

ART. LVIII.—*On Seasonal Time.*

By G. V. HUDSON.

[*Read before the Wellington Philosophical Society, 8th October, 1898.*]

ON the 15th October, 1895, I read a paper on the above subject before this Society, which, however, was not published in the volume of Transactions, and only an extremely brief abstract appeared in the Proceedings (page 734), which I had not the opportunity of correcting. The subject has, however, evoked considerable interest elsewhere, notably in Christchurch, where a thousand copies of my former paper were printed and circulated during 1896, and serious attempts were made by a number of persons to bring about a practical application of the scheme therein suggested. I should state that these steps were taken entirely independently of any action on my part. Under these circumstances, I therefore think I am to some extent justified in again bringing the subject of seasonal time under the notice of the Society, and I venture to hope that the matter may receive a more serious consideration by members than was accorded it on the previous occasion.

As some of those present to-night may not have heard my original paper, it will, perhaps, be desirable first to give an abstract of it; then to explain that the scheme is really only an extension of the principles followed by astronomers in determining the time standards at present in use; and finally to briefly deal with some of the chief objections that have been urged against the proposal since it was first published.

"In order to more fully utilise the long days of summer, it is proposed on the 1st October of each year to put the standard time on two hours by making 12 (midnight) into 2 a.m., whilst on the 1st March the time would be put back two hours by making 2 a.m. into 12 (midnight), thus reverting to the present time arrangements for the winter months. The effect of this alteration would be to advance all the day's operations in summer two hours compared with the present system. In this way the early-morning daylight would be utilised, and a long period of daylight leisure would be made available in the evening for cricket, gardening, cycling, or any other outdoor pursuit desired. It will no doubt be urged that people are at present quite at liberty to make use of the early-morning daylight in summer without any such drastic alteration in the established order of things as is here suggested. To this objection it may be pointed out that, living as we do

in a social community, we are unable to separate ourselves from the habits of those around us. We cannot individually alter our times of going to bed or getting up, but must fall in with the habits of the majority—at all events, to a great extent. Again, under the present arrangement, those who desire to utilise the early-morning daylight are compelled to take some of their recreation before their daily work and some afterwards, which in many cases results in their having to forego pursuits that they would be enabled to follow successfully if their daylight leisure were continuous.

“At present it may be said that people on an average rise at about 7 a.m., and retire to rest at about 11 p.m. Under the new summer *régime* those would become equal to 5 a.m. and 9 p.m. of present time respectively. Breakfast is usually taken at about 8 a.m., which, under the proposed system, would become equal to 6 a.m. Work begins in most cases at 8 or 9 o'clock in the morning, equal to 6 or 7 o'clock respectively. Dinner, again, is taken at 12 or 1, and would become equal to 10 or 11, and while, at present, work is not ended until 5 or 6 p.m., leaving at the most but three hours of daylight, under the proposed system it would cease at a time equal to 3 or 4 p.m., leaving five hours daylight at the end of the day, the average bed-time becoming, as before stated, equal to 9 p.m.

“The system we now employ has probably been adopted as a convenient one in the winter, and carried on during the summer, when it ceases to have application. With regard to the inconvenience of altering the time twice a year, it does not appear that it would bear any proportion to the advantages gained. The community would certainly be deprived of two hours' sleep on the night of the 30th September in each year, and probably a certain amount of inconvenience would be experienced in altering all the clocks for the following day. The same would apply in a lesser degree on the 28th February, when there would be an additional two hours' night, but people would, no doubt, soon become accustomed to the periodical adjustments. On ship-board, when travelling east or west, constant and extensive alterations of time have to be made, and but little inconvenience is experienced by those concerned. The alteration of time in the transmission of telegrams to and from foreign countries may possibly be urged as an objection, but to this it may be answered that equally extensive alterations have to be made already.

“In favour of the scheme, special attention is directed to the saving of expense in the lessened employment of artificial light; the greatly increased health and enjoyment to the numerous classes who are obliged to work indoors all day, and who, under existing arrangements, get a minimum of fresh

air and sunshine ; and the probable resultant increase in the health, morality, and happiness of the community generally.

"The foregoing remarks are framed to apply to us in the Southern Hemisphere, but with the seasons reversed they would, of course, apply with equal force to the Northern Hemisphere."

