is disregarded. Thus, the division described in (2) would give no representatives; that in (3) would give one to New York, etc.

(2) At the other extreme is the method of the harmonic mean, or as I have preferred to call it in arguing before the census committee, the method of minimum range. By it every decimal fraction, no matter how small, entitles the state to a representative. Thus, the division described in (2) would give forty-eight representatives; that in (3) would give forty-nine, etc.

(3) Next to the method of rejected fractions is the method of major fractions. By it every fraction larger than one half entitles the state to an additional representative. Thus, the division described in (2) would give four representatives to the four most populous states; that described in (3) would give five, etc.

(4) Between this and the method of the harmonic mean is the method of equal proportions. By it every quotient above the geometric mean between the two numbers of representatives under consideration entitles the state to the larger number. Thus, the division described in (2) would give forty-eight representatives; that described in (3) would also give forty-eight.

During the many years that I have worked upon the problem of federal apportionment, my main object has been to improve upon the method apparently preferred by Congress. Many scholars at various times have suggested methods which they thought better; Congress has rejected them all. The only revolutionary change of method ever made resulted from the constitutional argument of Daniel Webster when chairman of a Senate committee on apportionment. The report of his committee argued that every remainder above one half entitled a state to an additional member. The Vinton method adopted in 1850 was supposed at that time to be merely a variant of Webster's method. My contribution has made Webster's method more workable.

From the point of view of Congress and the average citizen I would arrange the methods in the order of decreasing persuasiveness, as follows:

Method of major fractions
Method of minimum range
Method of rejected fractions
Method of equal proportions

On scientific grounds I would place them in the same order, if we take as a criterion, as I think we should, the degree to which the several methods satisfy the legitimate purposes of the constitution and of Congress.

The main object which Congress and the country desire to realize by an apportionment is in my opinion either one of these two:

(1) To give the residents of the United States as nearly as may be equal representation in the House of Representatives, irrespective of the state of residence; or

(2) To give the members of the House of Representatives as nearly as may be equal numbers of constituents.

It might seem as if these two objects were one and the same, although viewed from different sides. But in fact they lead to different methods of apportionment. If the first is the controlling object, the method of major fractions is the one to be used. If the second is the controlling object, the method of minimum range is the one to be used. If the two are to be given equal weight, or an average is to be struck between them, the method of equal proportions is the one to be used.

The preceding statement probably reveals my reasons for thinking it undesirable "to request a report on the mathematical facts from the National Academy of Sciences." The fundamental problems are political. What is the main object of apportionment? What method of apportionment is best calculated to satisfy Congress and the country? On problems of this sort the judgment of the average representative or congressional committee is of far more importance than that of any group of scholars.

CORNELL UNIVERSITY,
DECEMBER 24, 1928

WALTER F. WILLCOX

"UNPROFITABLE METEORS" PAY LARGE DIVIDENDS

IN the December 14, 1928, issue of SCIENCE, pages 590–1, there appears an article by my good friend Dr. Heber D. Curtis, director of the Allegheny Observatory, entitled "Unprofitable Meteors." Apparently its publication was caused by annoyance and loss of time sustained by him due to people desiring further information about the Perseid and Leonid meteor showers of this year. As a result he is rather hard on the newspaper reporters for sensational articles on the subject, and indirectly even harder on professional astronomers who were obviously the sources of their information.

Nearly thirty years' acquaintance with Dr. Curtis, and a year or more of work as his assistant at Lick Observatory, have given me the highest opinion of him both as a man and a scientist. Paradoxically, it is for this very reason that I feel compelled to point out the true state of the case, in the same journal in which his note appeared, for otherwise I fear his remarks will do real harm to amateur astronomy.

