Other parts of his testimony are equally erroneous and misleading, but no opportunity was afforded for rebuttal, and the committee had no reason to question the accuracy of the information offered it. Moreover, after a number of these errors were called to Professor Willcox's attention, he declined to take steps to correct them.

From the scientific point of view there is another feature of the situation which is even more unfortunate. After admitting (p. 88) that "a large majority of mathematicians and statisticians are on record in favor of the method of equal proportions," Professor Willcox secured and read into the hearings about a dozen statements from constitutional lawyers and professors of political economy in favor of his method of major fractions and thus persuaded the committee that there is a conflict of opinion among scholars on this subject. Inasmuch as these scattered statements were secured by means of the same unsuspected misinformation that had misled the committee, they can not be regarded as concerted or final judgments.

There is of course no conceivable conflict of interest between the mathematicians on the one hand and the political scientists on the other hand. On the mathematical side the problem is a highly technical one, requiring investigation of scores of different methods; the results of the mathematical analysis are indispensable to the statesmen who must make the final choice between the small number of methods that are found to be logically possible and workable. Among the logically possible methods, the method of equal proportions is the only method which has the approval of any organized body of scholars. If Professor Willcox has any serious objections to offer against this method, he owes it to mathematicians and economists alike to publish his views in some regular journal, so that they may be accessible to the scrutiny of all groups of scholars.

This is not the place to go into any detailed discussion of the problem. Full references may be found in a recent paper in the Transactions of the American Mathematical Society for January, 1928. The important thing in relation to Congress is to have scientific opinion united on a scientific question.

Professor Willcox has himself suggested that the American Political Science Association might well appoint a committee to investigate and report on this subject. This is a suggestion which should be welcomed by all those interested in the constitutional aspects of the problem. If it is generally accepted, as seems now to be the case, that the provisions of the constitution are not intended to favor systematically either the smaller or the larger states in any apportionment of representatives, then the question becomes a purely mathematical one. The mathematical evidence, which was seriously misrepresented in the recent hearings, clearly indicates that the method of equal proportions is the one method which has no bias in favor of either the smaller or the larger states. It would be most unfortunate to have any other method incorporated in permanent legislation.

EDWARD V. HUNTINGTON
HARVARD UNIVERSITY

A POSSIBLE CORRELATION OF EYE SORENESS WITH VITAMIN A DEFICIENCY AMONG THE NEZ PERCÉS INDIANS

THE relation of vitamin A deficiency to a characteristic eye disease, known as xerophthalmia, keratomalacia, etc., was discovered by Osborne and Mendel in 1913 in their feeding experiments upon rats. Since the publication of their work various authorities have endeavored to determine whether a deficiency of vitamin A in the diet might not also be responsible for cases of eye trouble in man. The existing evidence upon this point by McCollum, Mori, Bloch and other observers has been summarized on pages 192 and 193 of Sherman and Smith's work upon "The Vitamins" of the American Chemical Society Monograph Series.

In the present note the writer wishes to call attention to what appears to be a much earlier recorded instance of eye soreness in man as a result of vitamin A deficiency. The references are contained in the journal of the expedition conducted by Lewis and Clarke to the northwestern territory of the United States in the years 1804–5–6, under the dates of May 10–12, 1806. The following extracts relate to observations made by the expedition during its stay with the Chopunnish or Nez Percés Indians within the present borders of Idaho. The page references are to Volume III of the "History of the Expedition under the Command of Captains Lewis and Clarke," published by the Allerton Book Co., New York, 1922.

> The chief spoke to the people, who immediately brought about two bushels of dried quamash roots, some cakes of the roots of cows (kouse), and a dried salmon trout: we thanked them for this supply, but observed that, not being accustomed to live on roots alone, we feared that such diet might make our men sick. (Page 102).
>
> Their chief subsistence is roots, and the noise made by the women in pounding them gives the hearer the idea of a nail factory. (Page 104.)
>
> We now resumed our medical labours, and had a number of patients afflicted with scrofula, rheumatism and sore eyes, to all which we administered very cheerfully as far as our skill and supplies of medicine would permit. We also visited a chief who has for three years past so completely lost the use of his limbs, that he lies like a perfect corpse in whatever position he is placed,

