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# THE ROCKY ROAD TO THE GREGORIAN CALENDAR

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**For thousands of years, people struggled to align their calendars with the solar year. But it was not until the advent of the leap year that they succeeded in putting an end to the previous calendar chaos. At least for a while. This is a travel through time and the history of our Gregorian calendar.**

Since ancient times, great minds have puzzled over the mystery of time. What factors influence its course? How can it be measured? How can we synchronise it with the movements of the celestial bodies, the changing of the seasons and life on Earth?

The cycles of the sun, moon and stars provided our ancestors with guides for sowing and harvesting and led to the development of the first calendars, thus forming a bridge between man and the cosmos. Sirius, for example, the brightest star in the sky, played an important role for the ancient Egyptians around 4000 BCE. Its appearance at dawn was a sign to farmers that the Nile was about to flood, an event that provided them with fertile soil approximately every 365 days at the time of the summer solstice at the end of June. They always tilled their fields on the night Sirius disappeared from the sky. The duration and height of the Nile floods varied, so the Nile year, which began with the flood, would last between 335 and 415 days. The oldest known calendar is a lunar calendar from the early dynastic period in Egypt around 3000 BCE. It measured the time between two appearances of Sirius and lasted on average 365.250012 days. Other ancient calendars, the civil calendars, divided the year into twelve months of 30 days each.

This meant that a 360-day year was almost a week less than the Earth's annual journey around the sun. The Mayan calendar was an exception, as it consisted of several interrelated systems: the 365-day solar year cycle, which was relevant for agricultural purposes, and the 260-day Tzolkin cycle, which served as a ritual calendar to determine auspicious dates.

## ELEVEN DAYS BEHIND TIME

Like the Egyptians, the ancient Greeks and Romans assigned specific events to the positions of the stars or celebrated festivals at pre-ordained phases of the moon and seasons.

And like the Egyptians, Greeks and Romans, the Chinese also used lunar calendars to measure time. For instance, the origins of the lunar calendar still extant in the Islamic calendar to this day can be traced back to the Sumerians in Mesopotamia, who had fixed lengths for the months of 29 and 30 days back in 3000 years BCE.

In their sexagesimal calendar system, a day consisted of 24 hours, each hour divided into 60 minutes and each minute into 60 seconds. However, since lunar months average only 29.5 days in length, and lunar years about 354 days, societies that looked to the moon for guidance quickly fell about eleven days behind the rhythm of the seasons.

## METON, THE MOON AND THE SUN

The Jewish calendar is thought to have originated back in the first millennium BCE and was taken back to Palestine by the Jews after their Babylonian exile. It is a lunisolar calendar that attempts to harmonise the interplay of the moon and the sun. Even in this calendar, a twelve-month period has a total of only 354 days; a problem of which the Egyptians were aware and are said to have offset by simply adding five days to the end of the year.

The Roman era began around 753 BCE with the official founding of Rome. Romulus, the first king of Rome according to legend, is said to have introduced the ten-month calendar. In a subsequent calendar reform, his successor King Numa Pompilius is thought to have added January and February.

About 530 years before the Common Era, the Persians were the first to introduce a 13<sup>th</sup> leap month, which was inserted every 19 years. In 432 BCE, the Greek astronomer Meton from Athens finally developed a cycle that took both the moon and sun into account. This worked relatively accurately and required a correction of only one day every 228 years. The Metonic cycle, which is still used today to calculate Christian Easter, was to remain valid for 387 years.

#### A CONFUSING YEAR FOR CAESAR

However, some 400 years later, during the reign of Julius Caesar, the Roman lunar calendar was already out of sync with the seasons by around three months. To eliminate this inconsistency, Caesar borrowed an ingenious idea from the Egyptians. They had introduced the leap year into their 365-day calendar some 3000 years earlier, an almost perfect system that adjusted the calendar every four years. However, in order to eliminate the major discrepancy that had developed over the years in one fell swoop, Caesar prescribed a 445-day year, his “annus confusionis” or Year of Confusion, in 46 BCE. This was followed by a 365.25-day year, in which a leap day was simply added every fourth year. This marked the introduction of the Julian calendar system, developed by the Greek astronomer Sosigenes of Alexandria. It changed the Roman calendar from a pure to a bound lunar calendar and at the same time to a solar calendar, which remained in use for almost 1600 years.

However, the Julian year with its average duration of 365.25 days, was around 11 minutes and 14 seconds longer than a solar year. This discrepancy added up to a deviation of a whole day every 128 years. The consequence of this small but critical mistake was that by the 16<sup>th</sup> century, important dates such as Christian holidays had already shifted by around ten days.

#### POPE GREGOR WIPES OUT TEN DAYS

The Catholic Church was particularly upset by this state of affairs. Easter, the highest of all Christian festivals, was timed to coincide with the beginning of spring and always fell on the first Sunday after the spring full moon. The vernal equinox was to fall on 21<sup>st</sup> March again, as established by the Council of Nicaea in 325 A.D. Pope Gregory XIII therefore had his own calendar introduced without further ado in 1582, taking an even more drastic approach than the one Caesar had adopted: he simply cancelled ten days. So, when you went to bed on Thursday, 4<sup>th</sup> October 1582, you woke up on Friday, 15<sup>th</sup> October. Today, the Gregorian calendar is used by most countries in the world. However, it took more than a hundred years before many Protestant countries finally recognised it in the 18<sup>th</sup> century. Soviet Russia and Turkey took even longer, finally adopting it in 1918 and 1927, respectively. Even in China, the Gregorian calendar is in official use today, despite the ongoing popularity of the traditional lunar-solar calendar in everyday life, where it determines the date of the Chinese New Year, for example.

In accordance with the Gregorian calendar, the leap days are now omitted in all leap years that are divisible by one hundred but not by four hundred. Consequently, the years 1700, 1800 and 1900 were not leap years. The years 1600 and 2000, on the other hand, had a leap day because they can be divided by four hundred. Thanks to this special leap year rule, the calendar is amazingly accurate. With an average length of 365.2425 days, the Gregorian year is around 27 seconds longer than a solar year: a fact that means the Gregorian calendar deviates from the natural solar year by one day every 3236 years. But by then, some ingenious watchmaker from IWC Schaffhausen is almost certain to have found a way of eliminating even this tiny flaw.

## IWC SCHAFFHAUSEN

IWC Schaffhausen is a leading Swiss luxury watch manufacturer based in Schaffhausen in the north-eastern part of Switzerland. With collections like the Portugieser and the Pilot's Watches, the brand covers the whole spectrum from elegant to sports watches. Founded in 1868 by the American watchmaker and engineer Florentine Ariosto Jones, IWC is known for its unique engineering approach to watchmaking, combining the best of human craftsmanship and creativity with cutting-edge technology and processes.

Over its more than 150-year history, IWC has earned a reputation for creating professional instrument watches and functional complications, especially chronographs and calendars, which are ingenious, robust, and easy for customers to use. A pioneer in the use of titanium and ceramics, IWC today specialises in highly engineered watch cases manufactured from advanced materials, such as coloured ceramics, Ceratanium®, and titanium aluminide.

A leader in sustainable luxury watchmaking, IWC sources materials responsibly and takes action to minimise its impact on the environment. Along the pillars of transparency, circularity, and responsibility, the brand crafts timepieces built to last for generations and continuously improves every element of how it manufactures, distributes, and services its products in the most responsible way. IWC also partners with organisations that work globally to support children and young people.

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