Being actively in charge of the work of the American Meteor Society, most of the observations of meteors by amateurs in America go through my hands, and therefore I am in better position than most others to judge of its amount and value. Due to official connections with the International Astronomical Union, I am kept more or less informed of similar work done by amateurs abroad. This being the case, I can affirm that were it not for the work of the amateur, meteoric astronomy on the observational side would come almost to a standstill. This is especially true of America. As to the newspaper publicity, it is quite true that the writer did not give out personal articles: he does not know about the one "from Cambridge." But he was certainly responsible for getting Science Service to try to arouse the interest of amateurs. If the articles grew somewhat as various reporters "edited" them to suit home consumption, as they saw it, no great harm was done, as is proved by the fruits of the campaign.

To speak only of the Leonids, thanks very largely to this publicity, to date good reports have come (and they are still coming, as one arrived to-day) from New Zealand, Alabama, California, Kansas, Oklahoma, Pennsylvania, Texas, and Wisconsin, and poorer ones from other states. Several observers have also joined the A. M. S. who never knew of it before. Thanks to the aid of the U. S. Weather Bureau and the Hydrographic Office, U. S. N., also through publicity, Leonid fireballs have been reported from several ships at sea.

Briefly, the writer will eventually be able to publish from this data: Proof that the Leonid stream is wider than before thought as undoubted Leonids were seen from November 10 to November 19 inclusive; a good idea of the hourly rate and consequent density of the stream; good radiants on several dates; heights of a number of Leonids from duplicate observations in Texas; and the obvious result that this year's shower furnished unexpected numbers of fine fireballs and was twice as good as we expected. This increases our hopes for great showers between 1932 and 1934. But careful observations should be made from many stations every intervening year to give the best possible idea of what to prepare for as the time of maximum draws near. The Perseids also gave a good shower in August, as is usual, but lack of space forbids further mention of them here.

The writer therefore affirms that the results of the newspaper campaign, even with its obvious faults, more than justify it. As to people seeing no Leonids this November, there were just two reasons and no more: either they were not out in the cold observing for them or they did not have a clear sky. For many Leonids, and some very beautiful ones, certainly were seen from all stations where a proper watch was kept and where the sky was favorable.

FLOWER OBSERVATORY, CHAS. P. OLIVIER
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DECEMBER 18, 1928

TERMINOLOGY OF "VITAMIN B"

THOSE who make a study of nutrition have no doubt been interested and pleased to see that from the British side an attempt has been made[1] to reach unanimity in the much-needed revision of the terminology of the so-called "vitamin B." It has been suggested that we shall continue to use the letter B to designate the "complex," B_1 for the antineuritic, less heat-stable factor, and B_2 for the more heat-stable factor—the vitamin that ensures a normal increase of bodily weight, stimulates appetite and has probably still other functions.

It stands to reason that the letter B does not suffice now that it has been proved that there are two, probably more, factors which differ considerably in physiological action and in stability.

Meanwhile in the United States objections have been raised to the British proposal which make it appear doubtful that this terminology will be accepted. It is not considered logical to go on using the old letter B—even when accompanied by a figure for nearer indication—for substances which are only in so far related as to occur together in certain vegetable products, for instance in brewers' yeast, and can be liberated from them by the same means of extraction.

Unfortunately no agreement has been reached among the American workers themselves. Sherman, to avoid any suggestion of connection, wants to do away with the letter B, and in accordance with the custom to indicate the vitamins alphabetically in the order of their discovery, proposes the letters F and G—F to designate the less heat-stable factor and G to identify the more heat-stable, growth-promoting one.

McCollum, who with Davis some years ago chose the letter B to refer to the antineuritic factor, wishes to keep it for this, and suggests the letter F—or G—for the more heat-stable factor. Steenbock concurs with McCollum's proposal, but Mitchell prefers new letters, namely, F and G.

It does not seem likely that unanimity will be reached unless the two sides will give and take, and so serve the interests of the cause. Therefore, we suggest a compromise here, namely, to designate the antineuritic, less heat-stable vitamin, which Funk was the first to examine chemically and for which McCollum and Davis have chosen the letter B, by F(B), and the vitamin stimulating appetite and growth by G(B). The advantage of this nomenclature is that

[1] SCIENCE, 68: 206. August 31, 1928.