shown that the solar year was actually slightly less than 365.25 days long? Undoubtedly this is the case, but it is not a matter of great consequence. Julius Caesar was looking for some simple, straightforward rule to replace the miscellany which had gone before: having 365 days in most years, but an extra single day in one in four, was about as simple as one could get. A leap-year rule based on Hipparchus's (inaccurate, we now know) evaluation of the year would have meant that once every three centuries a scheduled leap-year day would need to be skipped. If Julius Caesar could legislate to insert 90 extra days into one year, then surely some ruler several centuries hence would be able to delete a single day? Simplicity was the key to ending the confusion which reigned.

The Erroneous Triennial Leap Years

I wrote above that the one-leap-year-every-four-years rule is about as simple as one can get. But the pontifices managed to get it wrong: no wonder the verb *to pontificate* is often used in a pejorative manner!

The problem arose from the Roman inclusive-counting scheme: what to us is every fourth year would have been every fifth year to them. When the Egyptian Sosigenes stipulated an extra day every fourth year, this was interpreted by the Romans as being one year in three. The supposed Julian calendar was introduced, starting in 45 B.C., and in 44 B.C. Julius Caesar (who, one presumes, understood what Sosigenes had prescribed) was assassinated. And for the following few decades Rome mistakenly employed a cycle of two common years followed by a leap year, thus allowing the calendar to lag progressively behind the seasons.

As a matter of fact we do not know for sure *which* one-in-three years were leap years in this period, but by about 9 B.C. the problem was obvious, at least to the astronomers, with twelve rather than nine leap years having been employed since the Julian reform.

As a result Augustus declared a moratorium to let the dates catch up with the seasons, and there were no leap years again until over a decade later. Again we are not sure whether the next leap year was A.D. 4 or A.D. 8, but from then through to A.D. 1700 every fourth year was a leap year in all countries which inherited the Julian calendar.

How Were the Roman Months Numbered?

Let me here add an aside which may be of interest, with regard to the Roman inclusive-counting system.

Many authors have noted that the the names of September, October, November, and December indicate them to be the seventh, eighth, ninth, and tenth months. Indeed, I wrote precisely this earlier. But an inclusive-counting [illegible] that they would be called the eighth, ninth, tenth [illegible]

than the seventh month, but actually in Latin they are all adjectival in form with the qualifying *mensis* (month) usually being omitted but always understood. Thus I believe that the oft-stated opinion that the names of September through December implied them to be the seventh through tenth months in an early Roman calendar is another fallacy, at least in terms of our exclusive-counting system.

A possible solution is that the Roman year, when these months got their names, began with April. This makes sense, astronomically speaking, because the vernal equinox (and hence the start of the seasonal year) was occurring close to the end of March in the early part of the first millennium B.C. Additional support comes from the fact that the Romans believed their city to have been founded in April (of 753 B.C.). My comments in this connection are somewhat speculative, but I think worthy of consideration. I am not aware of this apparent anomaly having been pointed out elsewhere.

The Lengths of the Months Post-Reform

How long were the months after the Julian reform? I wrote above that the ten additional days (eleven in a leap year) were spread over the months, but this was done unevenly: Julius Caesar added two days each onto the ends of January, Sextilis (now August), and December, and one to April, June, September, and November; in a leap year an extra day was inserted into February (my terminology there is important: that day was *not* just tacked onto the end of *that* month, as we will see). The pre- and post-reform month lengths were therefore as follows:

Month	*Before Julian reform*	*After Julian reform*
Januarius	29	31
Februarius	28	28/29*
(Intercalaris*	22 or 23)	
Martius	31	31
Aprilis	29	30
Maius	31	31
Junius	29	30
Quintilis	31	31
Sextilis	29	31
September	29	30
October	31	31
November	29	30
December	29	31
Total	355 (plus* 22 or 23)	365/366*