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U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF CHEMISTRY—BULLETIN No. 84, PART III.

H. W. WILEY, CHIEF OF BUREAU.

INFLUENCE OF FOOD PRESERVATIVES AND ARTIFICIAL COLORS ON DIGESTION AND HEALTH.

III.—SULPHUROUS ACID AND SULPHITES.

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By H. W. WILEY, M. D.,

WITH THE COLLABORATION OF W. D. BIGELOW, F. C. WEBER, AND OTHERS.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Chemistry,
Washington, D. C., August 15, 1907.

Sir: I have the honor to transmit for your approval the results of the investigations which have been made in this Bureau to determine the effects of sulphurous acid and sulphites upon digestion and health. The work is a continuation of that reported in Parts I and II of Bulletin 84, dealing respectively with boric acid and borax, and salicylic acid and salicylates, and I recommend that this investigation be published as Part III of that bulletin.

The plan of the experiment is practically the same as that followed in the previous reports. The more elaborate study of sulphur metabolism, which was of special importance in this investigation, was made by Mr. F. C. Weber, who also conducted the hygienic table. Mr. W. D. Bigelow had charge of the general analytical work on the foods and feces. Mr. B. J. Howard made the microscopical examination of the blood and urine. The Bureau of Statistics, as in the previous investigations, rendered valuable aid in the compilation of the analytical data, a work of great magnitude.

Respectfully,

H. W. Wiley,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

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INFLUENCE OF FOOD PRESERVATIVES AND ARTIFICIAL COLORS ON DIGESTION AND HEALTH.

III.—SULPHUROUS ACID AND SULPHITES.

INTRODUCTION.

The relations of sulphurous acid to health are perhaps of greater importance than those of the preservatives already studied—namely, boron compounds and salicylic acid and its salts. The reason of this is found in the fact that the use of sulphurous acid at the present time is more general, and in certain classes of food products, according to the statements of manufacturers, more nearly approaches a necessity than is the case with boron or salicylic acid compounds.

Sulphurous acid in some form is extensively employed in many technical operations in the preparation of foods. This is especially true in the production of wine, in the preparation of evaporated or desiccated fruits, and in the manufacture of molasses. The problem presents itself under two aspects—namely, the use of sulphurous acid or its compounds for technical purposes in the preparation of foods and its application to the finished products as a preservative.

In the preparation of foods, sulphurous acid is chiefly employed in the form of the fumes of burning sulphur, applied either to the food products themselves in the course of manufacture or to the containers in which the food products are held. In the ripening of the wines in cellars it is customary to fumigate the barrels with burning sulphur each time the wines are racked. In this manner it often happens that the wine before it is finally ready for sale on the market may have been placed in five or more freshly sulphured containers. By this treatment the wine absorbs a varying quantity of the sulphurous acid, depending to some extent upon the amount of sulphur used in fumigating.

When sulphurous acid is used as a preservative for food products after the manufacture has been completed it is usually employed in the form of bisulphite of lime or some similar preparation. Sulphurous acid has the property of uniting with certain organic radicals, such as aldehydes and some sugars, to form compounds which are

more or less stable, and in this form it is known as combined sulphurous acid. When it exists in the form of an absorbed gas or in combination with an ordinary metallic base, such as soda, potash, or lime, it is said to be in a free state. Combined sulphurous acid is set free from the organic combination by treatment with an acid with the aid of heat, or with a dilute alkali in the cold.

In the accompanying report the effects of the combined sulphurous acid are not to be considered, except in so far as the combination takes place with the foods with which the sulphurous acid may be mixed after entering the stomach. The purpose of the investigation is, therefore, to determine practically the effect of free sulphurous acid—that is, sulphurous acid in a gaseous state absorbed by water or united with a base—rather than the effects of combined sulphurous acid. In no case has any question been considered in these investigations relating to the food value of the organic sulphur existing in proteids and other foods.

It is true that probably in the process of digestion complete saponification of the combined sulphur compounds takes place, so that finally they appear in the small intestines in a free state—that is, as sulphurous acid or sulphites—and are then oxidized to sulphuric acid, as is the free sulphurous acid, during the metabolic processes.

Practically, in the technical use of sulphurous acid in the manufacture of food products only the fumes of burning sulphur are employed. Desiccated fruits, pared or unpared, are subjected, after the removal of the pit or core, to the fumes of burning sulphur in what is known as a "sulphur box." In the manufacture of wines a piece of so-called "sulphur candle"—that is, a piece of cloth which has been dipped in melted sulphur—is burned. This candle is attached to a wire, ignited, placed in the barrel, the bung inserted, and the candle allowed to burn until the whole of the sulphur is consumed. Previous to the sulphuring it is the custom to thoroughly wash the barrel so that the interior thereof at the time of sulphuring is moist. The moist surface of the wood absorbs the sulphurous acid more freely than does the dry wood. The ostensible object of the sulphuring is to keep the barrels sweet; in other words, to destroy any yeasts or other ferments which may adhere to the surface of the wood or be present within it. The barrels are often sulphured some days, or even weeks, before they are filled; at other times the filling of the barrel with wine takes place immediately after the sulphuring. In both cases notable quantities of sulphurous acid become diffused throughout the wine itself. It is evident that some care must be exercised in the use of sulphur in wine making for two very important reasons. In the first place, if too much sulphur be used, red wines would to a certain extent be bleached. In the second place,

if the wines become entirely saturated with sulphurous acid the secondary fermentations which produce the ripening of the wine would not take place. In such cases the wines apparently appear to be perfectly mature within one or two years, whereas the proper maturation of a wine requires a much longer time. In the manufacture of non-fortified sweet wines much larger amounts of sulphur are used than in the manufacture of dry wines. This is an important fact, since it shows that the large quantities of sulphur are not necessary for the preservation of dry wines, because it is well known that red wines, which are generally very dry, are quite as well preserved as white, although containing much less sulphurous acid. It is claimed that in the manufacture of sweet wines—that is, those in which the natural sugars coming from the juice of the grape are not entirely fermented—larger quantities of sulphur are necessary to prevent fermentations after the wine is mature. If the sweet wine be made from a suitable kind of grape—that is, one which is so rich in sugar that it gives a certain maximum quantity of alcohol and still leaves some unfermented sugar—it is evident that no excess of sulphurous acid will be necessary. In such a case the wine would be preserved by its natural alcoholic content. If, on the other hand, a sweet wine be made from a must so poor in sugar that it is necessary to add an additional quantity, the product can not be regarded as a natural wine, and hence there seems to be no necessity for providing for its manufacture.

In the manufacture of sirups and molasses it is quite customary to expose the freshly expressed juices of the canes to the fumes of burning sulphur. The "sulphur box" used in this case is so constructed that the juice falling over shelves by gravity absorbs the fumes of the burning sulphur rising from the box, which to this extent serves as a chimney. The sulphur dioxid becomes incorporated with the components of the juice forming more or less stable compounds which are not entirely broken up by subsequent boiling. The sulphur in this form, as well as that which may still be present in the free state (that is either as an absorbed gas or in combination with metallic bases), passes into the finished product. When sugar is made there is a concentration of the sulphur compounds in the molasses and this concentration becomes greater in proportion to the number of crops of sugar crystals removed. In very low grade molasses the sulphur naturally occurs in extraordinarily large quantities.

In the preparation of evaporated apricots, peaches, pears, and mandarins sulphuring is practiced for the following reasons:

(1) To produce as clear and intense a yellow color as possible.
(2) To conceal decayed portions of the fruit which have been overlooked in trimming.
(3) To prevent fermentation and decay during the drying of the fruit.

(4) To protect the fruit during drying from flies and other insects, the larvæ of which would otherwise develop after the fruit was stored.

(5) To kill the cells of the fruit and thus make the texture more porous, which expedites drying.

In the application of the fumes of burning sulphur in the preparation of evaporated apples the principal object appears to be the preservation of the color of the finished product. Fruits which have been sulphured before evaporation seem to have a lighter color than those which are dried without sulphuring. At the same time it is well known that highly sulphured fruits are preserved with a lower degree of desiccation than those not sulphured, and for this reason a greater weight of fruit is produced from a given weight of the raw material when sulphur is used. It is not difficult to preserve a water content of 30 per cent or over in the finished product when liberal sulphuring is practiced. The use of sulphurous acid also makes it easier to protect the finished product from mold and fungous growths in general after manufacture. That excessive quantities of sulphur are not necessary for the production of evaporated fruits of pleasing appearance is well attested by analytical data obtained by the examination of fruits purchased in the open market having a light and pleasing color, and at the same time containing only a small quantity of sulphurous acid. On the other hand, it is quite easy by certain forms of treatment during the process of manufacture to obtain a product in which sulphurous acid is present in excessively large quantities. The analytical data also show that a portion of the sulphurous acid used in the preparation of such products becomes oxidized into sulphuric acid after a certain time, thus artificially increasing the small amount of sulphates naturally present in some food products, which does not appear to be a desirable practice.

As sulphurous acid in some form is almost universally employed in the manufacture of wines, molasses, and sirups, and in the preparation of desiccated fruits, it is evident that the prohibition of its use would necessitate a radical change in methods of manufacture. This fact, however, it might be stated, has nothing whatever to do with the purposes of the present investigation. Assuming that in the manufacturing processes certain added bodies are used which are found on investigation to be injurious to health, the rational conclusion of such an investigation would be, not to excuse or overlook the use of such bodies, but to institute investigations looking to their suppression. If, therefore, the results of the present study indicate that sulphurous acid, even in small quantities, is a deleterious substance when added to foods, it would be reasonable to expect that manufacturers, as well as investigators, would immediately take steps looking to the early suppression of the injurious substance. While it is not likely that such an event could be accomplished within a year or two, it is reasonable to suppose that it could be eventually brought about

without any disturbance to manufacture and without any diminution in the output of the article.

In matters of this kind it is advisable to proceed when possible with conservative steps and to avoid any attempt at sudden and revolutionary changes in methods of manufacture. In all such cases, however, it will be found not only possible and desirable to make the food product in question without the use of the deleterious substance, but there is evidence to show that the products thus manufactured will be more palatable, more wholesome, and more valuable than those made according to the methods commonly used at present. Practical experiments have shown, for instance, the possibility of producing a high-grade sirup from cane juice and other saccharine saps without the use of the fumes of burning sulphur. Analytical data show the presence on the market of considerable quantities of desiccated fruits of good appearance in which the quantity of sulphur is so small as to be ascribed rather to the conversion of the natural sulphur content of the product than to the addition of the sulphur in its manufacture. At the present time considerable quantities of wine are made without the addition of sulphur of any description, and these wines are of fine appearance, excellent flavor, and of noted purity and wholesomeness.

In so far as the mere tint of the food product is concerned, it is not a difficult matter to familiarize the public with a tint of a different kind from that which would be produced by the use of sulphur. The only arguments of any force favoring the use of sulphurous acid in food products are those which relate either to the preservation of the food product or to its color. As the preservation of the product can be easily secured, and a slight change in color rendered familiar without working any hardship, these arguments seem to have no force whatever in justifying the continuation of the use of sulphurous acid in foods. It may be the part of wisdom in the administration of food laws to tolerate existing methods of manufacture for a certain length of time looking to their amelioration or change, but that is a question with which this investigation is not concerned.

There is reason to believe, therefore, as a result of the present studies, which have shown that the use of sulphurous acid in foods is deleterious, that a rapid change will be made in the processes of manufacture looking to the complete and somewhat speedy suppression of its employment. The use of sulphurous acid and sulphites never adds anything to the flavor or quality of a food, but renders it both less palatable and less healthful. Every fact which has been brought out, therefore, in the investigation tends to accentuate the justness of the conclusion, namely, that the use of sulphurous acid in foods should be suppressed. The data on which these conclusions are based are given in detail in the following pages.

SERIES VII.

ADMINISTRATION OF THE PRESERVATIVE.

SCHEDULE OF ADMINISTRATION.

The fore period in Series VII began on February 1, 1904, and the after period closed on March 11. The fore period extended over a period of ten days, the preservative period lasted twenty days, and the after period ten days, a total of forty days under observation. The divisions of the periods are shown in Table I.

TABLE I.—*Dates of periods and subperiods, Series VII.*

Periods and subperiods.	Date of beginning.	Date of ending.
	1904.	1904.
Fore period	Feb. 1	Feb. 10
First subperiod	....do...	Feb. 5
Second subperiod	Feb. 6	Feb. 10
Preservative period	Feb. 11	Mar. 1
First subperiod	....do...	Feb. 15
Second subperiod	Feb. 16	Feb. 20
Third subperiod	Feb. 21	Feb. 25
Fourth subperiod	Feb. 26	Mar. 1
After period	Mar. 2	Mar. 11
First subperiod	....do...	Mar. 6
Second subperiod	Mar. 7	Mar. 11

The period extending from December 7, 1903, which marked the close of Series VI on salicylic acid, to February 1, 1904, when the sulphurous acid series was begun, is termed the relaxation period. Inasmuch as the same men served in the two experiments it was deemed advisable to allow this length of time to elapse before entering upon the second test.

In Table II is given a schedule showing the dates of the administration of the preservative and the amounts given. The salt used for the administration of the sulphurous acid was sodium sulphite, and the quantity of SO_2 contained therein was calculated. About one-fourth of the weight of crystallized sulphite ($Na_2SO_3\ 7\ H_2O$) is composed of sulphurous acid (SO_2). From the table it is seen that the quantity of sulphurous acid as sulphites administered during the first preservative subperiod to each man is 1.115 grams and in the form of sulphurous acid gas 0.856 gram. For the second preservative subperiod the quantity given to each man is 2.54 grams as

sulphite and 2 grams as sulphurous acid gas, with the exception of No. 7, who received only 1.6 grams. During the third preservative subperiod the total quantity of sulphurous acid as sulphites administered was 3.81 grams for all except No. 5, who received 2.54 grams. The quantity of sulphurous acid gas administered was 2 grams with the exception of No. 7, who received 1.8 grams, and of No. 12, who received 1.6 grams. For the fourth preservative subperiod the total quantity of sulphurous acid given as sodium sulphite was 3.81 grams for Nos. 1 and 2, 0.381 gram for No. 3, 5.1 grams for No. 4, and none at all for Nos. 5 and 6, who had become so ill that they could not take any more of the preservative. The quantity administered during the fourth preservative subperiod as sulphurous acid gas was 2 grams, except in the cases of Nos. 7 and 12, who by reason of illness took none at all.

The total and average amounts of the preservative administered and all individual variations in the quantities taken, may be found in Table II.

TABLE II.—*Schedule of administration of preservative, Series VII.*

Period and date (1904).	Sodium sulphite as SO_2 (capsules).						Sulphurous acid as SO_2 (aqueous solution).					
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	No. 11.	No. 12
First subperiod:	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*
Feb. 11	0.113	0.113	0.113	0.113	0.113	0.113	0.078	0.078	0.078	0.078	0.078	0.078
12	.240	.240	.240	.240	.240	.240	.178	.178	.178	.178	.178	.178
13	.254	.254	.254	.254	.254	.254	.200	.200	.200	.200	.200	.200
14	.254	.254	.254	.254	.254	.254	.200	.200	.200	.200	.200	.200
15	.254	.254	.254	.254	.254	.254	.200	.200	.200	.200	.200	.200
Total	1.115	1.115	1.115	1.115	1.115	1.115	.856	.856	.856	.856	.856	.856
Average	.223	.223	.223	.223	.223	.223	.171	.171	.171	.171	.171	.171
Second subperiod:												
Feb. 16	.508	.508	.508	.508	.508	.508	.400	.400	.400	.400	.400	.400
17	.508	.508	.508	.508	.508	.508	.400	.400	.400	.400	.400	.400
18	.508	.508	.508	.508	.508	.508	.400	.400	.400	.400	.400	.400
19	.508	.508	.508	.508	.508	.508	0	.400	.400	.400	.400	.400
20	.508	.508	.508	.508	.508	.508	.400	.400	.400	.400	.400	.400
Total	2.540	2.540	2.540	2.540	2.540	2.540	1.600	2.000	2.000	2.000	2.000	2.000
Average	.508	.508	.508	.508	.508	.508	.320	.400	.400	.400	.400	4.00
Third subperiod:												
Feb. 21	.762	.762	.762	.762	.762	.762	.400	.400	.400	.400	.400	.400
22	.762	.762	.762	.762	.762	.762	.400	.400	.400	.400	.400	.400
23	.762	.762	.762	.762	.762	.762	.400	.400	.400	.400	.400	.400
24	.762	.762	.762	.762	.254	.762	.400	.400	.400	.400	.400	.400
25	.762	.762	.762	.762	.000	.762	.200	.400	.400	.400	.400	.000
Total	3,810	3.810	3.810	3.810	2.540	3.810	1.800	2.000	2.000	2.000	2.000	1.600
Average	.762	.762	.762	.762	.508	.762	.360	.400	.400	.400	.400	.320
Fourth subperiod:												
Feb. 26	.762	.762	.381	1.020	0	0	0	.400	.400	.400	.400	0
27	.762	.762	0	1.020	0	0	0	.400	.400	.400	.400	0
28	.762	.762	0	1.020	0	0	0	.400	.400	.400	.400	0
29	.762	.762	0	1.020	0	0	0	.400	.400	.400	.400	0
Mar. 1	.762	.762	0	1.020	0	0	0	.400	.400	.400	.400	0
Total	3.810	3.810	.381	5.100	0	0	0	2.000	2.000	2.000	2.000	0
Average	.762	.762	.076	1.020	0	0	0	.400	.400	.400	.400	0
Entire preservative period:												
Total	11.275	11.275	7.846	12.565	6.195	7.465	4.256	6.856	6.856	6.856	6.856	4.456
Average	.564	.564	.392	.628	.310	.373	.213	.343	3.43	343	.343	.223

METHOD OF ADMINISTRATION.

