# CALENDAR REFORM.

By E. K. EASON.

*(Read on Friday, 19th December, 1941.)*

The subject of calendar reform became practical politics about twenty years ago, certainly when the League of Nations' Committee sat in the years 1923-1926. From that time till 1937 two forms of calendar were in the field, one with thirteen months and the other with twelve, but it is fair to say that to-day there is only one form, the one presented to you in the Table II. It is necessary that grave and weighty reasons should be put forward for demanding a change, in particular for requesting the use of ONE eight-day week at the end of each year and another at the end of June in each leap year. This innovation creates a universal religious issue, and it is essential to have support for it not only from the Christian Church but also from Jews and Mohammedans and, in fact, from all the important religious leaders. At the same time, it is desirable that the festivals of Easter and Whitsuntide should be fixed. For both these purposes a Church Council will, sooner or later, have to be summoned. Meanwhile, the economic, social and political arguments for reform should be set out as clearly as possible. and to-night I want to put some of them before you.

To-day we live in a new world in which millions of people are necessarily subjected to decisions made by people who have to base these decisions upon records of the facts, and not upon their personal observation of the facts themselves. In other words, we live in a statistical age. Forms and cumulated information are a necessary medium which governors and administrators need for their work in the world to-day. There is nothing sacred about the present lengths of our months, and it is obvious that the symmetry of the world calendar would be an asset. Convenience is, however, an insufficient argument to justify the overthrow of centuries old traditions; but neither is antiquity a valid argument against change. I want you to consider whether world order is possible without a new calendar. I do not mean that a new calendar will produce world order, but it will help to make order possible. Whenever an amount is presented to you for your decision upon it, you need some standard by which to compare it. Generally speaking, we look for an amount belonging to a similar period, but I wonder how many of you realise that, in the present calendar, similar periods of shorter length than one year hardly exist.

I have made some diagrams to illustrate the idiosyncrasies of our present calendar, and I shall try to explain why these idiosyncrasies prevent a true picture of the facts. Statistical records lose the individual details of each event, but they are necessary to give balance and to prevent one swallow from being regarded as a proof of summer. Under modern conditions, individual experience and individual memory are unreliable guides to the trend of events. We, therefore, must learn to record the facts and to build up statistical comparative statements so that. if possible, the truth shall stick out from the final figures. Between the event and the statistical record, either of quantity or of value, there is an act of cumulation, putting together the events that are similar for the purpose of the compilation. Under present conditions, however accurately the events have been recorded and the tabulations made, the statistical comparison for periods of less than a year and, in some cases, even for the year, are misleading, because the time periods are seldom similar.

Events must necessarily be recorded one by one, but they can be combined in many ways into daily, weekly, monthly, or quarterly summaries. The law of economy demands that compilation should not be done daily if once a week will do; nor weekly if once a month will do; nor monthly if once a quarter will serve the purpose; so that there are several methods in use. If compilation is daily and weekly it will be done to the same day of the week every week; if compilation is done daily and monthly it will be done to the ending day of the month. In the former case, the ending day of the week will be significant. as months will have five weeks whenever the months contain five of this particular day. In the latter case, in daily-monthly statistics, in the present calendar there may be three days of which there are five in each month. Each day of the year has a number; it also has a description. The numbers are fixed, but the descriptions are not. Thanks to Pope Gregory, the number, e.g., December 25, is fixed in relation to the solar year, but its description this year will be Thursday; last year it was Wednesday; next year it will be Friday. Each week-day tends to be associated with its own activities in almost every trade; Monday implies activities different from Tuesday or Wednesday. Look at the diagram. Are the thirty days of November in one year the same as the thirty in another? There are seven varieties. To some people one day may be the same as another, but in industry and commerce, in education and in government, the statistics of happenings on one day of the week are different in quantity and often in kind from those of another day. Table I shows you something of the difficulty of the comparison of quarterly data.

TABLE I.