It cannot be too strongly borne in mind that the time standard in ordinary use—*i.e.*, the mean solar day—is merely an abstraction devised for human convenience, and does not represent any actual time interval existing in nature. The shortest actual and unchangeable time-unit is the sidereal day, or the interval of time taken by the earth in performing one complete rotation on its axis, a measurement which is wholly unsuited to human requirements. The length of the sidereal day is 23 hours 56 minutes 4.091 seconds, the sidereal time, as shown by an observatory clock, thus gaining approximately four minutes each day on the ordinary clock keeping mean solar time. As the sun is not a fixed point in the sky, but is apparently continually moving towards the east, owing to the revolution of the earth around the sun, the earth requires to make a little more than one rotation on its axis to bring the sun to the same position each day. This apparent easterly movement of the sun is the cause of the four minutes difference between the sidereal and the solar day.

Owing to the sun's apparent movement in the sky not being absolutely uniform, but being quickest in December, when we are nearest to the sun, and slowest in June, when we are furthest from him, it is necessary to add or subtract a variable amount in order to obtain a uniform average length of twenty-four hours for each day. This amount, which is added to, or subtracted from, the apparent time as given by the sun, is called the "equation of time," and is stated in most almanacs against each day in the year to which it refers. The equation of time is greatest early in November, when the apparent time as shown by the sun is no less than sixteen minutes in advance of mean time. In Wellington there is, in addition, a constant difference of nine minutes between local time and the New Zealand mean time which is employed throughout the colony ; so that, in the early part of November, our clocks indicate a time no less than twenty-five minutes behind that shown by the sun—in other words, when the sun is on the meridian on the 3rd November the time according to our clocks is only 11.35 a.m.

I have been careful to specially point out these various adjustments, which are used by astronomers in computing the standard time, in order to show that the time in ordinary use is only an abstraction, so to speak, specially arranged to suit

human requirements, and does not by any means agree with the time as indicated by the sun.

The above facts are no doubt very familiar to many members, but, as most of the objections which have been urged against my system of seasonal time depend on the assumption that the ordinary time we employ is an unchangeable actuality existing in nature with which we must not and cannot in any way interfere, it has been specially necessary to emphasize the fact that our time is merely an artificial standard, which might be further adjusted if by so doing it could be made more subservient to our requirements.

Although, as above stated, during the early part of November our clocks point to 12 when the sun is actually twenty-five minutes past the meridian, few people are even aware of the fact, and certainly no one suffers any inconvenience from it. The direct effect is, however, to make the mornings fifty minutes longer than the afternoons. If the alteration suggested in this paper were given effect to, the clock would point to 2 when the sun was on the meridian; and I do not think it would cause much more inconvenience than the present adjustment of twenty-five minutes.

It will thus be seen that my scheme of "seasonal time" is only equivalent to an "equation of time" of two hours, to be added on to the present standard time on the 1st October, and to be deducted on the 1st March. When it is remembered that, under the system at present in use in New Zealand, adjustments amounting to nearly half an hour are made without the general public being even aware of the fact, I think it will be agreed that my proposed adjustment of two hours is not likely to cause any very great amount of inconvenience.

For the first two or three days after the alteration in spring the mornings would probably seem rather short, although, even then, they would be very little shorter than they are in midwinter under the present system, and, owing to the rapid lengthening of the day, they would very soon substantially increase. Any slight disadvantages felt in the mornings would, however, be more than compensated by the great increase in daylight in the evenings, as, under the new system of counting the hours, the daylight would last until after 8 o'clock p.m. Both mornings and evenings would continue to lengthen out until midsummer, at which time it would be daylight up till 10.30 p.m. As soon as the daylight became too short again in the mornings—which would occur towards the end of February—the clocks would be put back two hours at midnight on the 28th, and for the succeeding seven months the present time system would again be in force.

Amongst the objections which have been urged against the adoption of my scheme, I shall only briefly deal with those of more serious importance. A number of minor objections have been raised, which have simply arisen through the objectors not having taken the trouble to make themselves conversant with the subject. For instance, it has been urged that this scheme, if carried out, would deprive people of their long winter evenings, those raising this objection evidently having overlooked the fact that, during the seven months of the year which include the winter, the time would remain precisely as it is at present.

A more reasonable objection is that regarding the alteration of the clocks, some contending that it would be better for us to alter our habits during the summer, and leave the clocks alone. The reply to this is that such an alteration in habits would be wholly impracticable, as it would involve endless adjustment throughout the whole of society, which could never be carried out in all its detail. Meal times, arrivals and departures of trains, steamers, &c., opening of places of business, theatres, &c., would all have to be simultaneously altered, whereas, by moving the hands of the clock in the middle of the night, all these adjustments could be effected quite automatically, without disturbing in any way the existing state of things.