The organization of the work in general was practically identical with that of the previous investigations.[a] A slight variation in the administration of the preservative was introduced by the fact that it was deemed important that the investigation should include sulphurous acid in a gaseous state as well as in combination as sulphites. The most convenient method for the administration of the gaseous sulphurous acid was found to be by the preparation of an aqueous solution of the acid of standard strength taken, after dilution with water, as an ordinary drink. Water proved to be a more convenient vehicle than milk or other beverages for this purpose.

In the form of sulphites the method of administration in capsules was practiced. This method, as in the previous investigations, was found not only to be the most convenient, but also, all things considered, the most desirable form in which to administer a substance of this kind.

Attention has been called in the previous reports to the distaste which the subject would acquire for a food product in which he knew the preservative had been mixed, and therefore less disturbance of the mental equilibrum was caused by the administration of the capsule, the envelope of which is itself a food product and would be soon dissolved in the acid digestive juices of the stomach. Moreover, in the solution of this capsule the whole of the preservative is not discharged at once into the contents of the stomach, but the capsule dissolving at different points presents gradually increasing surfaces at which solution of its contents may take place, and this, in connection with the peristaltic action of the stomach, results in a complete incorporation of the preservative with the food in the stomach in a reasonable period of time. Thus, in substances which do not possess any active escharotic action, no possible damage can be done to the walls of the stomach by this method of administration. The objections which have been made to this form of administration are undoubtedly of a merely captious character, for the purpose, if possible, of prejudicing the public against the conclusions reached. Inasmuch as the capsule is a common method of administering solid remedies at the present time the practice of the medical profession approves unanimously this method of exhibition.

It will be observed that in all the discussions which follow summaries are prepared for Nos. 1 to 6 and 7 to 12, the individuals being grouped in accordance with the nature of the preservative administered, i. e., Nos. 1 to 6 receiving sodium sulphite, and Nos. 7 to 12 sulphurous acid. Additional summaries are given for Nos. 1 to 4, 5 and 6, and 8 to 11, these subgroups being arranged according to common variations in administration of the preservative.

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[a] Bul. 84, Part I, p. 11; Part II, p. 479.

DAILY MEDICAL AND CLINICAL NOTES.

INDIVIDUAL DATA.

As in the previous investigations, the young men were selected from a number of volunteers and were required to subscribe to the pledges described in Part I.[a] The members of the table were subjected to careful examination throughout the course of the experiments for the purpose of recording the medical data which are presented in the following pages by periods and subperiods.

No. 1.—C. W. N.

No. 1 of this series began the fore period with all functions in normal condition. His recorded temperature on the first day was 98.4°, pulse beats 78 per minute, and weight 68.5 kilograms. This normal condition continued throughout the first subperiod, the temperature ranging from 98.3° to 98.6°, and the pulse being constant for the last four days at 66 beats per minute. His body weight on the last day of this subperiod was 68.5 and the average weight for the five days was 68.44 kilograms.

On the first day of the second subperiod No. 1's temperature and pulse were normal, being 98.4° and 66 beats, respectively, and weight 68.5 kilograms. On the second day a slight febrile condition existed, his temperature registering 99° and pulse 84. This condition disappeared, however, by the following day, and for the remainder of the period his pulse and temperature were normal, but the weight had decreased during the period, 68 kilograms being recorded for the last day, while 68.25 kilograms represented the average weight for the second subperiod of the fore period. The average weight for the entire fore period is 68.34 kilograms.

The clinical examination of the urine during the fore period showed the kidneys to be in normal condition, no albumin or casts present. The general condition of the subject was good.

The same normal condition prevailed at the beginning of the first preservative subperiod and continued till the last day of the subperiod, when he complained of pain in the stomach and frequent urinations; his temperature and pulse for this day, February 15, were normal. The body weight had slightly increased, as compared with that of the last day of the fore period, the average for the subperiod being 68.31 kilograms.

In the second preservative subperiod the subject complained at intervals of pains in the stomach, particularly after meals, his temperature and pulse were still normal, and the body weight had steadily increased, giving an average of 68.44 kilograms for the subperiod.

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[a] Page 12.

The third preservative subperiod was characterized by pains in the stomach throughout the period, and on the first day of the period the subject complained of being weak and feeling chilly. His temperature for this period ranged from 98.2° to 98.6°, and his pulse was somewhat varied, ranging from 55 to 70 beats per minute. The body weight, however, showed a slight gain, 68.10 kilograms being recorded on the first day and 69.20 on the last day of the period. The average weight for this subperiod was 68.64 kilograms.

During the first part of the fourth preservative subperiod No. 1 still complained of abdominal pains, but by the end of the period the subject reported himself as feeling "normal" and with no "symptoms." The temperature and pulse were normal during this subperiod, the average body weight being 68.94 kilograms. The average weight for the entire preservative period was 68.58 kilograms.

During the preservative period No. 1 developed a very minute trace of albumin in his urine; the microscopical examination, however, did not show any marked change.

The preservative period, as a whole, had quite a noticeable effect on this subject, though he was loath to admit it. His general appearance was below normal and he seemed much depressed, but improved in the last preservative subperiod.

In the after period no symptoms are recorded; the temperature remained normal, 98.4° throughout, pulse normal, and the whole general appearance somewhat improved.

The average weight for the first after subperiod was 68.48 kilograms, for the second after subperiod 68.76 kilograms, and for the entire after period 68.62 kilograms.

No. 2.—W. P.

This subject began the fore period with a temperature of 98.1°, pulse 69 beats per minute, and a body weight of 70.72 kilograms. The only point of note during the fore period is the uniformly low temperature and the fact that the pulse is somewhat lower during the second fore subperiod, the average for the five days being 62. No. 2 had had no previous sickness and was in good condition during the fore period. The average body weight for the first subperiod was 70.31 kilograms, for the second subperiod 70.04, and for the entire fore period 70.18 kilograms. A clinical examination of the urine of No. 2 showed a slight albuminuria.

No. 2 passed through the first preservative subperiod without any apparent change, his temperature still remained subnormal, pulsations were very constant, registering 59 and 60 throughout; his average body weight was 69.94 kilograms. On the fourth day of the second preservative subperiod he reported a feeling of dizziness at times, which did not occur, however, on the succeeding day. His

temperature and pulse remained practically the same as in the previous subperiod. The average body weight for the second preservative subperiod was 69.66 kilograms.

The first day of the third preservative subperiod No. 2 reported himself as "feeling all right." On this day his temperature registered 98° and pulsations 65, body weight 69.37 kilograms. The next day he complained of a slight pain in the stomach. No other complaint or symptom is registered on the three following days of the subperiod, his temperature remaining at 98° and pulse 60 beats per minute. The average body weight for the third preservative subperiod was 69.44 kilograms.

No symptoms or complaints of any nature are registered during the fourth preservative subperiod. His temperature for the first four days of this subperiod was considerably below normal, but not sufficient to cause any suspicion, considering the uniform subnormal temperature of this subject throughout; on the last day the temperature registered 98.6° F., pulse 66, which is just a few beats higher than in the previous period. His average body weight for this subperiod was 69.41 kilograms. The average for the entire preservative period was 69.61 kilograms.

The condition of the kidneys remained about the same, a slight trace of albumin being shown throughout, with scarcely any change in the microscopical examination.

On the first day of the after period No. 2 had "a little pain in the stomach," which was of slight duration and did not recur again during this period. His temperature and pulse remained practically constant throughout at 98° and 60, respectively. The average body weight for this period was 69.41 kilograms.

In the second after subperiod the subject reported a headache and pain in the stomach on two successive days. His temperature registered 98° F. throughout and pulsations averaged 64, with very little variation. The average body weight for this subperiod was 69.13 kilograms, while the average for the entire after period was 69.27 kilograms.

The examinations of the urine in the after period again indicated a slight albuminuria.

The administration of the preservative seemed to have comparatively little effect on this subject. He complained once of dizziness and headache during the preservative period and on three days in the after period of pain in the abdominal region and headache, but for the greater part of the time was in good condition. He suffered an average loss of weight during the entire observation amounting to almost 1 kilogram, although his symptoms were not nearly so pronounced as those of No. 1, who made a slight gain in weight.

No. 3.—W. F. H.

This subject entered the fore period in good condition with all bodily functions normal. He had reported no sickness previous to entering on this work and had never been very ill. While in college he belonged to the rowing crew and sometimes had palpitation of the heart after severe training. Occasionally he had a touch of heartburn, but no serious indigestion.

The first fore subperiod passed with the subject in good condition, though his temperature was below normal, averaging 98° F., and pulse quite high, being on an average 84 beats per minute. His average body weight for this period was 63.54 kilograms.

There was no change in the subject's condition during the second fore subperiod. His temperature remained about the same, 98°, though on the first two days of the period it was normal. His pulse was normal, averaging 74 beats per minute for the period. His average weight was 64.08 kilograms.

He reported nothing wrong during the first preservative subperiod, and seemed, from outward appearances, to stand the preservative well. His average temperature for this period was 98.5° and average pulse beats 81. The body weight averaged 64.18 kilograms.

No. 3 began the second preservative subperiod with a temperature decidedly subnormal, 97.7°, taken before dinner, and pulsations 76. His temperature after dinner of the same day was 98.6° and the body weight 64.25 kilograms. On the evening of this day No. 3 became very much alarmed. He reported violent palpitation of the heart, with occasional loss of a beat at 10.30 p. m. of this day, which was directly brought about by a brisk walk for half a block to catch a car. He also experienced a sensation of giddiness and blurred vision and difficulty of breathing. These symptoms lasted during the night, and at 9 a. m. the next day his pulse was beating 120 per minute. In the afternoon he had an attack of indigestion, some headache, and continued dizziness.

At 5.30 p. m. of this day his temperature was normal, 98.4°, and pulse beats 76 per minute. The body weight was 64 kilograms. During the remainder of this period the indigestion evidently continued, as he experienced eructations of gas and occasionally belched a mouthful of food. He also had pain in the abdomen and over the left side and sensations of dizziness. His temperature and pulse were quite variable, registering 98.6° on February 19 and pulsations 80. On February 20, the last day of the second subperiod, his temperature is reported as 97.9° and pulsations 68. The average body weight for this subperiod is practically the same as for the previous one, 64.19 kilograms.

The third preservative subperiod began February 21, and a temperature, before dinner, of 98.9° F. and a pulse of 72 are recorded.

The subject was all right with the exception of a slight feeling of weakness. On the next day his temperature and pulse were exactly the same as on February 21. He was feeling very tired, although he had not taken any extra amount of exercise; lips were dry and parched and he had a bad taste in his mouth. He did not experience so much trouble from indigestion as on the preceding few days, but was troubled with quite severe heartburn. On February 23 his temperature and pulse were normal, 98.4° and 76, respectively. He reported "abdominal pains" and expulsions of gas during the day. He was feeling much better the next day, but on February 25 was quite uneasy again; had a very restless sleep and a return of pains in stomach, also dizziness. His temperature and pulse for this day were 97.9° and 80, respectively. His average body weight for the third preservative subperiod was 64.39 kilograms.

On the first day of the fourth preservative subperiod No. 3's temperature was 99.4° F. before dinner and 100° F. after dinner; pulsations, 100; he had decreased considerably in weight from the previous day and reported that he had had severe dizziness during the evening and day and another attack of palpitation, became nauseated, and had an attack of vomiting during the afternoon. The administration of the preservative was discontinued from this time on, but for the remainder of this period the same symptoms were noticeable, particularly a feeling of dizziness and pains in abdomen.

The last day of the preservative period No. 3 reported himself as "feeling good." His temperature was 98.90° F., pulse 72, and body weight 64.32 kilograms. The average body weight for this subperiod was 63.51 kilograms.

The average body weight for the entire preservative period was 64.07 kilograms, a little higher than the average for the fore period, but a glance at the daily platted weights (fig. 1) shows a marked falling off in weight corresponding to the large administration of preservative and an increase in weight when the preservative was withdrawn. The subject showed the effects of the preservative to a marked degree. His general appearance at the end of the preservative period was much below normal, his color was not good, and he was in a much depressed condition. He was quite ill on February 26, and though somewhat alarmed, the fact that he was a senior medical student would permit of full credence being given to the symptoms as he described them. The urine examination during the preservative period showed a minute trace of albumin at end of period.

In the first part of the after period the symptoms of digestive disturbance were still recorded by No. 3. The last part of the first subperiod he reported himself as feeling well. His temperature and pulse, which had been somewhat irregular, returned to normal, 98.6° F.

and 74, respectively, at end of the subperiod. The average body weight was 64.34 kilograms.

On the first day of the second after subperiod No. 3 reported a slight feeling of malaise and that he easily became tired. His temperature was 99.3° F. and pulsation 80. He felt all right the following day, but had a headache in the morning of the third day of the period, which passed away before evening. No symptoms are shown on the last two days of the period, his temperature and pulse being normal.

The average body weight for this subperiod was 64.66 kilograms and for the entire after period 64.50 kilograms. The small trace of albumin in the urine still persisted during the after period.

No. 4.—F. E. B.

At the beginning of the fore period No. 4 was suffering with a severe cold. He had some fever, his temperature on the first day of the period registering 100.1° F. and pulsation 96. He weighed 63.31 kilograms on this day. In the evening he took 4 grains of quinine and 15 grains of phenacetin. The next day his temperature had fallen to 99.6° and his pulse was 86 beats per minute. The cold was still quite severe, but improving. It gradually wore off as the period advanced, till at the end of the first fore subperiod the subject felt about normal, though he still had a slight cold with an occasional headache. His temperature on the last day of this period was 98.6° F., pulse 74, and body weight 62.91 kilograms. The average weight for the period was 63.11 kilograms.

He still suffered slightly from the cold during the first part of the second fore subperiod, but gradually improved, till at end of the period he reported himself as entirely normal and feeling all right. The average temperature for this subperiod was 98.4° and pulse 69, with only slight variations from these averages. The average body weight was 62.89, the average weight for the entire fore period being 62.97 kilograms.

No. 4 passed through the first preservative subperiod without any feeling of discomfort, and in a normal condition. His temperature was a little below normal, 98.2° F., and pulse averaged 67 beats per minute. His average weight for this period was 63 kilograms. There were no abnormal symptoms during the second preservative subperiod, temperature and pulse being also normal and the average body weight 62.82 kilograms.

The same statement also applies to the third preservative subperiod, with the exception of the temperature, which is a little subnormal, especially toward the end of the period, when only 98° is recorded. The body weight for this period averaged 62.69 kilograms.