*The incidence of extra days in the 3rd and 4th quarters, and the shortage in the 1st quarter when the year is not a leap year.*

| Year | Jany. 1st | March 31st | 12 only 1st Qr. | 2nd Qr. | 14 in 3rd Qr. and Sept. 30 | 14 in 4th Qr. and Decr. 31 |
|------|-----------|------------|-----------------|---------|----------------------------|----------------------------|
| 1925 | Th. | Tu. | W. | — | W. | Th. |
| 26 | F. | W. | Th. | — | Th. | F. |
| 27 | Sat. | Th. | F. | — | F. | Sat. |
| 1928* | S. | Sat. | — | — | S. | M. |
| 29 | Tu. | S. | M. | — | M. | Tu. |
| 30 | W. | M. | Tu. | — | Tu. | W. |
| 31 | Th. | Tu. | W. | — | W. | Th. |
| 1932* | F. | Th. | — | — | F. | Sat. |
| 33 | S. | F. | Sat. | — | Sat. | S. |
| 34 | M. | Sat. | S. | — | S. | M. |
| 35 | Tu. | S. | M. | — | M. | Tu. |
| 1936* | W. | Tu. | — | — | W | Th. |
| 37 | F. | W. | Th. | — | Th. | F. |
| 38 | Sat. | Th. | F. | — | F. | Sat. |
| 39 | S. | F. | Sat. | — | Sat. | S. |
| 1940* | M. | S. | — | — | M. | Tu. |
| 41 | W. | M. | Tu. | — | Tu. | W. |
| 42 | Th. | Tu. | W. | — | W. | Th. |
| 43 | F. | W. | Th. | — | Th. | F. |
| 1944* | Sat. | F. | — | — | Sat. | S. |

* Leap-year.

If you take any day, for example, Saturday, you will find that there is no regularity in its incidence. In 1933 and in 1939 there are twelve Saturdays in the first quarter and fourteen in the third quarter; it is possible to create thirteen Saturdays in the first and third quarters by treating Saturday, April 1, as belonging to the first quarter, and Saturday, July 1, as belonging to the second quarter. If this can be done, the only irregularity will be that fifty-three Saturdays occur in 1927, 1932, and 1938.

In education, teachers spend hours, not in considering the individual needs of their pupils, but in trying to adjust the programme of work to terms that vary in length from year to year, for no reason except the vagaries of the calendar. In law, the same problem arises, but lawyers need an excuse for the law's delays. In transport, the varying days of the week for national holidays cause serious wastage of effort and loss of material. In advertising, in publishing, and in the newspaper trade, the vagaries of the calendar are a perpetual source of trouble. The calendar which you use to-day is Julius Cæsar's. He adopted two forms, one for 365 days and one for 366 days, with the following number of days in each month :—

| March | April | May | June | July |
|-------|-------|-----|------|------|
| 31 | 30 | 31 | 30 | 31 |

| Sextilis | September | October | November | December |
|----------|-----------|---------|----------|----------|
| 31 | 30 | 31 | 30 | 31 |

| January | February |
|---------|----------|
| 31 | 28/29 |

Every calendar which maintains any fixity with the solar year must have some rule for intercalation. Julius Cæsar determined to provide his administrators and officials with a simple rule so that no one would be dependent upon the whims or vested interests of some individual. His rule, that the form for 366 days should be used every fourth year, was simple. His immediate successors misinterpreted his orders, as common a thing in those days as now, and used it every third year, but Cæsar Augustus realised the mistake and ordered the form for 365 days to be used consecutively for several years until the error of over-intercalation had been corrected. Cæsar's rule was simple, but it was too simple. It caused an excess in the civil year of about three-quarters of a day in a hundred years. By 1582 the growing inconvenience of the excess had become so great that Pope Gregory had to provide us with a better rule, still a simple one, and such that in 3200 the rulers of the world may decide to break it once and use the 365-day calendar in that year. Pope Gregory's other act was to correct the error by cutting ten days out of 1582. It is a curious comment on how Governments obey their own rules that when England, about 200 years later, dropped eleven days, the Chancellor of the Exchequer did not, and gave us the 5th April instead of the 25th March as the beginning of the financial year.