yet he eats heartily, digests his food very well, has a regular pulse, and retains his flesh; in short, were he not somewhat pale from lying so long out of the sun, he might be mistaken for a man in perfect health. This disease does not seem to be common; indeed, we have seen only three cases of it among the Chopunnish, who alone are afflicted with it. The scrofulous disorders we may readily conjecture to originate in the long confinement to vegetable diet; which may perhaps also increase the soreness of the eyes; but this strange disorder baffles at once our curiosity and our skill. Our assistance was again demanded early the next morning, Monday 12, by a crowd of Indians, to whom we gave eye-water. (Page 106.)

They then invited us into the tent, and told us that they now wished to answer what we had told them yesterday; but that many of their people were at that moment waiting in great pain for our medical assistance. It was therefore agreed that Captain Clarke, who is the favourite physician, should visit the sick, while Captain Lewis would hold the council. (Page 107.)[1]

Roots are all characterized by a very low vitamin A content and the absence of this important nutritional factor in the almost exclusively root diet of the Chopunnish Indians might very well give rise to eye soreness, a supposition which is hinted at with almost remarkable prescience in the report of the expedition. The cases of paralysis observed among the Chopunnish may also possibly have resulted from the lack of some necessary ingredient in the diet.

The observations of the Lewis and Clarke expedition upon the food and diseases of the various tribes of Indians which were visited are very complete but in no other case, besides the incident just cited, is the evidence so clearly marked of specific dietary deficiency on the one hand and of definite physical ailments on the other. With other tribes the use of roots was supplemented by the addition of cereals, vegetables, berries, nuts, fish and game. The general practice of the aboriginal Indians in eating the whole grain and in consuming all the organs of fish and game protected them no doubt from certain diseases which might have been incurred with the more civilized methods of preparing food.

C. A. BROWNE

BUREAU OF CHEMISTRY AND SOILS

THE LITER AND THE CUBIC DECIMETER

IN the original conception of the metric system of weights and measures all units of length, area, volume and mass were intended to be derived from the single basic unit of length, the meter, which was by definition equal to one ten millionth of the earth's quadrant from pole to equator. A cube having its edge equal to one tenth of the meter was provisionally adopted as the unit of volume, and was designated the cubic decimeter or the liter. The mass of this volume of water when at the temperature of its maximum density was provisionally adopted as the unit of mass, and was designated the kilogram.

It was found, however, that there were certain difficulties in the way of the practical realization of the original plan. For example, it was impracticable to determine accurately the length of the earth's quadrant and thus to fix the length of the meter on that basis. That difficulty was avoided by forsaking the original plan of deriving the meter from the figure of the earth and by defining the meter arbitrarily in terms of a specific material standard of length.

In attempting to establish the standard of mass in terms of the standard of length it was found that masses could be directly compared more accurately than they could be established through measurements of volume. It was, therefore, found advisable to depart again from the original plan and to define the kilogram arbitrarily in terms of a specific standard of mass without reference to the meter. Two arbitrary and independent standards were in that way established; the meter as the standard of length and the kilogram as the standard of mass.

As a result of the establishment of the kilogram independent of the meter there arose a need for a unit of volume which would also be independent of the meter. Such a unit was defined as the volume of a kilogram of water at the temperature of its maximum density. This new, or redefined, unit of volume was given the same name as that originally applied to the cube of one tenth of the meter; that is, it was still called the liter, although by the new definition it bears no direct relation to the cubic decimeter or to the meter. It is used in determinations of density and volume based on mass. That is, it is directly related to the kilogram.

We, therefore, now have two distinct units of volume in the metric system, the cubic decimeter derived from the unit of length and the liter derived from the unit of mass. These two units differ in volume by about twenty-seven parts in a million, the liter being the larger. The one thousandth part of the cubic decimeter is the cubic centimeter, and the one thousandth part of the liter is the milliliter. These units, of course, bear to each other the same relation as do the cubic decimeter and the liter, the

[1] The above references will also be found on pages 1002 to 1006 of Vol. III of the better known edition of the Lewis and Clarke expedition published by Elliott Coues in 1893.