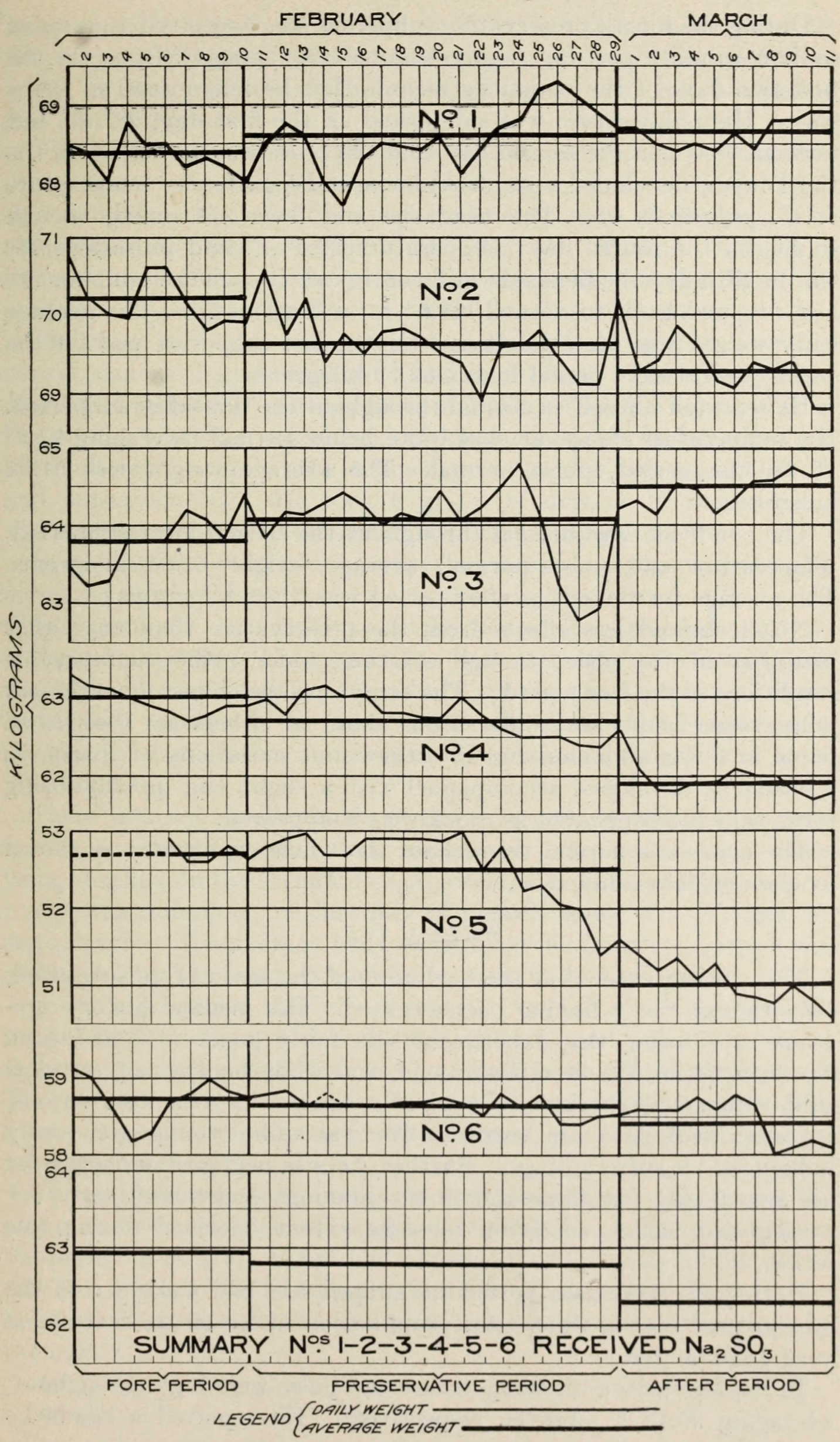

FIG. 1.—Daily and average body weights for Series VII, Nos. 1 to 6 and summary. (No. 5 is included in the summary throughout the fore period.)

During the fourth preservative subperiod No. 4 received 4 grams of sodium sulphite per day (equivalent to 1.020 grams SO_2). On the first two days of the period he records that he felt normal in every way. His temperature was subnormal on the first day, 98° F., but normal, 98.6°, on the second day, and the pulse was normal. On the third day he developed a slight headache and some fever; temperature 99.4°, pulsations 78. The headache and fever continued, though slight, on the fourth day; temperature 99.5° F. and pulsations 78. On the fifth day the headache still continued, though the temperature had dropped back to normal, 98.6° F., pulsations 74. The average body weight was 62.40 kilograms for the last subperiod and for the entire preservative period it was 62.73 kilograms.

He reported himself as normal throughout the first after subperiod. His temperature, however, was quite below normal, averaging 97.9° F. for the period, pulse normal. The average weight was 61.91 kilograms.

The condition was normal throughout the second after subperiod, temperature and pulse normal, average weight 61.85 kilograms. The average for the entire after period was 61.89 kilograms.

No. 4 showed less effects from the preservative than any other members of the class, though starting under rather unfavorable conditions in the fore period. The symptoms developed in the fourth preservative subperiod differ from those of others in absence of pains in lower abdomen and intestines and sensations of dizziness; a headache developed accompanied with a slight and quickly rising fever, which disappeared as quickly as it appeared.

The urine was normal throughout the whole experiment as shown by the clinical examination.

No. 5.—C. C. P.

This subject entered at the beginning of the second fore subperiod, the original No. 5 having been excused. His medical history previous to entering this experiment was fairly good. He had been No. 3 in Series VI on salicylic acid, and while he was not an ideal subject for such experimental work as concerned his own observations, his analytical data are correct. He was quite young and easily influenced by surroundings. Further, he was negligent in caring for his own bodily functions and in the previous experiment was very constipated, which condition to some extent obtained during this series.

During the relaxation period the subject had had a slight cold the greater part of the time. An examination of his heart revealed a very quick action.

In the fore period his temperature and pulse were high throughout, averaging 99.1° F. and 93, respectively. He reported a headache

on one or two occasions, but had no other symptoms to account for the continued high temperature except the effects of the cold from which he was just recovering. His average weight for this period was 52.72 kilograms.

The high temperature and pulse continued throughout the first preservative subperiod, the temperature ranging from 98.9° to 99.2° F. and pulsations 91. On the third and fourth days of the period he complained of pains in region of shoulder and left side. Otherwise his condition was apparently the same as in the fore period. The average body weight for this subperiod was 52.81 kilograms.

The same condition was manifest in the second preservative subperiod, namely, high temperature and high pulse. The subject complained of increasing pains in back and side till on the fourth day of the period, when he complained of headache, pains in left side, and felt "all broken up." His temperature for this day was 99.8° F. and pulsations 100. He took 8 grains of quinine in the evening. The average weight for the period was 52.91 kilograms.

In the third preservative subperiod these complaints gradually increased; high temperature and pulse also continued, till on the third and fourth day of the period his temperature reached 100.2° F. and pulsations 106. He appeared to be contracting a severe cold and was quite ill; complained of headache, pains in stomach and chest, and loss of appetite. No preservative was given after February 24, the fourth day of this subperiod. The average weight was 52.57 kilograms.

There was not much change in the subject's condition during the fourth preservative subperiod, maximum temperature and pulse being reached on the second day of period, 100.5° F. and 100, respectively, the minimum, on last day of period, being 99.2° F. and 90, respectively. His average body weight for the fourth subperiod was 51.69, and for the entire preservative period 52.49 kilograms.

In the after period the subject reported himself as feeling all right; temperature, however, was still high, 99.1° F. and pulsations 90; he did not regain his appetite and gradually lost weight throughout. The average weight for the after period was 51 kilograms. The urinary examination throughout the period of observation revealed nothing abnormal.

This subject was quite unsatisfactory throughout. He began the observation under adverse conditions, having had a cold throughout the period of relaxation, but had improved considerably at the end of the fore period. It is rather difficult to discriminate in this case between the symptoms induced by the preservative and the effects of the cold.

No. 6.—L. M. S.

No. 6 was confined to his room eleven days during the relaxation period with an attack of la grippe, his temperature at one time rising to 103° F. He still felt weak at the beginning of the period of observation, but was regaining his strength and feeling normal with good appetite. Aside from the facts above noted the subject passed through the fore period in good condition. He gained weight slightly, as might be expected, the average for the first fore subperiod being 58.65, for the second fore subperiod 58.82, and for the entire fore period 58.74 kilograms. Temperature and pulse were somewhat irregular during the fore period, but not to such an extent as to be abnormal.

The subject passed through the first preservative subperiod in good condition; temperature and pulse were normal. The average body weight for this subperiod was 58.77 kilograms.

In the second preservative subperiod No. 6 had an average temperature of 98.5° F. and pulse constant at 78 beats per minute. He had a slight attack of indigestion but was normal in all other respects. The average body weight for this subperiod was 58.71 kilograms.

Temperature and pulse remained normal throughout the third preservative subperiod. The subject complained of slight loss of appetite on the first day, which he regained, however, on the two succeeding days. He also complained of indigestion and an uncomfortable feeling in the stomach and headache after meals. He was taken with nausea after lunch on February 24, but retained food, and the nauseated feeling finally passed away. The average body weight was 58.66 kilograms for this subperiod.

No preservative was given during the fourth preservative period. The first three days of this period No. 6 had a temperature of 98.2° F., pulsations 78. He had sensations of pain in the region of the stomach, felt faint at times and dizzy; reported headache on one or two occasions. On the last two days of this period his temperature and pulse were normal, but he still had a touch of indigestion. His average body weight for this period was 58.50; for the entire preservative period 58.66 kilograms.

This subject's general appearance during the preservative period was decidedly below normal, and he showed the effects of the preservative to quite an extent.

In the first after subperiod there was shown a tendency to a subnormal temperature, though on the first day the temperature and pulse were normal. He complained on this day of a faint feeling in the stomach, which was relieved after eating; this same feeling manifested itself on the following day, though in other respects he was feeling well. On the last day of this subperiod his temperature was 98.2° F., pulsations 78, average body weight 58.65 kilograms.

The second after subperiod opened with the subject's temperature at 98.6° F. and pulsations 79 per minute. He reported a headache during the entire day and a "bad feeling in the stomach." The headache continued during the following two days, temperature for these days being somewhat below normal, 98.1° F. and pulse 78 beats per minute. The after period closed with the subject feeling well, temperature and pulse normal. His average body weight for this subperiod was 58.21, and for the entire after period 58.43 kilograms.

The examination of the urine showed a "small quantity" of albumin throughout the entire observation; this is evidently pathological in this case, as the same is reported in the previous series of which No. 6 was a member; the microscopical examination is not so alarming, a large number of mucous cylindroids and a few casts being found. As a whole, the urinary examination would point to the existence of a slight nephritis which had been of long standing.

No. 7.—J. N. B.

This subject was in excellent physical condition and had had no illness of any nature during the period of relaxation. His heart action and kidneys were normal; temperature somewhat subnormal, but uniformly so. The normal condition continued throughout the fore period, his average body weight for that time being 70.46 kilograms.

On the last day of the first preservative subperiod the subject reported a slight headache during the afternoon; there was no change in temperature or pulse and the body weight was practically the same as in the last fore subperiod. The average weight for this preservative subperiod was 70.02 kilograms.

No. 7 complained of a headache at the beginning of the second preservative subperiod, but this symptom disappeared by the following day. On the third day of the period he felt tired, especially in the lumbar region, and on the following day had a recurrence of headache accompanied by dizziness and feeling of weakness. His temperature and pulse were somewhat higher on this day. His body weight remained practically the same, averaging 70.06 kilograms for the subperiod.

In the third preservative subperiod this subject complained of feeling weak and tired, with a dull, depressed sensation; also of intense pain in the region of the kidneys. His average weight for this subperiod was 69.95 kilograms, a slight loss as compared with previous records. The administration of the preservative was discontinued at the beginning of the fourth subperiod, as the subject still complained of pain in the region of the kidneys and some headache. In fact, by the middle of the fourth preservative subperiod these feelings of uneasiness, combined with a vivid imagination, resulted in

his believing that he was going to be very ill, and after February 27 of this period the observation of this subject ceases, and the data are therefore excluded from the general summaries. A careful examination of the urine during the time that this subject complained of suffering so intensely with his kidneys revealed nothing abnormal.

Notwithstanding the exaggeration of his symptoms by this subject it is safe to conclude that the preservative did, as in other cases, produce headache, a sensation of dizziness, some loss of appetite, and slight indigestion, though the body weight remained fairly constant.

No. 8.—W. C. L.

This subject presents a very interesting case. He was very conscientious, regular in his habits, and gave the strictest attention to every detail. His personal idiosyncrasies and their possible effect on the metabolic processes must, however, be considered. He regularly took a prescribed laxative throughout the observation and drank a large quantity of water (a quart at a time was no unusual amount) on rising and at other times during the day, and in addition drank a cup of hot water at meal times.

He had suffered somewhat from a cold before beginning the fore period. The heart action and other body functions were normal. During the fore period No. 8 felt that he was taking cold, and took 10 grains of quinine on three different days; otherwise he passed through the fore period in good condition and his temperature and pulse were normal. The average weight for the fore period was 61.68 kilograms. He passed through the first preservative subperiod feeling "all right," and temperature and pulse remained normal, the average weight being 61.63 kilograms.

On February 16, the first day of the second preservative subperiod, No. 8 became dizzy and nauseated. This feeling came on while he was smoking his usual cigar, and may have been due to that, though he stated it was not a strong cigar. He felt all right, however, the next day, and also on the 18th. On the 19th he had a slight headache and a feeling of depression; his temperature and pulse, however, were normal. He complained on the last day of this subperiod of headache and eyes aching and a "grippe-like" feeling, which largely disappeared after he had completed his wheel ride before dinner. The average weight for the period was 61.99 kilograms, a slight gain over the preceding period.

During the third preservative subperiod No. 8 had a great variety of symptoms, some of which seemed to be irrelevant. On the first day he complained of a depressed and drowsy feeling, though he had plenty of exercise; at other times during the period he complained of headache, occasional loss of appetite, and drowsiness. On February 25, the last day of the period, he reported that he had a slight

feeling of nausea the night before and a mild pain in the stomach during the night and day. The sensation of drowsiness continued. His temperature throughout this subperiod shows a tendency to be below normal; pulse normal. The average body weight for the subperiod was 61.55 kilograms, a loss of 0.44 kilogram.

In the fourth preservative subperiod No. 8's symptoms were about of the same nature as those of the previous period. He experienced occasional headache and nausea, and the feeling of drowsiness still continued, though he was getting his regular amount of sleep. His temperature was occasionally subnormal; pulse remained normal and very constant throughout. His average weight for the period was 61.74 kilograms, the average for the entire preservative period being 61.73 kilograms.

In the first after subperiod No. 8's symptoms were as varied as usual; he was still in a somewhat depressed condition, which gradually wore off. His appetite toward the end of the period returned, but he still complained of being drowsy and seemingly not able to get a sufficient amount of sleep. The average weight for this subperiod was 61.78 kilograms.

No. 8 was practically normal in the second after subperiod; his temperature was subnormal on one or two days; pulsations normal throughout. His average weight for this subperiod was 61.88, and for the entire after period 61.83 kilograms. While this subject was the weakest man, physically, in the class, he seemed to stand the effects of the preservative better than any of the other members. The excessive quantity of water he drank allowed of a greater dilution of the preservative and a more rapid elimination, which undoubtedly is the explanation of his ability to withstand its action, though he developed symptoms of headache, nausea, dizziness, and loss of appetite during part or whole of the preservative period. He showed a slight gain in weight throughout the entire period of observation.

No. 9.—G. W. L.

No. 9 was in excellent condition on entering the fore period. His heart action and other conditions were normal. He passed through the fore period very well, having no trouble of any description. His temperature was normal, registering 98.5° F. most of the time; pulsations averaged 80 beats per minute for the period. The average body weight for the entire fore period was 62.23 kilograms.

No difficulty whatever was experienced in the first preservative subperiod; temperature and pulse were normal. The average weight for the period was 62.32 kilograms.

On the first day of the second preservative subperiod a slight rise in temperature is noted, 99° F. being registered, and pulsations 81.

He had a burning sensation in the æsophagus and stomach and some headache. This passed off, and he felt all right the next day and for the remainder of the subperiod. Temperature and pulse were normal after the first day. The body weight was 62.29 kilograms.

He was feeling well and temperature and pulse were normal on the first day of the third preservative subperiod. The following day he complained of a pain in the chest, and noted that he had passed a much larger quantity of urine for the day, i. e.—1,730 cc. He felt all right on the third day, but on the following day complained of being hungry and the ration not being large enough.