Pope Gregory did not change the form of Cæsar's calendar. We call our calendar the Gregorian Calendar, but it is the Julian Calendar with the Gregorian rule for intercalation. But there is another matter in which neither Julius Cæsar nor Pope Gregory had a hand; neither of them added the letters S., M., T., W.. T., F., S. It is this imposition of the Jewish-Christian seven-day week upon the Julian Calendar which created the strain upon it which compels us now, for the first time in the Christian era, to consider what should be the correct relation of a seven-day week to the solar year and to a calendar containing 365 or 366 days. There are other possible rules of intercalation, but to-day there is no politically possible alternative to years of 365 and 366 days, and to the Gregorian rule. The present proposal is to introduce the use of one eight-day week at the end of every year, and a second one in leap years at the end of June; to drop the use of August 31, May 31 and March 31, and introduce in every year February 29, February 30 and April 31, and in leap years, June 31. These changes produce the symmetrical calendar shown as Table II. This was the original Swiss plan, and is now known as the World Calendar.

TABLE II.

*The World Calendar.*

|  | JANUARY |  |  |  |  | FEBRUARY |  |  |  | MARCH |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. | 1 | 8 | 15 | 22 | 29 |  | 5 | 12 | 19 | 26 |  | 3 | 10 | 17 | 24 |
| M. | 2 | 9 | 16 | 23 | 30 |  | 6 | 13 | 20 | 27 |  | 4 | 11 | 18 | 25 |
| Tu. | 3 | 10 | 17 | 24 | 31 |  | 7 | 14 | 21 | 28 |  | 5 | 12 | 19 | 26 |
| W. | 4 | 11 | 18 | 25 |  | 1 | 8 | 15 | 22 | 29 |  | 6 | 13 | 20 | 27 |
| Th. | 5 | 12 | 19 | 26 |  | 2 | 9 | 16 | 23 | 30 |  | 7 | 14 | 21 | 28 |
| F. | 6 | 13 | 20 | 27 |  | 3 | 10 | 17 | 24 |  | 1 | 8 | 15 | 22 | 29 |
| S. | 7 | 14 | 21 | 28 |  | 4 | 11 | 18 | 25 |  | 2 | 9 | 16 | 23 | 30 |

|  | APRIL |  |  |  |  | MAY |  |  |  | JUNE |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. | 1 | 8 | 15 | 22 | 29 |  | 5 | 12 | 19 | 26 |  | 3 | 10 | 17 | 24 |
| M. | 2 | 9 | 16 | 23 | 30 |  | 6 | 13 | 20 | 27 |  | 4 | 11 | 18 | 25 |
| Tu. | 3 | 10 | 17 | 24 | 31 |  | 7 | 14 | 21 | 28 |  | 5 | 12 | 19 | 26 |
| W. | 4 | 11 | 18 | 25 |  | 1 | 8 | 15 | 22 | 29 |  | 6 | 13 | 20 | 27 |
| Th. | 5 | 12 | 19 | 26 |  | 2 | 9 | 16 | 23 | 30 |  | 7 | 14 | 21 | 28 |
| F. | 6 | 13 | 20 | 27 |  | 3 | 10 | 17 | 24 |  | 1 | 8 | 15 | 22 | 29 |
| S. | 7 | 14. | 21 | 28 |  | 4 | 11 | 18 | 25 |  | 2 | 9 | 16 | 23 | 30 |

|  | JULY |  |  |  |  | AUGUST |  |  |  | SEPTEMBER |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. | 1 | 8 | 15 | 22 | 29 |  | 5 | 12 | 19 | 26 |  | 3 | 10 | 17 | 24 |
| M. | 2 | 9 | 16 | 23 | 30 |  | 6 | 13 | 20 | 27 |  | 4 | 11 | 18 | 25 |
| Tu. | 3 | 10 | 17 | 24 | 31 |  | 7 | 14 | 21 | 28 |  | 5 | 12 | 19 | 26 |
| W. | 4 | 11 | 18 | 25 |  | 1 | 8 | 15 | 22 | 29 |  | 6 | 13 | 20 | 27 |
| Th. | 5 | 12 | 19 | 26 |  | 2 | 9 | 16 | 23 | 30 |  | 7 | 14 | 21 | 28 |
| F. | 6 | 13 | 20 | 27 |  | 3 | 10 | 17 | 24 |  | 1 | 8 | 15 | 22 | 29 |
| S. | 7 | 14 | 21 | 28 |  | 4 | 11 | 18 | 25 |  | 2 | 9 | 16 | 23 | 30 |

