working days is even more variable because of holidays and the five-Sunday and four-Sunday months, and in addition a correction for seasonal differences must be applied in business studies. The "changing of week-day names for monthly dates" means that business in months of one year can not be compared with that of corresponding months in the year following without corrections; and that a schedule of events made out for one year in month and day of month must be altered to fit the weeks of the following years. The present custom is to schedule recurring events as, for example, the Saturday following the fourth Monday of April; but in spite of much time spent in devising such rules, there are many conflicts, mistakes and worries. The other "undisputed defect" is a religious custom, not a calendar defect. The dates for these church festivals drift because they are not set by our present calendar. Easter commemorates the Resurrection of Jesus, and the Christian Church has seen fit to use, not only the date as given in the Scriptural narrative, but also the lunar months in use in Palestine at that time. Whether or not this rule is to be changed is a question for the churches to decide, and it should be discussed in religious, rather than scientific periodicals. Some wage earners who are paid weekly have difficulty meeting heavy monthly bills, and some persons on a monthly salary have trouble with weekly bills. Other difficulties have been charged against the calendar, but most are associated with the four we have listed.

Let us now consider, as we have suggested, the possibilities of improvement without waiting for an international overhauling of the world's calendar. First: For annually recurring events the period of recurrence is a year, and such events should, therefore, be assigned a certain week of the year, instead of a certain week of the month. The fifty-one (sometimes fifty-two) complete weeks of the year are indicated on calendars and almanacs in general use, and numbers for these weeks can easily be written on the margin of the office calendar. If the schedule for the following year is made out, assigning to each annually recurring event the same week and day of week as for this year, these events fall in exactly the same order, and the relation of each to all others in the annual schedule is unchanged. In this way a few interested business men can make out a permanent schedule for nearly all important events in their community without the average citizen knowing anything about it. Later, if a sufficient number become interested, calendars with the numbers for the weeks printed to the left of Sunday should be put in circulation. The general public probably would, at first, pay no more attention to these numbers than to those indicating the day of the year now printed on so many calendars; but the more intelligent would soon begin using them for such purposes as figuring the number of weeks for which wages must be paid on a certain job, or the number of weeks to the close of the school year. If the calendars carry the suggestion that the number for the week be used in scheduling recurring events, an increasing number of schedules would be so made out, and the date confusion to which calendar reformers refer would be practically eliminated. A business firm operating on this plan, which has been called the *numbered weeks* system, would, year after year, be scheduling practically the same events for a given week, and the sales for a group of weeks in one year could be directly compared with the same group in other years, thus avoiding another difficulty. Since many firms are now using an auxiliary calendar of groups of weeks to avoid the unequal months, the suggestion is evidently practical. Easter is a religious question, as we have pointed out, and need not be considered here. The last difficulty—that of wage earners on a weekly basis with heavy monthly expense items, is avoided by billing on each pay day, which is now recognized as a good business principle.

The preceding brief discussion has of necessity touched on only a few points, but we hope it has been sufficient to suggest the program, in line with the experimental method of modern science, which the organizers of the association now favor. The officers are: *Joint Chairmen,* Roy C. Flickinger, University of Iowa, Iowa City; Jakob Kunz, University of Illinois, Urbana, and *Secretary-Treasurer,* C. C. Wylie, University of Iowa, Iowa City. Correspondence is invited.

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PLURAL FRACTIONS AND OTHER FRACTIONS

UNDER the title of "Plural Fractions," Dr. C. E. Waters in the February 20 issue disapproves of the practice, common in scientific journals, of using the plural of the unit named when the number is a fraction; examples are .04 grams and .5 atmospheres. His arguments are good from his point of view, but there is another way of looking at the question.

Dr. Waters says that in reading 4/100 gram one naturally says "four one-hundredths (of a) gram," and he objects to writing .04 grams. But if instead of supplying *of a,* we supply *measured in,* then the plural is required. In a table headed "potential, volts" or "wave length, Angstroms," one naturally supplies *measured in* where the comma is placed, and when this is done the heading seems a perfectly natural one even though the maximum potential recorded be −.825 volts.

Probably no one will deny that it is more convenient to adopt the plural form exclusively for such writing, for one may then head a table "potential, volts" without committing an error when some of the figures are fractions or are negative. Another advantage is in the use of abbreviations; one may write *g* for *grams,* and not bother about *g* or *gm* for *gram* and *gs* or *gms* for *grams.* We should be pleased, then, if a justification has been found for the almost universal practice of using the plural form exclusively.