February 25, the last day of this subperiod, No. 9 still had a feeling of hunger, and also complained of a slight urethral irritation, which, however, was not of any importance, as it was not noticed afterwards. The average body weight for this subperiod was 62.70 kilograms.

In the fourth preservative subperiod he complained on one occasion of a severe headache, but aside from that was feeling well. Temperature and pulse were normal; average weight for the subperiod, 62.71 kilograms. The average weight for the entire preservative period was 62.50 kilograms.

During the after period the subject reported that he felt well at all times. His temperature and pulse showed a little more variation than usual, but aside from this he was apparently in good condition. The average weight for the entire after period was 62.37 kilograms.

This subject experienced very little effect, as far as could be noted, from the preservative. His general appearance declined somewhat, but judging from the symptoms recorded in the medical history, there was very little change in the subject's condition.

No. 10.—R. D. D.

There was nothing abnormal in the case of No. 10 during the relaxation period. The heart action was all right, but with a very strong first beat. He indulged in only normal exercise during the period of relaxation and was in good physical condition at the beginning of the observation.

His temperature and pulse averaged 98.2° F. and 70 beats per minute, respectively, for the fore period, being normal throughout this period in all respects. The average body weight was 57.09 kilograms.

No. 10 developed a slight cold in the head during the first part of the second preservative subperiod and complained of cramps in the stomach on the night of February 19, also of a slight headache on February 26. The temperature and pulse remained normal throughout the preservative period, except for a slight rise at the time the cold was noted. His general appearance was normal, and he had

the least difficulty of any member of the class in passing through the observation.

The average weight for the entire preservative period was 57.17 kilograms, practically the same as in the fore period.

This subject complained once or twice of a sensation of hunger during the first part of the after period, but had no other symptoms. His temperature throughout the after period is somewhat subnormal, pulsations normal. The average weight for the entire after period was 57.42 kilograms, a slight gain over the preservative period.

No. 11.—A. M.

This subject was in good condition during the relaxation period. Heart action was normal, and the urinary examination revealed nothing wrong with the kidneys or other organs. He entered the fore periods in excellent condition, temperature on the first day registering 98.4°, pulsations 75 beats per minute, and weight 66.6 kilograms. These figures remained remarkably constant throughout the entire fore period. His average weight for the fore period was 66.46 kilograms.

The same conditions prevailed during the first preservative subperiod, though a slight headache developed on the last day of the period, which passed away, however, before the following day. No rise in temperature or increase of pulse was noted during this subperiod, for which the weight was 66.52 kilograms.

The second preservative subperiod passed with no incidents worthy of mention. Temperature and pulse for the period were 98.3° F. and 66, respectively. The body weight was 66.55 kilograms, practically the same as in previous period.

On the first day of the third preservative subperiod No. 11 had a slight headache. It disappeared by the following day, but returned on the next day, on which there is recorded a slight increase of temperature and pulse, but not sufficient to be called abnormal. The body weight for this subperiod was 66.52 kilograms, being very constant so far.

No. 11 was apparently normal at the beginning of the fourth preservative subperiod, temperature 98.5° F. and pulse 72 beats per minute. He had a headache accompanied with sensation of dizziness on the following day, and temperature registered 99° F., pulse normal. He had no further trouble until the last day of the subperiod, when he complained of having pains in the region of the kidneys and symptoms of taking a slight cold. Temperature and pulse on this day were 98.7° F. and 75, respectively. His average weight for this subperiod was 66.75 kilograms, a slight gain. The average weight for the entire preservative period was 66.59 kilograms. A slight trace of albumin in the urine developed during the latter

part of the preservative period, which continued during the after period.

In the first after subperiod No. 11 reported normal condition with the exception of one day when a slight cold was noted. Temperature and pulse were normal; the body weight 66.70 kilograms.

On the second day of the second after subperiod he complained of of pains in the region of the kidneys all the afternoon. The temperature registered 99° F., pulse normal. He reported himself as normal on the third day, March 9, but on the fourth day of the period, March 10, he became nauseated during the evening and night and after breakfast of the last day vomited most of the meal. He felt some better at dinner, but could not eat his allowance. His temperature and pulse, however, for these days were normal. This condition lasted one or two days after the observation closed, when the subject returned to normal. The slight trace of albumin continued during the after period.

The average weight for the entire after period was 66.66 kilograms, showing a slight gain in body weight throughout the whole period of observation.

No. 12.—F. B. R.

No. 12 had a slight cold during the relaxation period. There were no noticeable bad effects from it, however, and his appetite continued good. All observed functions were normal during the fore period, the general physical condition of the subject being excellent. His temperature, though slightly subnormal, was constant throughout, and pulse was normal. The average weight for the fore period was 69.54 kilograms.

No. 12 to all appearances continued normal during the first preservative subperiod. His average weight for this time was 69.77 kilograms. On the first day of the second preservative subperiod he reported a "cold in the head" and a bad headache. On the following day he still suffered with dull constant headache and cold; he also reported that at 9.30 p. m. of this day, February 17, his pulse rose to 104, but subsided later in the day. At 5.30 his temperature and pulse were normal, 98.6° F. and 74, respectively. He also mentioned on this day that for the past two or three days his kidneys seemed irritated, and noted that he had passed a larger amount of urine than usual. A heavy, oppressed feeling in the stomach was experienced. This feeling had evidently disappeared somewhat by the following day, as he reported that his appetite was good. February 19 he had a recurrence of stomach trouble, accompanied by headache, and was much fatigued, this lasting all day. He felt very badly during the night, with pains in stomach and head; also experienced some discomfort in the intestines during the night and the following day. He had very little appetite at breakfast, but felt better toward

noon. The feeling of weariness and fatigue continued to such an extent that the subject had some difficulty in performing his work, and headache continued during the day. Temperature and pulse were normal throughout this subperiod. The body weight averaged 69.57 kilograms.

No. 12 had a headache throughout the third preservative subperiod. He also complained and had noted on several occasions that immediately after taking the preservative sharp pains would appear in his head, which would last from one to four hours. The taking of the preservative gradually became more and more irritating to the throat, an observation made by several of the subjects. On the second day of the subperiod he had a headache and felt tired, though he had not exercised as much as usual. The tired and weak feeling continued on the next day, February 23, with pain in stomach and head; complained on next day of pains in region of kidneys, heavy sensation in stomach, and the usual headache. On February 25, the last day of the period, he recorded that he had passed a very uncomfortable night; had pains in stomach and intestines; felt very weak and exhausted and had a severe headache during the day. His average weight for this period was 69.70 kilograms.

No preservative was given No. 12 during the fourth preservative subperiod. The headache, pains in region of kidneys, and general feeling of weakness continued. His general appearance was considerably below normal; his temperature appeared to be slightly lower during this period; pulse normal. A slight trace of albumin was detected in the urine in the fourth preservative subperiod, which continued during the after period. The average weight for this subperiod was 69.63 and 69.67 kilograms for the entire preservative period.

In the first after subperiod No. 12 on the first day felt weak, especially in the back in the region of the kidneys. He felt very well the following two days, with appetite gradually improving; on the last day, however, his appetite was not so keen. The body weight for this subperiod was 69.70 kilograms.

During the second after subperiod his appetite gradually returned, and he reported himself as feeling very well, but occasionally weak and tired at night. On the first day of this subperiod it is noted that for the week preceding he had suffered considerably with irritable kidneys and bladder. At times he had no control over the bladder and passed urine almost involuntarily. His general appearance was considerably improved at the end of the after period, though he was quite slow in getting back to a normal condition again. The average body weight for this period was 69.62 kilograms, the same as in the preservative period, and a slight gain over the fore period, the weight being very constant throughout the observation.

CONCLUSIONS.

It may be argued that in a class of this size, composed of young men who knew that they might have symptoms during the administration of the preservative, the reports would represent the effect of the subject's imagination rather than the action of the preservative. As in previous experiments, this point was kept in mind, and a careful record was made daily of the mental condition of the men, a personal acquaintance with them helping to a great extent to eliminate any effects from imagination or mental attitude. Where such existed, due credit is given in the medical history; this, as well as any other idiosyncrasy of the subject, being considered in connection with the daily observations.

From a general review of Nos. 1 to 6, who received sodium sulphite, it may be safe to conclude that the preservative in the majority of cases caused headache and sensations of dizziness. In some cases decided symptoms of indigestion and pains in the stomach and intestines accompanied one or both of these symptoms. Nausea is reported in one case.

With Nos. 7 to 12, who received sulphurous acid, headache was quite common, dizziness not so pronounced; nausea and feeling of exhaustion and weakness noted.

There is some tendency on the part of the preservative to produce albumin in the urine and a marked tendency to increase the amount of urine.

Taken as a whole, the most general symptom was that of headache, which developed about the middle of the second preservative subperiod. There were also some complaints of dizziness, pain in stomach and intestines, and a weak and depressed condition generally.

BODY WEIGHTS.

VARIATIONS IN BODY WEIGHTS.

In order that a comparison of the variations in weight of the several members of the table and the summaries may be more readily made, the data have been reduced to graphic form, as shown in figs. 1 and 2. These graphic charts show the daily determinations of weight for the several members and the averages by periods reduced to a straight line for purposes of comparison. All of the weight figures are included in these expressions, irrespective of variations in other data, and therefore they vary slightly from some of the averages as given in Table III.

In the case of No. 1 the chart shows a slight increase of weight during the preservative period and a very small additional increase in weight during the after period. In the case of No. 2 there is a marked loss of weight during the preservative period, and this is continued,

though in a less degree, during the after period. In the case of No. 3 there is a marked increase in weight, both in the preservative period and in the after period. In the case of No. 4 there is a decrease in weight in the preservative period, and this decrease is still more marked in the after period. In the case of No. 5 there is a very slight

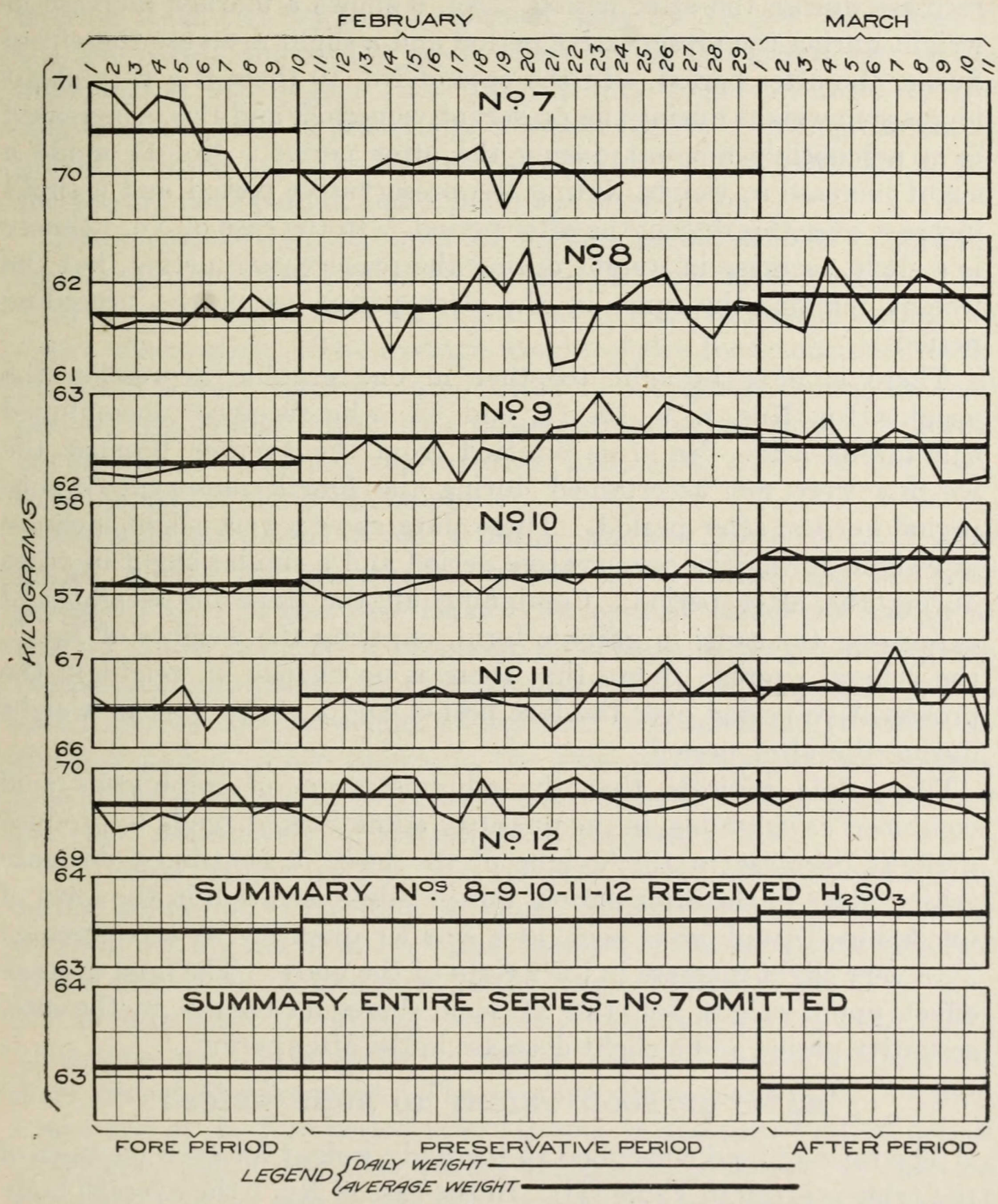

FIG. 2.—Daily and average body weights for Series VII, Nos. 7 to 12 and summary, together with the general summary for the entire series.

loss of weight during the preservative period and a marked loss during the after period. The average weights, as charted for Nos. 1 to 6, inclusive, who received sulphurous acid in the form of sodium sulphite, show a slight loss of weight during the preservative period, and this continues in a more marked degree during the after period.

The charts for Nos. 7 to 12, who received sulphurous acid in an uncombined form, show in the case of No. 7 a marked increase during the preservative period. No data are given for the final period for reasons already stated. In the case of No. 8 there is a very slight increase in weight during the preservative period and a continued increase during the after period. No. 9 shows a marked increase in weight during the preservative period and a slight decrease therefrom during the after period. In the case of No. 10 there is a very slight increase in weight during the preservative period, and this is increased to a perceptible amount during the after period. No. 11 made a slight increase in weight during the preservative period and a slight increase over this during the after period. In the case of No. 12 there is a slight increase in weight during the preservative period, but the weight remains the same in the after period as in the preceding period.

There is next brought together in one graphic expression the weights for Nos. 8, 9, 10, 11, and 12, who received uncombined sulphurous acid. No. 7 is omitted from the average because the weights were not ascertained during the fourth preservative sub-period nor the after period. These data show a very slight increase in weight during the preservative period and a similar slight increase during the after period. Combining all the data for weight and expressing the same in graphic form, omitting the weights of No. 7, the general average shows that there is no change in weight in the preservative period over the fore period and a slight loss in weight during the after period.

These data indicate that the administration of sulphurous acid combined as sulphites, in the quantity administered, tends to produce a slight decrease in the weight of the body, a continued decrease taking place in the after period, but its administration in the form of uncombined sulphurous acid, in a smaller quantity, is accompanied by a very slight increase in the weight of the body. The final average effect upon weight for the 11 men shows no change in the preservative period and a slight decrease in the after period.

RATIO OF FOOD WEIGHT TO BODY WEIGHT.

The ratio of food consumed to the body weight for each member of the table is given in Table III. In the case of No. 1 the average body weight during the fore period is 68.34 kilograms, during the preservative period 68.58, and during the after period 68.62 kilograms. These data show a very slight change in the weight of the body during the period of observation, a slight increase, amounting to 0.24 kilogram, occurring during the preservative period.

The average weight of dry food consumed is slightly less in the preservative period than in the fore and after periods. The weight of

the dry food consumed is almost 1 per cent of the weight of the body, being 0.98 per cent in the fore period, 0.99 in the after period, and 0.95 in the preservative period.

The average weight of No. 2 in the fore period is 70.18 kilograms, in the preservative period 69.61, and in the after period 69.27. The average weight of dry food consumed daily by No. 2 is 664 grams in the fore period, during the preservative period 658 grams, and in the after period 663 grams. The ratio of dry food consumed to the weight of the body is practically constant for No. 2 during the entire period of observation, being 0.95 per cent for the fore period, 0.95 for the preservative period, and 0.96 for the after period.