|  | OCTOBER |  |  |  |  | NOVEMBER |  |  |  | DECEMBER |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. | 1 | 8 | 15 | 22 | 29 |  | 5 | 12 | 19 | 26 |  | 3 | 10 | 17 | 24 |
| M. | 2 | 9 | 16 | 23 | 30 |  | 6 | 13 | 20 | 27 |  | 4 | 11 | 18 | 25 |
| Tu. | 3 | 10 | 17 | 24 | 31 |  | 7 | 14 | 21 | 28 |  | 5 | 12 | 19 | 26 |
| W. | 4 | 11 | 18 | 25 |  | 1 | 8 | 15 | 22 | 29 |  | 6 | 13 | 20 | 27 |
| Th. | 5 | 12 | 19 | 26 |  | 2 | 9 | 16 | 23 | 30 |  | 7 | 14 | 21 | 28 |
| F. | 6 | 13 | 20 | 27 |  | 3 | 10 | 17 | 24 |  | 1 | 8 | 15 | 22 | 29 |
| S. | 7 | 14 | 21 | 28 |  | 4 | 11 | 18 | 25 |  | 2 | 9 | 16 | 23 | 30 |

Second Saturday (or Year Day) . . . . . . . . . . . . . . . . 31

The advantages of the World Calendar would be :—Fixed agree-ment between the days of the week and the dates in each successive year. Fixed days and dates, if desired, for all annual meetings, re-ports, etc. Exact comparability for any period of any length with its corresponding period in another year. The abolition of the irregular occurrence of five Saturdays or five Sundays or other days of the week with individual economic value. The abolition of non-comparable " odd " days at the ends of corresponding months. Each of the four normal quarters of the year would be ninety-one days in length. Each month would have twenty-six week-days, since the thirty-one-day months contain five Sundays. January 1, April 1, July 1 and October 1 are all Sundays, so that comparison of periods " within the year " is in many cases exact. Fixed quarterly dates and days of the week would be possible for all quarterly meetings or quarterly reports. For example, February 7 would be a Tuesday, so also would be May 7, August 7 and November 7, and each of these dates would be exactly ninety-one days from the next; but, of course, there would be ninety-

two days between November 7 and the following February 7, as this period would include December 31.

Any one to whom the idea of one eight-day week is novel and its use impossible should look at Table III.

<center>TABLE III.</center>

<center>*The Last Week of the Year in a 12-Month Fixed Calendar.*</center>

" X " December 25, " Christmas Day."
" Y " December 31, " Year Day " or " New Year's Eve."
" Z " January 1, " New Year's Day."

| JAN. 1 | SUNDAY | | | 1 JAN. |
|---|---|---|---|---|
| JAN. 2<br>TO<br>DEC. 24 | MONDAY<br>(355 days)<br>SUNDAY | | | 2 JAN.<br>TO<br>24 DEC. |
| DEC. 25 | " X " | MON. | MON. | 25 DEC. |
| 26 | MON. | TUES. | TUES. | 26 |
| 27 | TUES. | WED. | WED. | 27 |
| 28 | WED. | THUR. | THUR. | 28 |
| 29 | THUR. | FRI. | FRI. | 29 |
| 30 | FRI. | SAT. | SAT. | 30 |
| 31 | SAT. | " Y " | SUN. | 31 |
| JAN. 1 | SUN. | SUN. | " Z " | 1 JAN. |
| JAN. 2 | MONDAY | | | 2 JAN. |

This table shows what would occur at the end of the year 1950 (selected because it commences on a Sunday) if one day be given a special name and in consequence how every year would have an unaltered calendar. By using any one of the three names, " X," " Y," and " Z," the calendar would be fixed. No extra days have been added to or taken from the year. The year still contains 365 days.

It is not enough to show that the present calendar causes inaccuracy in comparative statistics; it is necessary to show that the degree of inaccuracy is such that it causes decisions to be incorrect. All statistics, in fact, all measurements, have some inaccuracy. If we can accept current statistics as being an accurate record of what has, in fact, occurred, and if we compare the current amount with the amount for the other period, what difference must there be before it will cause us to take action? Is the calendar effect as great as this

minimum? Unless we can show that the calendar-created difference between two comparative amounts, which are supposed to represent statistically similar situations in two years, is greater than this minimum, we have insufficient ground for demanding reform.