It has also been urged that by lengthening the hours of daylight at the end of the day shopkeepers and others might be tempted to extend the hours of labour for their employés. This, it may be remarked, is really a side question which has already been specially dealt with by legislation, and although there are at present nearly two hours' daylight after closing-time in summer, I am not aware that any systematic attempt has been made to lengthen the hours of labour in summer on this account. The milkmen, and other persons who have to begin their work very early in the morning, would undoubtedly suffer under my scheme, as they would have to start their duties in the dark of early morning almost the entire year through. As these persons, however, constitute a very small minority in the social community, it is not to be expected that their personal comfort or convenience would be allowed to interfere with the adoption of the scheme if it were found to be beneficial to the large majority.

The kerosene, gas, and electric-light companies would also suffer severely under the proposed system; but, owing to the saving of artificial light, the rest of the community would gain what they would lose; and it is doubtful whether their interests could be fairly considered against the combined interests of all the rest of the community. It is also likely that during the five months the scheme was in operation indoor

amusements and recreations—such as the theatre, concerts, &c.—would suffer to a considerable extent, as outdoor pursuits would be available to all. A reaction in favour of indoor amusements would, however, inevitably take place during the other seven months of the year, which would very possibly make up for the falling-off during the summer.

I am convinced that all those who believe an abundance of outdoor recreation is the most effective means of securing human health and happiness should support this scheme, as by means of it the average worker in summer would enjoy from four to five hours' fresh air and sunshine after his day's work was done. By it all outdoor sports and pastimes would receive a great impetus—the man of business, for instance, who leaves his work at 5 o'clock would in midsummer have five hours of continuous daylight available, during which he would be at liberty to follow any of the numerous outdoor pursuits, which are so essential to the health and happiness of those whose bread-winning occupation obliges them to remain indoors during the major part of the day.

The school-children, again, would benefit in a similar manner; but it would be essential to fix the times for examinations in the winter—that is, of course, assuming that examinations and the accompanying "cram" must always exist in our educational institutions. Indeed, even under the existing time system, it has always appeared incredible to me that the schools should have fixed the time for the examinations in the middle of summer, thus compelling the students to work at high pressure and remain indoors during the very season when the beauties of nature are at their best, and when it would be most conducive to the physical well-being and happiness of the children to be out in the fresh air.

Another alteration, which would be very beneficial to a numerous class, would be to change the balancing time in many financial institutions in the Southern Hemisphere from the 31st December to the 30th June. The clerical labour necessary at the close of the year in these institutions is generally very great, and those employed frequently have to work long hours for a considerable time. This overtime, taking place during the long evenings of summer, is a much greater hardship than it would be in midwinter, and it would appear that the custom of balancing, &c., in December has been brought from the Northern Hemisphere, where it is suitable, into the Southern Hemisphere, where it is unsuitable.

These two latter suggestions might, of course, be carried out quite independently of my system of time-adjustment, but, in the event of the season time ever being adopted, they would probably follow as necessary consequences.

I am quite prepared to hear it urged in many quarters that we must adhere to old customs, and this, no doubt, will be considered by many as an unanswerable argument against the reforms advocated in this paper. The objections to any alteration in existing methods of measuring time has always been very strongly urged amongst a large number, and was well exemplified by the behaviour of an old couple who lived in 1752, when eleven days were deducted from the year in order to bring the calendar into agreement with the seasons. It is stated that the old couple above referred to insisted on observing Good Friday according to the old style of reckoning. "To this end they walked seriously, and in full dress, to the church-door, at which the gentleman rapped with his stick; on finding no admittance they walked as seriously back again, and read the service at home. But, on the new and spurious Good Friday, they took pains to make such a festival at their house as would convince the neighbours that their Lent was either ended or in abeyance." *

ART. LIX.—*The Wanganui Earthquake of the 8th December, 1897.*

By GEORGE HOGBEN, M.A., Secretary of the Seismological Committee of the Australasian Association for the Advancement of Science.

[Read before the Philosophical Institute of Canterbury, 2nd November, 1898.]

Plate LVI.

THE earthquake of the 8th December, 1897, was felt generally in the districts around Cook Strait, from Opunake to Nelson, and beyond those districts as far north and east as Auckland, Gisborne, and Napier, and as far south as Timaru. The returns are sufficiently definite to determine the epicentrum and the velocity, and the circumstances afford a good opportunity of reviewing the data of the shocks in recent years that have proceeded from the same origin.

The returns received from the telegraph-offices through the courtesy of the Telegraph Department were as follows:—

* "Chambers's Astronomy," p. 441.