The average weight of No. 3 for the fore period is 63.81 kilograms, for the preservative period 64.07, and for the after period 64.50. There is thus seen to be a slight gradual increase in weight during the entire observation. The average weight of dry food consumed daily by No. 3 is very constant, amounting to 660 grams during the fore period, 662 grams during the preservative period, and 683 grams during the after period, representing 1.03, 1.03, and 1.06 per cent, respectively, of the body weight.

The average weight of No. 4 during the fore period is 62.97 kilograms, during the preservative period 62.73, and during the after period 61.88. In this case there is an opposite tendency shown to that of No. 3, namely, a progressive decrease in weight during the period of observation, and this has taken place in connection with a small increase in the weight of dry food consumed daily, which, in the fore period, is 608 grams, in the preservative period 621 grams, and in the after period 631 grams, equivalent to 0.97, 0.99, and 1.02 per cent, respectively, of the weight of the body.

The observations for No. 5 in the fore period are confined to the second subperiod. The data, although they are given in full in so far as obtained, are not of much value, because of the febrile disturbance in the case of No. 5, described in the medical history.

The data show the average weight for the fore period to be 52.72 kilograms, for the preservative period 52.49 kilograms, and for the after period 51 kilograms. The average daily quantity of dry food consumed in the fore period is 626 grams, in the preservative period 536 grams, and in the after period 502 grams, equivalent in the fore period to 1.19 per cent of the body weight, in the preservative period to 1.02 per cent, and in the after period to 0.98 per cent.

The average weight of No. 6 during the fore period is 58.74 kilograms, during the preservative period 58.66, and during the after period 58.43, showing a slight tendency to a decrease in the weight of the body. The average quantity of dry food consumed daily by No. 6 is 598 grams during the fore period, 614 grams during the preservative period, and 642 grams during the after period. Thus, the

decrease in weight is associated with a very slight increase in the quantity of food consumed, amounting to 16 grams a day in the preservative period and 44 grams per day in the after period, as compared with the fore period. The weight of the dry food consumed in the fore period is 1.02 per cent of the weight of the body, in the preservative period 1.05 per cent, and in the after period 1.10 per cent.

The average weight of No. 7 during the fore period is 70.46 kilograms, and the average weight of dry food consumed is 560 grams, amounting to 0.79 per cent of the weight of the body. The data for the remainder of the observation in the case of No. 7 are incomplete for the reasons given in the medical history. In this case we undoubtedly find an illustration of the results of a vivid imagination in connection with the symptoms produced by the preservative period, which finally led the subject into a state of susceptibility which rendered it inadvisable to continue the experimental work with him.

The average weight of No. 8 during the fore period is 61.68 kilograms, during the preservative period 61.73, and during the after period 61.83. The average quantity of dry food consumed by No. 8 during the fore period is 647 grams, during the preservative period 641 grams, and during the after period 661 grams. The percentage of dry food consumed compared with body weight is 1.05 in the fore period, 1.04 in the preservative period, and 1.07 in the after period.

These data show a very slight increase of weight during the preservative period, although the quantity of food consumed is 6 grams less per day. During the after period, when the quantity of food consumed was 14 grams per day larger than in the fore period, the average increase in weight amounted to 100 grams over the preservative period.

The average weight of No. 9 during the fore period is 62.23 kilograms, during the preservative period 62.50, and during the after period 62.37. The average quantity of dry food consumed daily is 550 grams in the fore period, 548 grams in the preservative period, and 549 grams in the after period. These data show a very slight increase in the weight of the body during the preservative period and an almost constant quantity of dry food consumed. The percentage of dry food consumed, based on the weight of the body, is 0.88 for each of the three periods.

The average weight of No. 10 during the fore period is 57.09 kilograms, during the preservative period 57.17, and during the after period 57.42. The average quantity of dry food consumed daily by No. 10 is 593 grams in the fore period, 600 grams in the preservative period, and 589 grams in the after period. The percentage of body weight consumed as dry food is 1.04 in the fore period, 1.05 in the preservative period, and 1.03 in the after period. These data show a

slight increase in weight during the preservative period and a slight increase in the quantity of food consumed. They also show a marked increase in weight during the after period, though the quantity of food consumed is 4 grams less daily than in the fore period and 11 grams less daily than in the preservative period.

The average weight of No. 11 during the fore period is 66.46 kilograms, during the preservative period 66.59, and during the after period 66.66 kilograms. The average daily quantity of food consumed is 742 grams in the fore period, 754 grams in the preservative period, and 739 grams in the after period. These data show a very slight increase in weight during the preservative period, accompanied by an increase of 12 grams daily in the quantity of food consumed. There is also another very slight increase in weight in the after period, though the quantity of food consumed is 3 grams less daily than in the fore period. The dry food consumed constitutes 1.12 per cent of the weight of the body in the fore period, 1.13 per cent in the preservative period, and 1.11 per cent in the after period.

The average weight of No. 12 in the fore period is 69.54 kilograms, in the preservative period 69.67, and in the after period 69.66. The average quantity of dry food consumed during the fore period is 659 grams, during the preservative period 685 grams, and during the after period 644 grams. These data show a slight increase in weight during the preservative period, accompanied by an increase in the quantity of food eaten. The increase in weight is almost maintained in the after period, while the quantity of food consumed is 15 grams per day less than in the fore period. The amount of dry food consumed is 0.95 per cent of the weight of the body in the fore period, 0.98 per cent in the preservative period, and 0.92 per cent in the after period.

Several summaries are submitted, drawn up according to common variations in the data, but only those for Nos. 1 to 6 and 8 to 11 will be discussed as representing most completely the two groups taking sodium sulphite and sulphurous acid, respectively.

The average weight of Nos. 1 to 6 for the fore period is 63.71 kilograms, for the three subperiods of the preservative period 62.78, and for the after period 62.28 kilograms. The average quantity of dry food consumed for the fore period is 639 grams, for the preservative period 629 grams, and for the after period 634 grams. The dry food consumed is practically 1 per cent of the body weight for all three periods.

The summary for Nos. 8, 9, 10, and 11 shows an average weight in the fore period of 61.87 kilograms, in the preservative period 62 kilograms, and in the after period 62.07 kilograms. The average daily quantity of food consumed in the fore period is 633 grams, in the preservative period 636 grams, and in the after period 635 grams. A

slight tendency is shown here to an increase in weight, while the quantity of food consumed remains practically constant. The dry food consumed, expressed as percentage of body weight, is 1.02 during the fore period, during the preservative period 1.03, and during the after period 1.02, showing a remarkable constancy in this particular. As is seen under variations in body weight, no marked influence is shown in the case of sulphurous acid, while for those receiving sodium sulphite there is a decrease in weight both in the preservative and after periods.

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII.*

[Averages are per day.]

Period.	No. 1.					No. 2.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	342.20	14,168	3,484	4.14	1.02	351.53	13,601	3,343	3.87	0.95
Average	68.44	2,834	697	.....	.....	70.31	2,720	669	.....	.....
Second subperiod:										
Total	341.24	12,239	3,229	3.59	.95	350.22	16,628	3,292	4.75	.94
Average	68.25	2,448	646	.....	.....	70.04	3,326	658	.....	.....
Entire fore period:										
Total	683.44	26,407	6,713	3.86	.98	701.75	30,229	6,635	4.31	.95
Average	68.34	2,641	671	.....	.....	70.18	3,023	664	.....	.....
Preservative period.										
First subperiod:										
Total	341.55	12,315	3,133	3.61	.92	349.70	16,322	3,243	4.67	.93
Average	68.31	2,463	627	.....	.....	69.94	3,264	649	.....	.....
Second subperiod:										
Total	342.20	12,152	3,256	3.55	.95	348.28	15,816	3,309	4.54	.95
Average	68.44	2,430	651	.....	.....	69.66	3,163	662	.....	.....
Third subperiod:										
Total	343.20	11,925	3,270	3.47	.95	347.19	16,638	3,317	4.79	.96
Average	68.64	2,385	654	.....	.....	69.44	3,328	663	.....	.....
Fourth subperiod:										
Total	344.70	12,170	3,400	3.53	.99	347.07	16,133	3,291	4.65	.95
Average	68.94	2,434	680	.....	.....	69.41	3,227	658	.....	.....
Entire preservative period:										
Total	1,371.65	48,562	13,059	3.54	.95	1,392.24	64,909	13,160	4.66	.95
Average	68.58	2,428	653	.....	.....	69.61	3,245	658	.....	.....
After period.										
First subperiod:										
Total	342.40	12,864	3,403	3.76	.99	347.07	16,232	3,331	4.68	.96
Average	68.48	2,573	681	.....	.....	69.41	3,246	666	.....	.....
Second subperiod:										
Total	343.80	12,036	3,411	3.50	.99	345.64	16,365	3,302	4.73	.96
Average	68.76	2,407	682	.....	.....	69.13	3,273	660	.....	.....
Entire after period:										
Total	686.20	24,900	6,814	3.63	.99	692.71	32,597	6,633	4.71	.96
Average	68.62	2,490	681	.....	.....	69.27	3,260	663	.....	.....

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII*—Continued.

[Averages are per day.]

Period.	No. 3.					No. 4.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	317.68	14,045	3,231	4.42	1.02	315.53	12,469	3,076	3.95	0.97
Average	63.54	2,809	646	.....	.....	63.11	2,494	615	.....	.....
Second subperiod:										
Total	320.40	16,101	3,372	5.03	1.05	314.19	12,472	3,002	3.97	.96
Average	64.08	3,220	674	.....	.....	62.84	2,494	600	.....	.....
Entire fore period:										
Total	638.08	30,146	6,603	4.72	1.03	629.72	24,941	6,078	3.96	.97
Average	63.81	3,015	660	.....	.....	62.97	2,494	608	.....	.....
Preservative period.										
First subperiod:										
Total	320.92	14,350	3,271	4.47	1.02	315.01	12,245	3,025	3.89	.96
Average	64.18	2,870	654	.....	.....	63.00	2,449	605	.....	.....
Second subperiod:										
Total	320.95	14,642	3,403	4.56	1.06	314.11	12,448	3,140	3.96	1.00
Average	64.19	2,928	681	.....	.....	62.82	2,490	628	.....	.....
Third subperiod:										
Total	321.94	14,658	3,373	4.55	1.05	313.43	12,525	3,116	4.00	.99
Average	64.39	2,932	675	.....	.....	62.69	2,505	623	.....	.....
Fourth subperiod:										
Total	317.57	13,497	3,195	4.25	1.01	312.00	12,229	3,132	3.92	1.00
Average	63.51	2,699	639	.....	.....	62.40	2,446	626	.....	.....
Entire preservative period:										
Total	1,281.38	57,147	13,242	4.46	1.03	1,254.55	49,447	12,413	3.94	.99
Average	64.07	2,857	662	.....	.....	62.73	2,472	621	.....	.....
After period.										
First subperiod:										
Total	321.69	14,209	3,390	4.42	1.05	309.54	12,524	3,165	4.05	1.02
Average	64.34	2,842	678	.....	.....	61.91	2,505	633	.....	.....
Second subperiod:										
Total	323.32	14,448	3,435	4.47	1.06	309.25	12,418	3,142	4.02	1.02
Average	64.66	2,890	687	.....	.....	61.85	2,484	628	.....	.....
Entire after period:										
Total	645.01	28,657	6,825	4.44	1.06	618.79	24,942	6,307	4.03	1.02
Average	64.50	2,866	683	.....	.....	61.88	2,494	631	.....	.....

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII*—Continued.

[Averages are per day.]

Period.	No. 5.					No. 6.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	.....	.....	.....	.....	.....	293.26	14,179	3,015	4.83	1.03
Average	.....	.....	.....	.....	.....	58.65	2,836	603	.....	.....
Second subperiod:										
Total	263.59	13,745	3,129	5.21	1.19	294.10	13,625	2,963	4.63	1.01
Average	52.72	2,749	626	.....	.....	58.82	2,725	593	.....	.....
Entire fore period:										
Total	.....	.....	.....	.....	.....	587.36	27,804	5,978	4.73	1.02
Average	.....	.....	.....	.....	.....	58.74	2,780	598	.....	.....
Preservative period.										
First subperiod:										
Total	264.07	13,094	3,021	4.96	1.14	293.83	13,100	3,121	4.46	1.06
Average	52.81	2,619	604	.....	.....	58.77	2,620	624	.....	.....
Second subperiod:										
Total	264.54	12,659	3,072	4.79	1.16	293.54	13,635	3,031	4.65	1.03
Average	52.91	2,532	614	.....	.....	58.71	2,727	606	.....	.....
Third subperiod:										
Total	262.84	12,235	2,516	4.65	.96	293.32	13,135	3,015	4.48	1.03
Average	52.57	2,447	503	.....	.....	58.66	2,627	603	.....	.....
Fourth subperiod:										
Total	258.44	10,525	2,120	4.07	.82	292.50	12,878	3,116	4.40	1.07
Average	51.69	2,105	424	.....	.....	58.50	2,576	623	.....	.....
Entire preservative period:										
Total	1,049.89	48,513	10,729	4.62	1.02	1,173.19	52,748	12,283	4.50	1.05
Average	52.49	2,426	536	.....	.....	58.66	2,637	614	.....	.....
After period.										
First subperiod:										
Total	255.87	11,870	2,434	4.64	.95	293.26	12,943	3,313	4.41	1.13
Average	51.17	2,374	487	.....	.....	58.65	2,589	663	.....	.....
Second subperiod:										
Total	254.14	11,836	2,587	4.66	1.02	291.03	12,553	3,104	4.31	1.07
Average	50.83	2,367	517	.....	.....	58.21	2,511	621	.....	.....
Entire after period:										
Total	510.01	23,706	5,021	4.65	.98	584.29	25,496	6,417	4.36	1.10
Average	51.00	2,371	502	.....	.....	58.43	2,550	642	.....	.....

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII*—Continued.

[Averages are per day.]

Period.	No. 7.					No. 8.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	354.19	12,067	2,979	3.41	0.84	308.01	15,684	3,277	5.09	1.06
Average	70.84	2,413	596	.....	.....	61.60	3,137	655	.....	.....
Second subperiod:										
Total	350.39	11,021	2,621	3.15	.75	308.80	15,810	3,192	5.12	1.03
Average	70.08	2,204	524	.....	.....	61.76	3,162	638	.....	.....
Entire fore period:										
Total	704.58	23,088	5,600	3.28	.79	616.81	31,494	6,469	5.11	1.05
Average	70.46	2,309	560	.....	.....	61.68	3,149	647	.....	.....
Preservative period.										
First subperiod:										
Total	350.10	10,993	2,727	3.14	.78	308.17	16,151	3,169	5.24	1.03
Average	70.02	2,199	545	.....	.....	61.63	3,230	634	.....	.....
Second subperiod:										
Total	350.32	10,995	2,674	3.14	.76	309.93	16,178	3,174	5.22	1.02
Average	70.06	2,199	536	.....	.....	61.99	3,236	635	.....	.....
Third subperiod:										
Total	349.73	10,801	2,580	3.09	.74	307.73	17,608	3,262	5.72	1.06
Average	69.95	2,160	516	.....	.....	61.55	3,522	652	.....	.....
Fourth subperiod:										
Total	.....	.....	.....	.....	.....	308.70	15,496	3,215	5.02	1.04
Average	.....	.....	.....	.....	.....	61.74	3,099	643	.....	.....
First, second, and third subperiods:										
Total	1,050.15	32,789	7,981	3.12	.76	.....	.....	.....	.....	.....
Average	70.01	2,186	532	.....	.....	.....	.....	.....	.....	.....
Entire preservative period:										
Total	.....	.....	.....	.....	.....	1,234.53	65,433	12,820	5.30	1.04
Average	.....	.....	.....	.....	.....	61.73	3,272	641	.....	.....
After period.										
First subperiod:										
Total	.....	.....	.....	.....	.....	308.90	19,705	3,333	6.38	1.08
Average	.....	.....	.....	.....	.....	61.78	3,941	667	.....	.....
Second subperiod:										
Total	.....	.....	.....	.....	.....	309.41	19,272	3,278	6.23	1.06
Average	.....	.....	.....	.....	.....	61.88	3,854	656	.....	.....
Entire after period:										
Total	.....	.....	.....	.....	.....	618.31	38,977	6,611	6.30	1.07
Average	.....	.....	.....	.....	.....	61.83	3,898	661	.....	.....