The items in the three columns below represent a series of comparative statistics for similar periods less than a year; for a quarter, a month or a week :—

| | | |
|------|------|-----|
| 1001 | 1000 | 999 |
| 1105 | 1000 | 995 |
| 1010 | 1000 | 990 |
| 1025 | 1000 | 975 |
| 1050 | 1000 | 950 |

At what stage would you ask why the difference has arisen and take action because of the trend shown? When you come to comparison of monthly data, the picture of November gives you some idea of the degree to which such monthly comparative data can convey an incorrect picture of the facts.

*Diagram Showing Seven Different Varieties of the Month of November.*
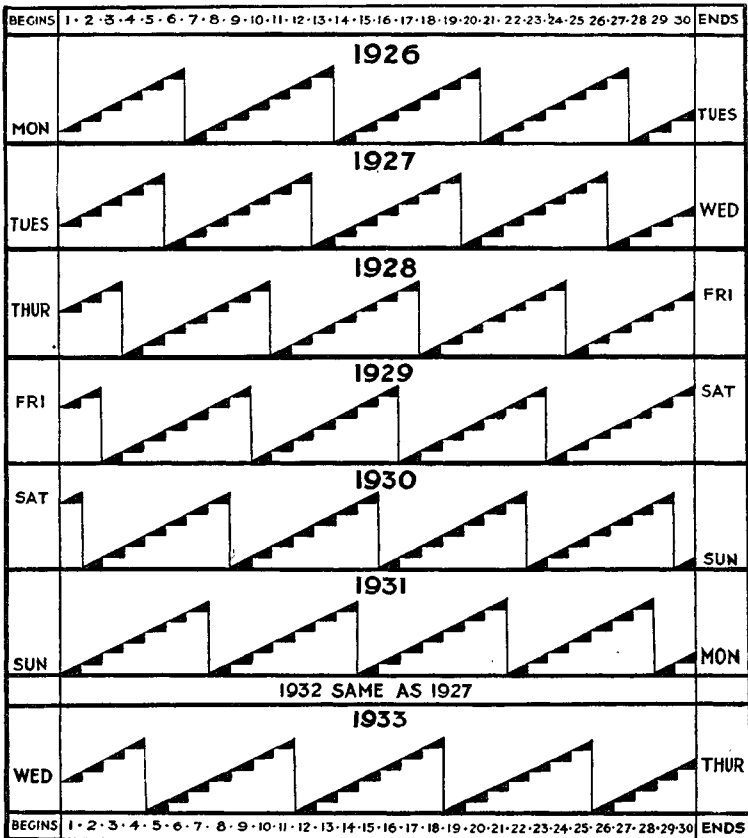
Look at November in the diagram. In order to be sure that our statistics shall represent a truthful appearance, how often do we, in fact, wait till three months have expired? Is there any reason why this delay should be accepted by us? It would not be necessary in the proposed calendar. If each week-day were alike, what is the effect of a five-Sunday month compared with a four-Sunday month?

| | 31-day month | | | 30-day month | | |
|---|---|---|---|---|---|---|
| Sundays ... ... | 4 | 5 | 4 | 4 | 5 | 4 |
| Total ... ... | 31 | 31 | 31 | 30 | 30 | 30 |
| Weekdays ... ... | 27 | 26 | 27 | 26 | 25 | 26 |
| Comparative effect | | 1/27 | 1/26 | | 1/26 | 1/25 |
| Percentage effect ... | | —3.7 | +3.85 | | —3.85 | +4.0 |

These computations. however, are not applicable to any ordinary commercial monthly comparative statistics compiled on a daily basis, because most commercial daily events in a normal week have a special weekly rhythm and do not occur equally on each day of the week.

As an example, assume that 1000 events occur in six days; if each day be alike, 167 occur on four days and 166 on two. But usually one day of the week is a busy day in regard to this event, and another day is a slack day. The words busy and slack are vague. What is the percentage variation from the average either way which will create the impression of extra pressure or reduction of pressure? A 20 per cent. increase in number of events per day would, surely, be perceptible; translated into statistics. this means that 200 events occurred on one day instead of 167, for 33 in 167 is 20 per cent. above average. If the number dropped on one day to 150, i.e., 17 in 166 or 10 per cent., the difference between the busy day and this slack day would be 50 events, so that the busy day has $33\frac{1}{3}$ per cent. more events in it than the slack day.