Dr. Waters objects to "occurs at every 2×10^3 collision" on the grounds that one would not write "at every two collision." Now we can easily write "at every second collision" or at "every fiftieth collision," because there is a well-known terminology for the small ordinal numbers, but for the large ones this is not true. Dr. Waters assumes that in this example 2×10^3 is used in its numeral sense: I prefer to take it in its ordinal sense. Should one write 7.2×10^a *d* or 7.2×10^a *th?* Either is awkward and apt to be misunderstood, so why not use 7.2×10^a for either the ordinal or numeral sense when there can be no ambiguity? The same is being done with small numbers; we see a street sign marked "38 street" and read it "thirty-eighth street."

An offense worse than misusing singular and plural forms in naming units is not to use either one, so let us hope that no one will be so fearful of blundering in the singular and plural that he choose to omit any name whatever.

While on the subject of plurals I should like to mention the perplexing problem of forming the plural of symbols. In dealing with equations involving $x_1, x_2, x_3, \ldots$, when one wishes to speak of them collectively, it is probably easy enough to write "the x_i's in eq. (3)," but if these quantities had been denoted by ${A'_1}^2, {A'_2}^2, {A'_3}^2, \ldots$ or some other complicated symbols, plurals formed with the apostrophe and *s* would be clumsy. A practice that seems proper, is surely advantageous and deserves wider use is to omit any sign of plural form and simply write "the x_i (or ${A'_i}^2$) in eq. (3)." Many nouns do not add *s* or change in any way in the plural, so there is nothing peculiar in mathematical symbols behaving the same way. In some foreign languages the modifying article is different in its singular and plural forms and the mathematical writer profits by it. In English it seems best to use the symbol without change in the collective sense, and charge the offense, if there be any, to the deficiencies of our language.

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THE ACCUMULATION OF STRONG ELECTROLYTES IN LIVING CELLS

Recent uncritical discussion[1,2,3] of the relative validity of the two hypotheses as to the mechanism of selective accumulation of ions by living cells merits rectification. We refer to the "molecular hypothesis" (Osterhout) and the "ionic exchange" hypothesis (Brooks).[4,5,6] Osterhout's criticism of the ionic exchange hypothesis is self-contradictory, illogical, or based upon distorted interpretation, and he does not discuss certain serious weaknesses of his own molecular hypothesis.

Specific details being incompatible with the space limitations of the present communication, attention is called to the following condensed comparison.

(1) No test permitting *experimental* discrimination between the two hypotheses has yet been applied. Experimental alteration of intra- or extra-cellular pH does not constitute such a test. Disagreement between observed and calculated rates of ion intake when the basic assumptions are changed in the middle of the calculation (*i.e.,* after numerical values for relative permeability to different ions are reached) proves nothing as to the relative validity of the two sets of assumptions.

(2) No non-aqueous solvents[7] have to my knowledge been shown to be more permeable to KOH than to NaOH, as apparently demanded by Osterhout's molecular hypothesis. On the other hand, divers artificial and natural membranes which are selectively permeable to cations do show such a difference as regards K^+ and Na^+, and so do many if not most living cells. Analogous anion permeable membranes resemble living cells in showing little differential permeability to different univalent anions. The ionic exchange hypothesis thus has well-established experimental analogs, which are entirely lacking for the molecular hypothesis, which has so far offered no rational explanation for the highly selective absorption of ions by living cells.

(3) The molecular hypothesis fails to explain why K in the form of KCl molecules does not pass out of the cells used by Osterhout faster than it goes in as KOH. Using Osterhout's formulations we deduce as necessary to his hypothesis the following assumptions:

a. That KCl is about 50,000,000 times more disso-

1 W. J. V. Osterhout, *Jour. Gen. Physiol.* 14: 277, 1930.

2 W. J. V. Osterhout, *loc. cit.,* 14: 285, 1930.

3 A. G. Jacques and W. J. V. Osterhout, *loc. cit.,* 14: 301, 1930.

4 S. C. Brooks, *Proc. Soc. Exp. Biol. Med.,* 27: 75, 1929.

5 S. C. Brooks, *Protoplasma,* 8: 389, 1929.

6 S. C. Brooks, In *Contributions* to Marine Biology, Stanford University, California, 1930.

7 Exception being made of selectivity ion-permeable membranes which may be regarded either as porous solids or as non-aqueous solvents (see Brooks[6]).