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII*—Continued.

[Averages are per day.]

Period.	No 9.					No. 10.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	310.77	11,856	2,765	3.82	0.89	285.45	11,913	3,038	4.17	1.06
Average	62.15	2,371	553	.....	.....	57.09	2,383	608	.....	.....
Second subperiod:										
Total	311.55	10,898	2,731	3.50	.88	285.45	12,022	2,892	4.21	1.01
Average	62.31	2,180	546	.....	.....	57.09	2,404	578	.....	.....
Entire fore period:										
Total	622.32	22,754	5,496	3.66	.88	570.90	23,935	5,930	4.19	1.04
Average	62.23	2,275	550	.....	.....	57.09	2,394	593	.....	.....
Preservative period.										
First subperiod:										
Total	311.58	11,181	2,709	3.59	.87	285.05	12,040	2,922	4.22	1.03
Average	62.32	2,236	542	.....	.....	57.01	2,408	584	.....	.....
Second subperiod:										
Total	311.45	11,401	2,760	3.66	.89	285.70	12,081	3,104	4.23	1.09
Average	62.29	2,280	552	.....	.....	57.14	2,416	621	.....	.....
Third subperiod:										
Total	313.50	11,050	2,757	3.52	.88	286.23	12,004	2,989	4.19	1.04
Average	62.70	2,210	551	.....	.....	57.25	2,401	598	.....	.....
Fourth subperiod:										
Total	313.54	11,905	2,731	3.80	.87	286.42	11,778	2,979	4.11	1.04
Average	62.71	2,381	546	.....	.....	57.28	2,356	596	.....	.....
Entire preservative period:										
Total	1,250.07	45,537	10,957	3.64	.88	1,143.40	47,903	11,994	4.19	1.05
Average	62.50	2,277	548	.....	.....	57.17	2,395	600	.....	.....
After period.										
First subperiod:										
Total	312.50	12,557	2,774	4.02	.89	286.75	12,287	2,962	4.28	1.03
Average	62.50	2,511	555	.....	.....	57.35	2,457	592	.....	.....
Second subperiod:										
Total	311.15	12,477	2,716	4.01	.87	287.40	11,700	2,924	4.07	1.02
Average	62.23	2,495	543	.....	.....	57.48	2,340	585	.....	.....
Entire after period:										
Total	623.65	25,034	5,490	4.01	.88	574.15	23,987	5,886	4.18	1.03
Average	62.37	2,503	549	.....	.....	57.42	2,399	589	.....	.....

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII*—Continued.

[Averages are per day.]

Period.	No. 11.					No. 12.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	332.77	17,336	3,715	5.21	1.12	347.20	12,853	3,289	3.70	0.95
Average	66.55	3,467	743	.....	.....	69.44	2,571	658	.....	.....
Second subperiod:										
Total	331.85	17,674	3,702	5.33	1.12	348.20	13,251	3,302	3.81	.95
Average	66.37	3,535	740	.....	.....	69.64	2,650	660	.....	.....
Entire fore period:										
Total	664.62	35,010	7,417	5.27	1.12	695.40	26,104	6,591	3.75	.95
Average	66.46	3,501	742	.....	.....	69.54	2,610	659	.....	.....
Preservative period.										
First subperiod:										
Total	332.61	16,625	3,727	5.00	1.12	348.83	12,945	3,381	3.71	.97
Average	66.52	3,325	745	.....	.....	69.77	2,589	676	.....	.....
Second subperiod:										
Total	332.77	18,053	3,817	5.43	1.15	347.85	13,350	3,479	3.84	1.00
Average	66.55	3,611	763	.....	.....	69.57	2,670	696	.....	.....
Third subperiod:										
Total	332.76	18,371	3,778	5.52	1.14	348.50	13,148	3,411	3.77	.98
Average	66.55	3,674	756	.....	.....	69.70	2,630	682	.....	.....
Fourth subperiod:										
Total	333.73	17,739	3,762	5.32	1.13	348.15	13,378	3,431	3.84	.99
Average	66.75	3,548	752	.....	.....	69.63	2,676	686	.....	.....
Entire preservative period:										
Total	1,331.87	70,788	15,084	5.31	1.13	1,393.33	52,821	13,702	3.79	.98
Average	66.59	3,539	754	.....	.....	69.67	2,641	685	.....	.....
After period.										
First subperiod:										
Total	333.52	17,581	3,717	5.27	1.11	348.50	12,606	3,270	3.62	.94
Average	66.70	3,516	743	.....	.....	69.70	2,521	654	.....	.....
Second subperiod:										
Total	333.05	17,767	3,677	5.33	1.10	348.10	11,720	3,171	3.37	.91
Average	66.61	3,553	735	.....	.....	69.62	2,344	634	.....	.....
Entire after period:										
Total	666.57	35,348	7,394	5.30	1.11	696.60	24,326	6,441	3.49	.92
Average	66.66	3,535	739	.....	.....	69.66	2,433	644	.....	.....

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Period.	Nos. 1 to 6.					Nos. 1 and 4.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	[a]1,620.20	68,462	16,149	4.23	1 00	657.73	26,637	6,560	4.05	1.00
Average	60.81	2,738	646	.....	.....	65.77	2,664	656	.....	.....
Second subperiod:										
Total	1,883.74	84,810	18,987	4.50	1.01	655.43	24,711	6,231	3.77	.95
Average	62.79	2,827	633	.....	.....	65.54	2,471	623	.....	.....
Entire fore period:										
Total	3,503.94	153,272	35,136	4.37	1.00	1,313.16	51,348	12,791	3.91	.97
Average	63.71	2,787	639	.....	.....	65.66	2,567	640	.....	.....
Preservative period.										
First subperiod:										
Total	1,885.08	81,426	18,814	4.32	1.00	656.56	24,560	6,158	3.74	.93
Average	62.84	2,714	627	.....	.....	65.66	2,456	616	.....	.....
Second subperiod:										
Total	1,883.62	81,352	19,211	4.32	1.02	656.31	24,600	6,396	3.75	.97
Average	62.79	2,712	640	.....	.....	65.63	2,460	640	.....	.....
Third subperiod:										
Total	1,881.92	81,116	18,607	4.31	.99	656 63	24,450	6,386	3.72	.97
Average	62.73	2,704	620	.....	.....	65.66	2,445	639	.....	.....
Fourth subperiod:										
Total	.....	.....	.....	.....	.....	656.70	24,399	6,532	3.72	.99
Average	.....	.....	.....	.....	.....	65.67	2,440	653	.....	.....
First, second, and third subperiods:										
Total	5,650.62	243,894	56,632	4.32	1.00	.....	.....	.....	.....	.....
Average	62.78	2,710	629	.....	.....	.....	.....	.....	.....	.....
Entire preservative period:										
Total	.....	.....	.....	.....	.....	2,626.20	98,009	25,472	3.73	.97
Average	.....	.....	.....	.....	.....	65.66	2,450	637	.....	.....
After period.										
First subperiod:										
Total	1,869.83	80,642	19,036	4.31	1.01	651.94	25,388	6,568	3.89	1.01
Average	62.33	2,680	634	.....	.....	65.19	2,539	657	.....	.....
Second subperiod:										
Total	1,867.18	79,656	18,981	4.26	1.01	653.05	24,454	6,553	3.74	1.00
Average	62.24	2,655	631	.....	.....	65.31	2,445	655	.....	.....
Entire after period:										
Total	3,737.01	160,298	38,017	4.28	1.01	1,304.99	49,842	13,121	3.82	1.01
Average	62.28	2,672	634	.....	.....	65.25	2,492	656	.....	.....

[a] No. 5 absent.

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII*—Continued.

[Averages are per man per day.]

Period.	Nos. 5 and 6.					Nos. 7 to 12.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	.....	.....	.....	.....	.....	1,938.39	81,709	19,063	4.22	0.98
Average	.....	.....	.....	.....	.....	64.61	2,724	635	.....	.....
Second subperiod:										
Total	557.69	27,370	6,092	4.91	1.09	1,936.24	80,676	18,440	4.17	.95
Average	55.77	2,737	609	.....	.....	64.54	2,689	615	.....	.....
Entire fore period:										
Total	.....	.....	.....	.....	.....	3,874.63	162,385	37,503	4.19	.97
Average	.....	.....	.....	.....	.....	64.58	2,706	625	.....	.....
Preservative period.										
First subperiod:										
Total	557.90	26,194	6,142	4.70	1.10	1,936.34	79,935	18,635	4.13	.96
Average	55.79	2,619	614	.....	.....	64.54	2,665	621	.....	.....
Second subperiod:										
Total	558.08	26,294	6,103	4.71	1.09	1,938.02	82,058	19,008	4.23	.98
Average	55.81	2,629	610	.....	.....	64.60	2,735	634	.....	.....
Third subperiod:										
Total	556.16	25,370	5,531	4.56	.99	1,938.45	82,982	18,777	4.28	.97
Average	55.62	2,537	553	.....	.....	64.62	2,766	626	.....	.....
Fourth subperiod:										
Total	550.94	23,403	5,236	4.25	.95	.....	.....	.....	.....	.....
Average	55.09	2,340	524	.....	.....	.....	.....	.....	.....	.....
First, second, and third subperiods:										
Total	.....	.....	.....	.....	.....	5,812.81	244,975	56,420	4.21	.97
Average	.....	.....	.....	.....	.....	64.59	2,722	627	.....	.....
Entire preservative period:										
Total	2,223.08	101,261	23,012	4.55	1.04	.....	.....	.....	.....	.....
Average	55.58	2,532	575	.....	.....	.....	.....	.....	.....	.....
After period.										
First subperiod:										
Total	549.13	24,813	5,747	4.52	1.05	.....	.....	.....	.....	.....
Average	54.91	2,481	575	.....	.....	.....	.....	.....	.....	.....
Second subperiod:										
Total	545.17	24,389	5,691	4.47	1.04	.....	.....	.....	.....	.....
Average	54.52	2,439	569	.....	.....	.....	.....	.....	.....	.....
Entire after period:										
Total	1,094.30	49,202	11,438	4.50	1.05	.....	.....	.....	.....	.....
Average	54.72	2,460	572	.....	.....	.....	.....	.....	.....	.....

TABLE III.—*Amount of moist and dry food consumed, expressed as percentage of body weight, Series VII*—Continued.

[Averages are per man per day.]

Period.	Nos. 8, 9, 10, and 11.					Nos. 7 and 12.				
	Body weight.	Weight of food.		Average daily ratio of food weight to body weight.		Body weight.	Weight of food.		Average daily ratio of food weight to body weight.	
		Moist.	Dry.	Moist.	Dry.		Moist.	Dry.	Moist.	Dry.
Fore period.										
First subperiod:	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Kilos.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*
Total	1,237.00	56,789	12,795	4.59	1.03	701.39	24,920	6,268	3.55	0.89
Average	61.85	2,839	640	.....	.....	70.14	2,492	627	.....	.....
Second subperiod:										
Total	1,237.65	56,404	12,517	4.56	1.01	698.59	24,272	5,923	3.47	.85
Average	61.88	2,820	626	.....	.....	69.86	2,427	592	.....	.....
Entire fore period:										
Total	2,474.65	113,193	25,312	4.57	1.02	1,399.98	49,192	12,191	3.51	.87
Average	61.87	2,830	633	.....	.....	70.00	2,460	610	.....	.....
Preservative period.										
First subperiod:										
Total	1,237.41	55,997	12,527	4.53	1.01	698.93	23,938	6,108	3.42	.87
Average	61.87	2,800	626	.....	.....	69.89	2,394	611	.....	.....
Second subperiod:										
Total	1,239.85	57,713	12,855	4.65	1.04	698.17	24,345	6,153	3.49	.88
Average	61.99	2,886	643	.....	.....	69.82	2,435	615	.....	.....
Third subperiod:										
Total	1,240.22	59,033	12,786	4.76	1.03	698.23	23,949	5,991	3.43	.86
Average	62.01	2,952	639	.....	.....	69.82	2,395	599	.....	.....
Fourth subperiod:										
Total	1,242,39	56,918	12,687	4.58	1.02	.....	.....	.....	.....	.....
Average	62.12	2,846	634	.....	.....	.....	.....	.....	.....	.....
Second and third subperiods:										
Total	.....	.....	.....	.....	.....	2,095.33	72,232	18,252	3.45	.87
Average	.....	.....	.....	.....	.....	69.84	2,408	608	.....	.....
Entire preservative period:										
Total	4,959.87	229,661	50,855	4.63	1.03	.....	.....	.....	.....	.....
Average	62.00	2,871	636	.....	.....	.....	.....	.....	.....	.....
After period.										
First subperiod:										
Total	1,241.67	62,130	12,786	5.00	1.03	.....	.....	.....	.....	.....
Average	62.08	3,107	639	.....	.....	.....	.....	.....	.....	.....
Second subperiod:										
Total	1,241.01	61,216	12,595	4.93	1.01	.....	.....	.....	.....	.....
Average	62.05	3,061	630	.....	.....	.....	.....	.....	.....	.....
Entire after period:										
Total	2,482.68	123,346	25,381	4.97	1.02	.....	.....	.....	.....	.....
Average	62.07	3,084	635	.....	.....	.....	.....	.....	.....	.....

WEIGHT AND WATER CONTENT OF THE FECES.

In Table IV are given the data relating to the moist and dry weight and water content of the feces. In this connection attention should be called to the fact that the feces were collected by periods and not studied by separating the ingested materials of the various periods by means of charcoal or other distinctive coloring matter. For this reason some small discrepancy may enter into the computations by reason of the irregular amount excreted from day to day. In the large number of persons under observation, however, there would be a marked tendency to correct any appreciable error and to secure in the general expression a fairly accurate average value for the fecal excretions.

INDIVIDUAL DATA.

The average weight of the moist feces for No. 1 for the fore period is 66 grams, containing 69.68 per cent of water and 20 grams of dry matter. For the preservative period the average weight of the feces is 89 grams, containing 79.95 per cent of moisture and 18 grams of dry substance. For the after period the average weight of the moist feces is 37 grams, containing 65.14 per cent of water and 13 grams of dry substance. These data show a very complete absorption of the ingested material throughout and consequently a small excretion of feces. There is a marked increase in the water content of the feces in the preservative period and a slight decrease in the quantity of dry matter excreted. In the after period there is a decrease in the quantity of water in the feces, as compared with the fore period, and a marked decrease in the quantity of dry matter excreted.

The data for No. 2 show in the fore period that the average weight of the feces is 87 grams, containing 68.74 per cent of water and 27 grams of dry matter. For the preservative period the mean quantity of moist feces is 99 grams, containing 69.72 per cent of water and 30 grams of dry matter. For the after period the average quantity of feces excreted is 100 grams, containing 73.03 per cent of water and 27 grams of dry matter. These data show little change in the fecal excretion during the three periods of observation. There is a slight increase in the percentage of water in the preservative period and a still greater increase in the after period. The quantity of dry matter in the feces during the preservative period is increased by 3 grams per day, while the quantity of dry matter in the fore period and after period is the same.

In the case of No. 3 there is found in the feces during the fore period 55 grams of moist feces daily, containing 64.62 per cent of water and 20 grams of dry matter. During the preservative period the average daily excretion of moist feces is 78 grams, containing 65.49 per cent of water and 27 grams of dry matter. In the after period the average daily quantity of feces is 60 grams, containing 68.38 per cent of water and 19 grams of dry matter. In this case the percentage of water in the feces does not vary much during the period of observation, though it is slightly increased in the preservative period and again increased in the after period. The quantity of dry matter in the feces is very markedly larger in the preservative period, the increase amounting to 35 per cent, while the quantity of dry matter excreted during the after period is almost exactly the same as in the fore period.

In the case of No. 4 the average quantity of moist feces excreted daily is 96 grams in the fore period, 121 grams in the preservative period, and 110 grams in the after period. The quantities of water in the feces for the three periods, respectively, are 73.54 per cent, 79.02 per cent,

and 77.48 per cent. The quantity of dry matter in the feces remains the same for the three periods. The variations in weight, therefore, of the feces are due solely to the differences in the percentages of water, the amount of water being smallest in the fore period and largest in the preservative period.

