

FROM AN ASTRONOMER'S VIEWPOINT

By Robert G. Aitken

Director Emeritus of Lick Observatory

(Printed in The Journal of Calendar Reform, Vol. 21, December 1951, pages 170-173)

One of the world's most distinguished astronomers, head of Lick Observatory for the past 21 years and dean of the astronomical department at the University of California, died in Berkeley, California, on 29 October 1951, at the age of 86. His discovery of 3,100 twin stars during a 12-year survey of the skies was his most spectacular contribution to science; he was also a specialist on Mars, having stirred the astronomical horizon in 1924 with his proof that the planet's temperature could support life. Professor Aitken had been an ardent supporter of The World Calendar since its inception, and welcomed every opportunity to speak or write in favor of its adoption. The following article is abstracted from several of his letters, speeches and essays. His literary style was always brilliantly colloquial and provocative.

OUR present calendar, particularly in its role as a social and economic time-keeper, is sadly out of step with our vaunted "practical" civilization. This has been pointed out many times, and its defects need not be listed again. The plan of The World Calendar has been widely circulated. It is a scientific document; it is simple and perpetual; it meets all social and economical as well as astronomical requirements. I see no good reason why it should not be adopted.

Astronomers, with their eyes on the whole universe, have a uniquely impartial viewpoint from which to consider calendar problems. Think of the tribulations of calendar makers on the planet Jupiter. Not only are there about 10,500 days in the year, but the number of days probably varies with the latitude and at the equator may be fully 90 greater than in high north and south latitudes.

Even with the inhabitants of Mars the calendar problem is bad enough. The planet's year has 668.6 days. Three different schemes for a Martian calendar have been suggested. The inhabitants, if any, might have four years of 669 days each, followed by one of only 667 days; or they might have four years of 668 days each, followed by one with 671 days. By either plan they would have 3343 days in five years, which is what the actual rotation and revolution periods require. But a third alternative is probably more practical—to have the Martian years run alternately 668 and 669 days, and then insert an extra leap-day every tenth year to care for the odd one-tenth of a day. This would keep dates in step with the seasons for more than 10,000 years.

The year on Mars might well be divided into quarters of 167 days each. There is nothing on Mars that corresponds exactly to the Earth's lunar period (which gives rise to the monthly and weekly subdivisions of the Earthly calendar). Mars has two moons, the outer of which makes one complete revolution in about $1\frac{1}{4}$ of our days, while the inner one revolves nearly four times as fast. A Martian calendar might well provide a year

with 16 months of 42 days each, and these months might be further subdivided for convenience into six weeks each.

A man from Mars, if he came to Earth and examined our hodge-podge calendar, would be likely to express his surprise that the human race, which prides itself upon its progressiveness, had so long been content to put up with this situation, and that it should be so slow and hesitant about adopting the revision proposed by The World Calendar Association, a revision that would so obviously improve and simplify—particularly since the adoption of the new system could be effected with so little inconvenience to anyone. He would listen with impatience to any explanation about the power of tradition and the reluctance of the conservative element to give up an old custom or tradition in favor of a new one, even though the new one offers definite advantages. This, he would contend, is unreasonable. It is all right to “hold fast to that which is good,” but why should anybody hold fast to something that is not so good and that can so easily be made better?

Of course it would be most convenient if our year contained an exact number of days, and if that number were exactly divisible both by 7 and 12. But Dame Nature, if she be the responsible party, has been culpably indifferent to commensurability in the rotation periods and revolution periods of the Earth and of all the other planets. Happily this is of no consequence except for Mars and the Earth, for as we know, the other planets are uninhabitable, or at least uninhabited.

* * * *

Improvement of the Earthly calendar has been a live subject of discussion from prehistoric times. It all began with that period in the human climb upward toward what we are pleased to call civilization, when people forsook their nomad wanderings and began the practice of agriculture, and the building of more or less organized communities. Earlier, they had felt no special need for a definite standard of reference to keep account of business transactions and sundry appointments. When that need did arise, they found their standard on hand in the apparent motions of the sun and moon.

Long centuries before, when people were still nomads, the wiseacres of those who roamed the river lands of Egypt and Mesopotamia had marked the courses of the sun and moon among the stars. They had noted that it took the moon about 28 to 29 days to run through its cycle of phases, and the sun about 365 days (or about 12 lunar changes of phase) to pass from vernal equinox back to vernal equinox again. They had also noted that the moon needed about 7 days to pass from one phase to another, and they gave each day of the seven a distinctive name—Sun-day, Moon-day, or names drawn from the tribe’s earlier myths and legends.

