Why was I excited about my birthday in 2000 when everyone knew it was a Leap Year, being 4 years after 1996? When I lived in Brazil, everyone referred to Leap Year as *bissextile*. What was that all about? After the Gregorian reform in 1582, how come George Washington's mother recorded his birth in their family bible as 11 February 1731 when we say it is 22 February 1732 (whereas Abraham Lincoln's mother recorded 12 February 1809 for her son, which we agree with)?

The answers to these questions turn out to be rather complicated, not least because of all the obsolete baggage we have retained over several millennia (somewhat like all the "redundant" genes we keep, after various mutations, that clutter up our chromosomes). I am not going to go into lengthy detail, but just focus on the trivia questions. Before the arrival of the Millennium in 2000 various books were written about the calendar and two that I enjoyed (before the advent of *Wikipedia*) were by E. G. Richards (1998) ([1]) and D. E. Duncan (1998) ([2]). However, *Wikipedia* articles (2019) ([3], [4], [5]) now give good summaries of information relevant to my questions, although they are not immune to some ambiguity and confusion.

## Question 1: What is significant about 29 February 2000?

The Julian calendar reform of 46 BC provided for the addition of a day every 4 years. The significance of the Gregorian reform of 1582 was that it reduced the error generated by the Julian reform by adding a different rule for the centuries, namely, centuries would not be leap years in general even though divisible by 4, but only if they were divisible by 400. So 1700, 1800, and 1900 were *not* leap years, but 1600 and 2000 were. Therefore the fact that I *did* have a birthday in 2000 was a one in 400 year event! Alas, most people were not aware of this distinction and treated my excitement with a decided jaundiced eye.

## Question 2: What is bissextile?

The answer to this question is far more involved and depends on all the obsolete historical junk left in our calendar calculations. That is, there is not *logical* reason for it and it is surrounded by a good bit of ambiguity.

The early calendar around the time of the founding of Rome in the eighth century BC or before began with March at the spring equinox. It also consisted of 10 months. "The remaining period of two months or lunations is uncertain (as are other details) and mysterious."([1] p.207) Numa Pompilius in the seventh century BC added two months, January and February. (I am ignoring a discussion of the lengths of all the months, which varied considerably over the history of the Roman calendar.) All the various calendar schemes eventually were at variance with the sun and seasons and required "corrections". The additions of days at the end of the year in February were called *intercalations*. Originally they amounted to months, and were inserted so as to disrupt festivals in a minimal way. Therefore they were added after the Feast of Terminalia on 23 February and before Regifugium ("Flight of the King") or Fugalia ("Festival of the Flight") on 24 February. Given the idiosyncratic way the Romans counted their days (at least to our eyes) by counting backwards and

inclusively, the 24<sup>th</sup> of February out of a month of 28 days was the 6<sup>th</sup> day before the kalends (first day) of March (where March 1 was included in the count). So when all the smoke cleared by 46 BC when Julius Caesar reformed the calendar under the guidance of Sosigenes and only one day was added to the calendar every four years, that day was inserted between 23 and 24 of February. This day was called *ante diem bis sextum Kalendas Martias* (“the sixth doubled day before the Kalends of March” where “bis” means “twice” in Latin.). And so the leap day became designated the bissextile day and the leap year the bissextile year, even after the intercalation day was moved to 29 February in the Middle Ages.

One further thing to note: the beginning of the year. “After the fall of the Roman monarchy in 509 BC, the Romans dated events by reference to the consuls in office at the time. In 158 BC they began to take office on 1 January, and the year certainly started on that date thereafter.” ([1] p.208) So even though the year no longer ended in February, the intercalation day continued to be taken then. There is more to this story, however, as we shall see next.

### **Question 3: Why was George Washington’s birthday 11 February 1731 instead of 22 February 1732?**

First, we see that ([5]):

Although Gregory’s reform was enacted in the most solemn of forms available to the Church, the bull had no authority beyond the Catholic Church and the Papal States. The changes that he was proposing were changes to the civil calendar, over which he had no authority. They required adoption by the civil authorities in each country to have legal effect.

The bull *Inter gravissimas* became the law of the Catholic Church in 1582, but it was not recognized by Protestant Churches, Eastern Orthodox Churches, Oriental Orthodox Churches, and a few others. ...

Many Protestant countries initially objected to adopting a Catholic innovation; some Protestants feared the new calendar was part of a plot to return them to the Catholic fold. For example, the British could not bring themselves to adopt the Catholic system explicitly: the *Annexe to their Calendar (New Style) Act 1750* established a computation for the date of Easter that achieved the same result as Gregory’s rules, without actually referring to him. Britain and the British Empire (including the eastern part of what is now the United States) adopted the Gregorian calendar in 1752.

And then regarding the start of the year after the Romans moved it to 1 January, we have ([1] p.218):

Later, the Christian Church, wishing to dissociate itself from pagan practices, preferred to begin the year with the day of a Christian festival; a logical day might be the Feast of the Annunciation on 25 March. So, at various times and places, including England up to 1752, 25 March heralded the New Year.

So we see that George Washington was born under the regime of the Julian calendar with the new year beginning in March. In 1731 the year 1732 started March 25. By 1752 the difference between the Julian and Gregorian calendars was 11 days. So when the change was made to the Gregorian calendar, Washington’s birthday had 11 days added and was placed in the next year 1732, which was now retroactively designated to start on 1 January instead of 25 March.

There are a lot of great stories about the disruption caused when the British and their colonies switched calendars in a move that including losing 11 days. There was a huge outcry over banks trying to charge interest for the missing 11 days, for example.

## References

- [1] Richards, E.G., *Mapping Time: The Calendar and Its History*, Oxford University Press, 450pp, 1998
- [2] Duncan, David Ewing, *Calendar: Humanity's Epic Struggle to Determine a True and Accurate Year*, 1998, Avon Books Inc., paperback, 328pp, 1999.
- [3] "Roman Calendar," *Wikipedia* ([https://en.wikipedia.org/wiki/Roman\\_calendar](https://en.wikipedia.org/wiki/Roman_calendar), retrieved 2/28/2019)
- [4] "Julian Calendar," *Wikipedia* ([https://en.wikipedia.org/wiki/Julian\\_Calendar](https://en.wikipedia.org/wiki/Julian_Calendar), retrieved 2/28/2019)
- [5] "Gregorian Calendar," *Wikipedia* ([https://en.wikipedia.org/wiki/Gregorian\\_calendar](https://en.wikipedia.org/wiki/Gregorian_calendar), retrieved 2/28/2019)

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