The data for No. 5 are, as has before been explained, incomplete. In so far as obtained they show an average daily excretion of 66 grams of moist feces in the fore period, 87 grams in the preservative period, and 74 grams in the after period. The content of water in the feces is 76.53 per cent, 77.88 per cent, and 77.43 per cent, respectively, for the three periods. The quantity of dry matter excreted is 16 grams, 19 grams, and 17 grams, respectively, for the three periods. These data show a slight increase in the percentage of water in the preservative period and a slight increase in the quantity of dry matter excreted in the feces.

The observations made on No. 6 show an average daily excretion of 113 grams of moist feces in the fore period, 128 grams in the preservative period, and 131 grams in the after period. The quantities of water contained therein are 78.85 per cent, 79.23 per cent, and 80.47 per cent, respectively, for the three periods. The weights of dry matter excreted in the feces are 24 grams, 26 grams, and 26 grams, respectively, for the three periods. These data show a slight increase in the percentage of water in the feces in the preservative period and another slight increase in the after period. The quantity of dry matter excreted is slightly increased in the preservative and after periods over the fore period.

For No. 7 the average amount of moist feces excreted in the fore period is 94 grams, and for the first, second, and third subperiods of the preservative period 77 grams; the percentage of water and amount of dry matter are slightly decreased in the preservative period. By reason of the incompleteness of these data a comparison of those secured is not of much value.

No. 8 has an average daily excretion of moist feces in the fore period of 107 grams, in the preservative period of 113 grams, and in the after period of 144 grams. The percentages of water contained in the feces are for the fore period 77.43, for the preservative period 78.08, and for the after period 83.37. The average daily quantities of dry matter excreted are for the fore period 24 grams, for the preservative period 25 grams, and for the after period 24 grams. The percentage of water in the feces is slightly increased in the preservative period and largely increased in the after period. The quantity of dry matter excreted in the feces is slightly increased in the preservative period and is the same in the fore and after periods.

No. 9 shows an average daily excretion of moist feces in the fore period of 57 grams, in the preservative period of 59 grams, and in the

after period of 109 grams. The percentages of water contained in the feces are 68.73 for the fore period, 67.51 for the preservative period, and 73.87 for the after period. The quantities of dry matter excreted in the feces are 18 grams for the fore period, 19 grams for the preservative period, and 28 grams for the after period. These data are apparently abnormal, as indicated by the large increase in the feces excreted during the after period.

The average daily quantities of moist feces excreted by No. 10 are 71 grams for the fore period, 108 grams for the preservative period, and 104 grams for the after period. The percentages of moisture contained therein are 75.35 for the fore period, 79.38 for the preservative period, and 74.86 for the after period. The quantities of dry matter in the feces are 17 grams for the fore period, 22 grams for the preservative period, and 26 grams for the after period. In this case there is a marked increase in water content in the preservative period, accompanied by a considerable increase in dry matter, which continues in the after period, through the water content markedly decreases.

The data for No. 11 show an average daily quantity of moist feces in the fore period of 112 grams, in the preservative period of 126 grams, and in the after period of 105 grams. The percentages of water contained therein are 75.53 for the fore period, 77.19 for the preservative period, and 76.36 for the after period. The average quantity of dry matter excreted in the feces during the fore period is 28 grams, during the preservative period 29 grams, and during the after period 25 grams. In this instance both the quantity of water in the feces and the amount of dry matter excreted are largest in the preservative period.

The data for No. 12 show a daily excretion of 84 grams of moist feces for the fore period, 97 grams for the preservative period, and 75 grams for the after period. The percentages of moisture contained therein are 71.62 in the fore period, 74.34 in the preservative period, and 73.36 in the after period. The average daily quantities of dry matter excreted are for the fore period 24 grams, for the preservative period 25 grams, and for the after period 20 grams. In this case also the percentage of water in the feces and the amount of dry matter excreted are greatest in the preservative period.

SUMMARIES.

In the summary for Nos. 1 to 6, inclusive, who received sodium sulphite, the following results are obtained: The average daily quantity of moist feces excreted in the fore period is 82 grams, during the first, second, and third subperiods of the preservative period 103 grams, and during the after period 85 grams. The average percentage

of moisture in the feces in the fore period is 72.50, during the preservative period 76.15, and during the after period 75.40. The average daily quantity of dry matter excreted in the fore period is 23 grams, in the preservative period 25 grams, and in the after period 21 grams.

This summary shows that there is a decided tendency on the part of the sulphites administered to cause an increase in the percentage of moisture in the feces, thus indicating a slight tendency toward catharsis. It is also noted that there is a distinct tendency to increase the dry matter excreted in the feces, this increase amounting to 2 grams in the preservative period, or 8.7 per cent. On the withdrawal of the preservative there is a marked decrease in the quantity of dry matter excreted, amounting to 8.7 per cent in this case also, as compared with the fore period.

It will be recalled that the average daily quantity of dry food consumed for the fore period by these men is 639 grams and for the preservative period 629 grams. Thus, while the quantity of food consumed has been slightly diminished, the quantity of dry matter excreted in the feces has been markedly increased. It would appear, therefore, in the light of these data, that the preservative administered has had an inhibiting effect upon the total quantity of material digested and absorbed. This phenomenon may also have been accompanied by an increased katabolism.

Next to be considered are the summaries of the men who received sulphurous acid in an uncombined state. Only the most complete summaries are discussed, although others are submitted for comparison.

The summary of Nos. 8 to 11, inclusive, shows an average daily excretion of moist feces in the fore period of 87 grams, in the preservative period of 102 grams, and in the after period of 115 grams. The percentages of water contained in the feces are for the fore period 74.97, for the preservative period 76.60, and for the after period 77.63, respectively. The average daily excretion of dry matter in the feces is 22 grams in the fore period, 24 grams in the preservative period, and 26 grams in the after period.

These data show an increase both in the water content of the feces and in the amount of dry matter excreted during the preservative period, and the increases are continued in the after period.

Considering the data now as a whole it is evident that the administration of sulphurous acid, both as sulphites and in the form of uncombined acid, has a marked tendency to increase the percentage content of moisture in the feces and the total quantity of dry matter excreted during the preservative period. In the case of those receiving sodium sulphite the opposite tendency is shown in the after period, while in the summary for Nos. 8 to 11, receiving sulphurous acid, there is a continued increase in dry matter excreted and in percentage of water.

TABLE IV.—*Weight and water content of feces by periods, Series VII.*

[Averages are per day.]

Period.	No. 1.			No. 2.			No. 3.		
	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.
Fore period.									
First subperiod:	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*
Total	451	70.07	135	356	69.66	108	223	66.40	75
Average	90	.....	27	71	.....	22	45	.....	15
Second subperiod:									
Total	212	68.92	66	511	68.12	163	331	63.44	121
Average	42	.....	13	102	.....	33	66	.....	24
Entire fore period:									
Total	663	69.68	201	867	68.74	271	554	64.62	196
Average	66	.....	20	87	.....	27	55	.....	20
Preservative period.									
First subperiod:									
Total	475	77.48	107	424	69.07	131	421	66.02	143
Average	95	.....	21	85	.....	26	84	.....	29
Second subperiod:									
Total	764	84.94	115	572	70.11	171	356	67.72	115
Average	153	.....	23	114	.....	34	71	.....	23
Third subperiod:									
Total	298	80.21	59	464	70.25	138	449	64.40	160
Average	60	.....	12	93	.....	28	90	.....	32
Fourth subperiod:									
Total	234	68.37	74	525	69.34	161	327	63.93	118
Average	47	.....	15	105	.....	32	66	.....	24
Entire preservative period:									
Total	1,771	79.95	355	1,985	69.72	601	1,553	65.49	536
Average	89	.....	18	99	.....	30	78	.....	27
After period.									
First subperiod:									
Total	181	64.09	65	533	73.34	142	263	65.40	91
Average	36	.....	13	107	.....	28	53	.....	18
Second subperiod:									
Total	189	66.05	64	468	72.63	128	341	70.69	100
Average	38	.....	13	94	.....	26	68	.....	20
Entire after period:									
Total	370	65.14	129	1,001	73.03	270	604	68.38	191
Average	37	.....	13	100	.....	27	60	.....	19

TABLE IV.—*Weight and water content of feces by periods, Series VII*—Continued.

[Averages are per day.]

Period.	No. 4.			No. 5.			No. 6.		
	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.
Fore period.									
First subperiod:	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*
Total	382	73.30	102	.....	.....	.....	540	79.43	111
Average	76	.....	20	.....	.....	.....	108	.....	22
Second subperiod:									
Total	573	73.65	151	332	76.53	78	590	78.29	128
Average	115	.....	30	66	.....	16	118	.....	26
Entire fore period:									
Total	955	73.54	253	.....	.....	.....	1,130	78.85	239
Average	96	.....	25	.....	.....	.....	113	.....	24
Preservative period.									
First subperiod:									
Total	525	78.87	111	405	76.77	94	559	79.08	117
Average	105	.....	22	81	.....	19	112	.....	23
Second subperiod:									
Total	801	80.53	156	442	75.54	108	828	78.98	174
Average	160	.....	31	88	.....	22	166	.....	35
Third subperiod:									
Total	500	78.60	107	413	79.40	85	551	79.30	114
Average	100	.....	21	83	.....	17	110	.....	23
Fourth subperiod:									
Total	594	77.46	134	485	79.58	99	614	79.64	125
Average	119	.....	27	97	.....	20	123	.....	25
Entire preservative period:									
Total	2,420	79.02	508	1,745	77.88	386	2,552	79.23	530
Average	121	.....	25	87	.....	19	128	.....	26
After period.									
First subperiod:									
Total	540	79.44	111	457	80.95	87	671	80.17	133
Average	108	.....	22	91	.....	17	134	.....	27
Second subperiod:									
Total	561	75.56	137	283	71.75	80	640	80.77	123
Average	112	.....	27	57	.....	16	128	.....	25
Entire after period:									
Total	1,101	77.48	248	740	77.43	167	1,311	80.47	256
Average	110	.....	25	74	.....	17	131	.....	26

TABLE IV.—*Weight and water content of feces by periods, Series VII*—Continued.

[Averages are per day.]

Period.	No. 7.			No. 8.			No. 9.		
	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.
Fore period.									
First subperiod:	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*
Total	393	80.13	78	525	78.85	111	298	70.14	89
Average	79	.....	16	105	.....	22	60	.....	18
Second subperiod:									
Total	547	82.62	95	543	76.08	130	268	67.16	88
Average	109	.....	19	109	.....	26	54	.....	18
Entire fore period:									
Total	940	81.60	173	1,068	77.43	241	566	68.73	177
Average	94	.....	17	107	.....	24	57	.....	18
Preservative period.									
First subperiod:									
Total	498	76.92	115	322	74.22	83	343	67.94	110
Average	100	.....	23	64	.....	17	69	.....	22
Second subperiod:									
Total	373	80.71	72	452	79.42	93	359	70.47	106
Average	75	.....	14	90	.....	19	72	.....	21
Third subperiod:									
Total	277	82.68	48	780	80.14	155	288	64.88	101
Average	55	.....	10	156	.....	31	58	.....	20
Fourth subperiod:									
Total	.....	.....	.....	713	76.72	166	198	65.20	69
Average	.....	.....	.....	143	.....	33	40	.....	14
First, second, and third subperiods:									
Total	1,148	79.53	235	.....	.....	.....	.....	.....	.....
Average	77	.....	16	.....	.....	.....	.....	.....	.....
Entire preservative period:									
Total	.....	.....	.....	2,267	78.08	497	1,188	67.51	386
Average	.....	.....	.....	113	.....	25	59	.....	19
After period.									
First subperiod:									
Total	.....	.....	.....	597	81.40	111	632	74.52	161
Average	.....	.....	.....	120	.....	22	126	.....	32
Second subperiod:									
Total	.....	.....	.....	846	84.76	129	455	72.98	123
Average	.....	.....	.....	169	.....	26	91	.....	25
Entire after period:									
Total	.....	.....	.....	1,443	83.37	240	1,087	73.87	284
Average	.....	.....	.....	144	.....	24	109	.....	28

TABLE IV.—*Weight and water content of feces by periods, Series VII*—Continued.

[Averages are per day.]

Period.	No. 10.			No. 11.			No. 12.		
	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.
Fore period.									
First subperiod:	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*
Total	441	76.17	105	596	76.01	143	471	70.68	138
Average	88	.....	21	119	.....	29	94	.....	28
Second subperiod:									
Total	265	74.00	69	528	74.98	132	371	72.80	101
Average	53	.....	14	106	.....	26	74	.....	20
Entire fore period:									
Total	706	75.35	174	1,124	75.53	275	842	71.62	239
Average	71	.....	17	112	.....	28	84	.....	24
Preservative period.									
First subperiod:									
Total	739	82.14	132	775	79.74	157	540	73.69	142
Average	148	.....	26	155	.....	31	108	.....	28
Second subperiod:									
Total	540	79.26	112	558	76.90	129	466	77.70	104
Average	108	.....	22	112	.....	26	93	.....	21
Third subperiod:									
Total	255	76.04	61	607	75.44	149	562	74.20	145
Average	51	.....	12	121	.....	30	112	.....	29
Fourth subperiod:									
Total	629	77.57	141	576	75.88	139	369	71.28	106
Average	126	.....	28	115	.....	28	74	.....	21
Entire preservative period:									
Total	2,163	79.38	446	2,516	77.19	574	1,937	74.34	497
Average	108	.....	22	126	.....	29	97	.....	25
After period.									
First subperiod:									
Total	557	77.19	127	532	74.82	134	280	72.49	77
Average	111	.....	25	106	.....	27	56	.....	15
Second subperiod:									
Total	481	72.12	134	517	77.96	114	467	73.88	122
Average	96	.....	27	103	.....	23	93	.....	24
Entire after period:									
Total	1,038	74.86	261	1,049	76.36	248	747	73.36	199
Average	104	.....	26	105	.....	25	75	.....	20

TABLE IV.—*Weight and water content of feces by periods, Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Period.	Nos. 1, 2, 3, 4, 5, and 6.			Nos. 1 and 4.			Nos. 5 and 6.		
	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.
Fore period.									
First subperiod:	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*
Total	[a] 1,952	[a] 72.80	[a] 531	833	71.55	237	(a)	.....	.....
Average	78	.....	21	83	.....	24	.....	.....	.....
Second subperiod:									
Total	2,549	72.27	707	785	72.36	217	922	77.66	206
Average	85	.....	24	79	.....	22	92	.....	21
Entire fore period:									
Total	4,501	72.50	1,238	1,618	71.94	454	.....	.....	.....
Average	82	.....	23	81	.....	23	.....	.....	.....
Preservative period.									
First subperiod:									
Total	2,809	74.97	703	1,000	78.20	218	964	78.11	211
Average	94	.....	23	100	.....	22	96	.....	21
Second subperiod:									
Total	3,763	77.70	839	1,565	82.68	271	1,270	77.80	282
Average	125	.....	28	157	.....	27	127	.....	28
Third subperiod:									
Total	2,675	75.22	663	798	79.20	166	964	79.36	199
Average	89	.....	22	80	.....	17	96	.....	20
Fourth subperiod:									
Total	.....	.....	.....	828	74.88	208	1,099	79.62	224
Average	.....	.....	.....	83	.....	21	110	.....	22
First, second, and third subperiods:									
Total	9,247	76.15	2,205	.....	.....	.....	.....	.....	.....
Average	103	.....	25	.....	.....	.....	.....	.....	.....
Entire preservative period:									
Total	.....	.....	.....	4,191	79.41	863	4,297	78.69	916
Average	.....	.....	.....	105	.....	22	107	.....	23
After period.									
First subperiod:									
Total	2,645	76.22	629	721	75.59	176	1,128	80.50	220
Average	88	.....	21	72	.....	18	113	.....	22
Second subperiod:									
Total	2,482	74.54	632	750	73.20	201	923	78.01	203
Average	83	.....	21	75	.....	20	92	.....	20
Entire after period:									
Total	5,127	75.40	1,261	1,471	74.37	377	2,051	79.38	423
Average	85	.....	21	74	.....	19	103	.....	21

[a] No. 5 absent.

TABLE IV.—*Weight and water content of feces by periods, Series VII*—Continued.

[Averages are per man per day.]