Table IV shows the rhythm of daily business which is not seriously affected by a single day such as a market day.

TABLE IV.

EXAMPLE OF DAILY RHYTHM *in four consecutive weeks in each of two months, the amount for each. week of six days being* 1000 *units.*

| | Mon. | Tues. | Wed. | Thur. | Fri. | Sat. |
|---|---|---|---|---|---|---|
| First week ... ... | 196 | 140 | 102 | 159 | 175 | 228 |
| Second week ... ... | 183 | 161 | 176 | 138 | 162 | 180 |
| Third week ... ... | 184 | 176 | 191 | 140 | 157 | 152 |
| Fourth week ... ... | 206 | 146 | 179 | 141 | 200 | 128 |
| *Average* ... ... | *193* | *153* | *158* | *145* | *175* | *176* |
| First week ... ... | 172 | 101 | 208 | 167 | 210 | 142 |
| Second week ... ... | 199 | 149 | 171 | 185 | 173 | 123 |
| Third week ... ... | 206 | 170 | 176 | 154 | 176 | 118 |
| Fourth week ... ... | 203 | 129 | 145 | 170 | 217 | 136 |
| *Average* ... ... | *195* | *136* | *175* | *169* | *195* | *130* |

The effect of this rhythm within the week upon a monthly comparison varies according to the make-up of the two months. One day, in leap years two days, will be different, and the calendar effect is the effect of the difference between the indices for these two days, if there be no change in the events from year to year. When figures are compiled daily and monthly, and where there is a more or less definite daily rhythm within each week, the shift of the week-day names in the calendar, by itself alone, causes a percentage increase or decrease, obtainable from the following formulæ (based on 1000 events per week) :—

$$30 \text{ day month}: \quad \frac{1}{4333} \left\{ \begin{array}{c} \text{Value of} \\ \text{Last day} \\ \text{This year} \end{array} - \begin{array}{c} \text{Value of} \\ \text{First day} \\ \text{Last year} \end{array} \right\}$$

$$31 \text{ day month}: \quad \frac{1}{4500} \left\{ \begin{array}{c} \text{Value of} \\ \text{Last day} \\ \text{This year} \end{array} - \begin{array}{c} \text{Value of} \\ \text{First day} \\ \text{Last year} \end{array} \right\}$$

The value for insertion in the above formulæ is the daily rhythm figure, using 1000 events for the week.

If the daily rhythm be the mild one shown as the average of the first four weeks on page 26 for which the figures are :—

M. 193 : Tu. 153 : W. 158 : Th. 145 : F. 175 : Sat. 176

the figures within the brackets given by the formula are

for 30 day months  ... —175   17   153   —35  — 8   17   31
for 31 day months  ... —145   18  —23   158  —48   22   18

The large amounts are due to the incidence of five Sundays in one of the months. but leaving them aside, there is a variation of — 35 to + 31 and — 48 to + 22 which is over 1 per cent. and can hardly be regarded as negligible. It is unnecessary to compile further examples to show that true statistical comparability is not possible for periods of less than a year, so long as the daily rhythm, the weekly rhythm and the monthly are not in harmony in two consecutive years. We needs must follow the best when we see it, and anyone who deals with administration based upon records cannot fail to see how much more satisfactory his work would be if we had the new calendar. The symmetry of the World Calendar and its quarterly regularity, with monthly variety, makes it a much more suitable instrument for the description of our passing days than the present one, which we owe to Julius Cæsar.

Julius Cæsar did a good job, but it is time we, now in the 20th century, improved upon it. The World Calendar can almost slide into operation upon 31st December, 1944, or upon 1st January, 1950; but all action is personal, and some Minister in some State must take the initiative in summoning a Calendar Reform Conference to submit the case for reform, involving the fixing of Easter and the use of one eight-day week, to the Vatican, who must then summon a Church Council to consider the religious aspects of it, on which much preparatory work has been done by many Catholic writers. amongst whom Abbé Chauve-Bertrand has probably been the most active and influential.