Having now the approximate length of the year and of the month, the next problem was to combine them in one cycle that would repeat itself endlessly. Efforts to solve the

problem encountered a fact that baffled calendar makers through the centuries: the lengths of the months and the year, expressed in solar days, are incommensurable quantities and nothing that humans can do will alter the fact. The astronomer cannot change the velocities or orbits of the celestial bodies; he can only measure and compute. This he has done with ever-increasing accuracy, until the precision of his date far exceeds the needs of the calendar maker. For the latter's purpose it suffices to know that the time from one equinoctial passage of the sun to the next (the so-called "tropical" year) equals 365.242 days, and that the length of the ordinary month from New Moon round to New moon again is 29.531 solar days.

A good calendar, however, is one in which the tabulated date of the vernal equinox falls invariably on the day when the sun reaches the true equinoctial point in the heavens. It was found that this could be accomplished reasonably well for a short period by the use of intercalary days. In fact, the whole history of the calendar down to the middle of the first century B.C.E. (whether we follow the Mesopotamian or the Egyptian efforts to establish a sound system) is the story of more or less successful intercalation. The results were mostly lamentably unsuccessful; so that when Julius Caesar came into power, the computed date of the equinox was 80 or 90 days ahead of the true date, and the whole calendar was a mess.

Caesar decided to scrap it and start anew. To this end he called upon an expert for advice, as other rulers have done before and since. Caesar differed from others, however, in that when Sosigenes, the expert, gave his advice Caesar studied the recommendations carefully and then acted upon them! That indeed is a course that may well be urged to some of the great powers and leaders of the present day.

The Sosigenes recommendations and instructions were drastic, it is true, and might have given pause to a lesser man than Julius. But drastic action was, so to speak, Caesar's long suit and once he had satisfied himself that the cards were genuine, he played his hand masterfully. As Sosigenes had recommended, he decreed that the calendar's vernal equinox should always fall on 21 March, and that the length of the year should be precisely $365\frac{1}{4}$ days. Then, to combine those two decrees successfully, he adopted what Sir John Herschel describes as "Sosigenes' neat contrivance" of having two artificial years—one with a length of 365 days, to hold for three years in succession, and the other of 366 days, to apply to the fourth year and bring the average of the four to $365\frac{1}{4}$ days.

What Caesar said became, ipso facto, law. The new calendar went into effect as ordained, throughout the Roman Empire. Unfortunately, Julius himself was assassinated about a year later, and the men to whom the care of the calendar was then entrusted did not know what it was all about. They misread the rules, for they could not count, they could only add. They therefore began adding one day in three, instead of one in four years. Their error was eventually brought to the attention of Augustus, who also being an Emperor, rectified matters by a simple order. Thus remedied, the Julian calendar remained in force until the days of Pope Gregory XIII.

It might still be in force except for the fact that heavenly bodies refuse to obey even a Caesar. The sun insisted on coming to the vernal equinoctial point at regular intervals of 365.242 days, instead of precisely 365.25 days, as ordained. The difference may have seemed to Caesar as negligibly slight, but it was cumulative and by the 16th century it had amounted to ten days, an “intolerable error” to the leaders of thought in those opening days of new-born science.

They began to petition the rulers of the Catholic Church, the only power whose orders ran across national boundary lines, to correct it, but did not succeed until 1582. Then Pope Gregory ordained that the last day on which the Julian Calendar might be used officially in his jurisdiction would be 5 October 1582; the day following would be known as 15 October, the first official date of the new Gregorian Calendar. This would set the calendar straight; and to keep it so, centennial years thereafter were to be leap years only if their numerical figures were divisible by 400. Thus 1900 was not a leap year, 2000 will be. With these changes the calendar would continue to tell the truth for more than 3,000 years.

Slight, relatively speaking, as these proposed changes were, they raised a violent outcry throughout Europe. It soon subsided in Catholic countries, but held on long in lands that did not owe allegiance to the Pope. In England and the American colonies, it did not disappear until after an Act of Parliament decreed that 2 September 1552, should be the last date for official use of the Julian calendar and should be followed by 14 September of the Gregorian calendar.

For 170 years then the champions of the Julian and Gregorian calendars had disputed and argued, to the annoyance of later chronologists. Advocates of both systems were forced to adopt the custom of adding O.S. (“Old Style,” for Julian) or N.S. (“New Style” for Gregorian) to dated letters and documents. *

If it took 170 years and more to get the simple and obviously meritorious Gregorian reform adopted internationally, how long will it take to enact the equally simple and worthwhile World Calendar? Let us hope we have grown wiser with the passing years and can attend to this important matter with speed and unity. Already 117 years have passed since the Italian Abbé Mastrofini initiated modern calendar reform. Surely we should proceed in this important matter with speed and unity.

* [“TWC” for 2012 and beyond. –Ed.]

Links to this document:

www.TheWorldCalendar.org/AstronomerAitkenViewpoint.pdf and
www.TheWorldCalendar.org/AstronomerAitkenViewpoint.htm

E-mail to: TWCA@TheWorldCalendar.org

Rev. 6 August 2009