Period.	Nos. 7, 8, 9, 10, 11, and 12.			Nos. 8, 9, 10, and 11.			Nos. 7 and 12.		
	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.	Feces.	Water.	Dry feces.
Fore period.									
First subperiod:	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*	*Grams.*	*Per ct.*	*Grams.*
Total	2,724	75.62	664	1,860	75.91	448	864	75.00	216
Average	91	.....	22	93	.....	22	86	.....	22
Second subperiod:									
Total	2,522	75.61	615	1,604	73.88	419	918	78.65	196
Average	84	.....	21	80	.....	21	92	.....	20
Entire fore period:									
Total	5,246	75.62	1,279	3,464	74.97	867	1,782	76.88	412
Average	87	.....	21	87	.....	22	89	.....	21
Preservative period.									
First subperiod:									
Total	3,217	77.03	739	2,179	77.88	482	1,038	75.24	257
Average	107	.....	25	109	.....	24	104	.....	26
Second subperiod:									
Total	2,748	77.58	616	1,909	76.95	440	839	79.02	176
Average	92	.....	20	95	.....	22	84	.....	18
Third subperiod:									
Total	2,769	76.20	659	1,930	75.85	466	839	77.00	193
Average	92	.....	22	97	.....	23	84	.....	19
Fourth subperiod:									
Total	.....	.....	.....	2,116	75.66	515	2,716	76.95	626
Average	.....	.....	.....	106	.....	26	91	.....	21
First, second, and third subperiods:									
Total	8,734	76.94	2,014	.....	.....	.....	.....	.....	.....
Average	97	.....	22	.....	.....	.....	.....	.....	.....
Entire preservative period:									
Total	.....	.....	.....	8,134	76.60	1,903	.....	.....	.....
Average	.....	.....	.....	102	.....	24	.....	.....	.....
After period.									
First subperiod:									
Total	.....	.....	.....	2,318	77.01	533	.....	.....	.....
Average	.....	.....	.....	116	.....	27	.....	.....	.....
Second subperiod:									
Total	.....	.....	.....	2,299	78.25	500	.....	.....	.....
Average	.....	.....	.....	115	.....	25	.....	.....	.....
Entire after period:									
Total	.....	.....	.....	4,617	77.63	1,033	.....	.....	.....
Average	.....	.....	.....	115	.....	26	.....	.....	.....

THE URINE.[a]

VOLUME, SPECIFIC GRAVITY, AND TOTAL SOLIDS.

SERIES VII.

INDIVIDUAL DATA.

In Table V is found a detailed and summarized statement of the data for the volume, specific gravity, and total solids of the urine of the twelve men during the period of observation.

The volume of the urine excreted daily by No. 1 during the fore period is 922 cc, for the preservative period 961 cc, and for the after period 944 cc. The average specific gravities of the urine for the

[a] These studies, as in the previous experiments, were conducted by F. C. Weber.

periods named are 1.0300 for the fore period, 1.0293 for the preservative period, and 1.0297 for the after period. The average total quantity of dry solids excreted during the fore period is 67.7 grams, for the preservative period 68.6 grams, and for the after period 68.7 grams. In this case the volume of urine is considerably increased during the preservative period and diminished somewhat during the after period, but does not fall to the amount of the fore period. The specific gravity is slightly diminished during the preservative period, and in the after period is increased to almost the same figure as in the fore period. The quantity of total solids excreted is increased by nine-tenths of a gram daily in the preservative period and by 1 gram daily in the after period, as compared with the fore period.

The volume of urine excreted by No. 2 in the fore period is 1,577 cc, 1,565 cc during the preservative period, and 1,470 cc during the after period. The specific gravity of the urine during the fore period is 1.0191, during the preservative period 1.0187, and in the after period 1.0195. The total weight of dry solids excreted daily during the fore period is 73.7 grams, during the preservative period 71.7 grams, and during the after period 70 grams. These data show a slight decrease in the volume of liquid and also in the specific gravity in the preservative period, an additional decrease of almost 100 cc per day in the after period, attended, however, by an increase of specific gravity. The total quantity of solids eliminated is diminished by 2 grams daily in the preservative period and by an additional 1.7 grams during the after period.

In the case of No. 3 the average daily volume of urine during the fore period is 1,231 cc, during the preservative period 1,290 cc, and during the after period 1,251 cc. The specific gravities of the urine for the three periods are 1.0212, 1.0221, and 1.0214, respectively. The total weights of dry solids excreted daily during the three periods are 63.5 grams, 69.3 grams, and 65.5 grams, respectively. In this case there is a slight increase in the volume of the urine and also in the specific gravity during the preservative period. The volume excreted during the after period is less than during the preservative period, but not so small as in the fore period. The specific gravity also falls in the after period, but is slightly higher than in the fore period. The weight of total solids excreted is greatest in the preservative period, falling in the after period, but not to quite so low a number as in the fore period.

The average daily total volume of urine excreted by No. 4 during the fore period is 973 cc, during the preservative period 1,041 cc, and during the after period 997 cc. The specific gravities of the urine during these periods are 1.0300, 1.0291, and 1.0296, respectively. The average weights of dry solids excreted daily for the three periods are 71.6 grams, 74.2 grams, and 72.2 grams, respectively. There is an

indication in this case that the administration of the preservative has increased the volume of the urine 68 cc daily. This increase is partly lost in the after period, but the average daily quantity excreted is still greater than in the fore period. The specific gravity of the urine falls slightly during the preservative period and rises during the after period, but does not quite reach the average of the fore period. The total quantity of solids excreted in the urine increases by 2.6 grams daily during the preservative period, falling during the after period, but not to the average amount excreted in the fore period.

The data for No. 5, as already explained, are incomplete. They show an average daily excretion of urine during the single fore subperiod of 936 cc, in the preservative period of 1,049 cc, and in the after period 862 cc. The specific gravities of the urine for the three periods are 1.0232, 1.0202, and 1.0200, respectively. The average daily quantities of solids excreted in the urine are 53.2 grams, 52.3 grams, and 42.1 grams, respectively. These data show a large increase in the volume of the urine during the administration of the preservative, attended by a very marked decrease in specific gravity. There is a very marked decrease in the volume of urine during the after period, amounting to 187 cc per day, as compared with the preservative period. There is also a decrease in the total solids excreted, which are 0.9 gram less than during the fore period and 10.2 grams less during the after period than in the preservative period.

In the case of No. 6 the data show the average daily excretion of 838 cc of urine during the fore period, 930 cc during the preservative period, and 933 cc during the after period. The specific gravities of the urine for the three periods are 1.0276, 1.0276, and 1.0275, respectively, showing practically no change. The total solids excreted daily in the urine amount to 56.7 grams in the fore period, 62.9 grams in the preservative period, and 62.8 grams in the after period. These data show a marked increase in the volume of the urine during the preservative period, which is continued and even slightly increased during the after period. There is a corresponding increase in the quantity of total solids eliminated, and this increased rate of elimination continues through the after period.

In the case of No. 7 the volume of urine excreted in the fore period is 930 cc and in the first, second, and third subperiods of the preservative period 1,038 cc. The specific gravity in the fore period is 1.0210 and in the preservative period 1.0202. The quantity of total solids daily excreted is 47.7 grams in the fore period and 53.6 grams in the preservative period. The data are not complete, but show an increase in both the volume of the urine and the quantity of solids excreted.

The volume of urine excreted by No. 8 is 1,536 cc in the fore period, 1,959 cc in the preservative period, and 2,048 cc in the after period.

These data show again an increase in the volume of urine under the administration of the preservative. The specific gravities are low, as would be expected where so large a volume is excreted. The numbers expressing the specific gravities for the three periods are 1.0162, 1.0133, and 1.0124. These figures are very low, and the specific gravity is diminished in the preservative period and again in the after period. The average daily weight of solids excreted is for the fore period 61.2 grams, for the preservative period 63.5 grams, and for the after period 61.5 grams, showing an increase in the excretion of total solids amounting to 2.3 grams per day. This increase disappears during the after period.

The data for No. 9 show an average daily quantity of urine of 989 cc for the fore period, 1,146 cc for the preservative period, and 1,075 cc for the after period. The specific gravities for the three periods are 1.0251 for the fore period, 1.0237 for the preservative period, and 1.0251 for the after period. The average quantity of total solids excreted is 60.7 grams for the fore period, 66.7 grams for the preservative period, and 66.2 grams for the after period. These data show a marked increase in the volume of the urine during the preservative period, attended with a slight decrease in specific gravity and an increase of 6 grams daily of solid matter excreted. The increase in solid matter continues during the after period, but with a tendency to return to the conditions of the fore period.

In the case of No. 10 the average daily volume of urine is 937 cc in the fore period, 1,142 cc in the preservative period, and 1,230 cc in the after period. The specific gravities for the three periods are 1.0257 for the fore period, 1.0197 for the preservative period, and 1.0193 for the after period. These data show a great increase in the volume of urine during the preservative period, which is accentuated during the after period. The specific gravity rapidly falls in the preservative period and is not increased during the after period. The quantity of total solids excreted decreases 4.8 grams during the preservative period, a part of which is regained during the after period.

In No. 11's case the volume of urine excreted during the fore period is 1,321 cc, during the preservative period 1,361 cc, and during the after period 1,307 cc. The specific gravities for the three periods are 1.0221 for the fore period, 1.0205 for the preservative period, and 1.0221 for the after period. The quantity of total solids diminished notably during the preservative period, the decrease amounting to a daily average of 3.4 grams daily. This was partially recovered during the after period.

In the case of No. 12 the average daily volume of urine excreted during the fore period is 1,156 cc, during the preservative period 1,388 cc, and during the after period 1,123 cc. These data show a strong

tendency to increase the volume of the urine during the preservative period. During the after period the quantity of the urine excreted diminished to even a smaller figure than in the fore period. The specific gravity of the urine decreased during the preservative period and was restored to a little higher than the normal during the after period. The total quantity of solids excreted daily is 66.1 grams in the fore period, 69.6 grams in the preservative period, and 64.7 grams in the after period. These data show a notable increase of 3.5 grams in the preservative period, while in the after period the quantity excreted is 1.4 grams less than in the fore period. The diuretic effect of the preservative is very marked in this case.

SUMMARIES.

The summaries for Nos. 1 to 6, inclusive, are complete, with the exception of the fourth preservative subperiod. The average daily volume of urine for the six men is 1,092 cc in the fore period, 1,139 cc in the preservative period, and 1,076 cc in the after period. The specific gravity is practically the same in the three periods. The average daily quantity of solids excreted is 1.2 grams greater in the preservative period and 1.9 grams less in the after period than in the fore period. These data show a slight diuretic effect, the total increase in the volume of the urine in the preservative period being 47 cc daily.

For Nos. 8, 9, 10, and 11 complete data are available for a summary. In these cases the average daily increase in the quantity of the urine excreted under the influence of the preservative is extremely great, amounting to 207 cc daily. This diuretic effect is continued in the after period, though with diminished intensity toward its close. The quantity of solids excreted daily in the preservative period remains practically unchanged, and in the after period the quantity is only 0.7 gram greater than in the fore period.

The general effect of the administration of sulphurous acid upon the volume, specific gravity, and total solids in the urine is therefore seen to be to increase the volume of the urine, to increase the total quantity of solids eliminated, and to decrease the specific gravity. In so far as the volume is concerned the diuretic effect is more marked in the cases where the preservative is given as sulphurous acid (Nos. 8 to 11) than when it is given as sodium sulphite (Nos. 1 to 6). These data indicate plainly a disturbance of the metabolic activities produced by the preservative, in both forms.

TABLE V.—*Urine determinations—Volume, specific gravity, and total solids, Series VII.*

[Averages are per day.]

Period.	No. 1.			No. 2.			No. 3.		
	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245.)	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245.)
Fore period.									
First subperiod:	*cc.*		*Grams.*	*cc.*		*Grams.*	*cc.*		*Grams.*
Total	4,685	1.0300	344.3	7,584	1.0200	371.5	5,565	1.0225	306.8
Average	937	.....	68.8	1,517	.....	74.3	1,113	.....	61.4
Second subperiod:									
Total	4,530	1.0300	332.9	8,190	1.0182	365.2	6,740	1.0199	328.6
Average	906	.....	66.6	1,638	.....	73.0	1,348	.....	65.7
Entire fore period:									
Total	9,215	1.0300	677.2	15,774	1.0191	736.7	12,305	1.0212	635.4
Average	922	.....	67.7	1,577	.....	73.7	1,231	.....	63.5
Preservative period.									
First subperiod:									
Total	4,940	1.0265	320.7	7,515	1.0175	322.2	5,460	1.0242	323.7
Average	988	.....	64.1	1,503	.....	64.4	1,092	.....	64.7
Second subperiod:									
Total	4,080	1.0312	311.9	8,210	1.0186	374.1	7,240	1.0206	365.4
Average	816	.....	62.4	1,642	.....	74.8	1,448	.....	73.1
Third subperiod:									
Total	4,640	1.0310	352.4	7,750	1.0200	379.7	6,645	1.0215	350.0
Average	928	.....	70.5	1,550	.....	75.9	1,329	.....	70.0
Fourth subperiod:									
Total	5,550	1.0284	386.2	.....	.....	.....	.....	.....	.....
Average	1,110	.....	77.2	.....	.....	.....	.....	.....	.....
First, second, and third subperiods:									
Total	.....	.....	.....	23,475	1.0187	1,076.0	19,345	1.0221	1,039.1
Average	.....	.....	.....	1,565	.....	71.7	1,290	.....	69.3
Entire preservative period:									
Total	19,210	1.0293	1,371.2	.....	.....	.....	.....	.....	.....
Average	961	.....	68.6	.....	.....	.....	.....	.....	.....
After period.									
First subperiod:									
Total	4,970	1.0288	350.7	7,935	1.0186	361.6	6,494	1.0204	324.5
Average	994	.....	70.1	1,587	.....	72.3	1,299	.....	64.9
Second subperiod:									
Total	4,470	1.0307	336.2	6,770	1.0204	338.4	6,015	1.0224	330.1
Average	894	.....	67.2	1,354	.....	67.7	1,203	.....	66.0
Entire after period:									
Total	9,440	1.0297	686.9	14,705	1.0195	700.0	12,509	1.0214	654.6
Average	944	.....	68.7	1,470	.....	70.0	1,251	.....	65.5

TABLE V.—*Urine determinations—Volume, specific gravity, and total solids, Series VII*—Continued.

[Averages are per day.]

Period.	No. 4.			No. 5.			No. 6.		
	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).
Fore period.									
First subperiod:	*cc.*		*Grams.*	*cc.*		*Grams.*	*cc.*		*Grams.*
Total	4,730	1.0307	355.8	.....	.....	.....	4,140	1.0276	279.9
Average	946	.....	71.2	.....	.....	.....	828	.....	56.0
Second subperiod:									
Total	5,000	1.0294	361.0	4,680	1.0232	266.0	4,240	1.0276	286.7
Average	1,000	.....	72.2	936	.....	53.2	848	.....	57.3
Entire fore period:									
Total	9,730	1.0300	716.8	.....	.....	.....	8,380	1.0276	566.6
Average	973	.....	71.6	.....	.....	.....	838	.....	56.7
Preservative period.									
First subperiod:									
Total	5,220	1.0278	355.5	5,880	1.0208	299.6	4,615	1.0268	303.0
Average	1,044	.....	71.1	1,176	.....	59.9	923	.....	60.6
Second subperiod:									
Total	5,410	1.0279	369.8	5,420	1.0222	294.8	4,760	1.0277	323.0
Average	1,082	.....	73.9	1,084	.....	59.0	952	.....	64.6
Third subperiod:									
Total	5,020	1.0303	372.7	5,115	1.0200	250.6	4,595	1.0286	322.0
Average	1,004	.....	74.5	1,023	.....	50.1	919	.....	64.4
Fourth subperiod:									
Total	5,175	1.0304	385.4	4,560	1.0180	201.1	4,640	1.0272	309.2
Average	1,035	.....	77.1	912	.....	40.2	928	.....	61.8
Entire preservative period:									
Total	20,825	1.0291	1,483.4	20,975	1.0202	1,046.1	18,610	1.0276	1,257.2
Average	1,041	.....	74.2	1,049	.....	52.3	930	.....	62.9
After period.									
First subperiod:									
Total	5,080	1.0296	368.4	4,600	1.0185	208.5	4,720	1.0275	318.0
Average	1,016	.....	73.7	920	.....	41.7	944	.....	63.6
Second subperiod:									
Total	4,890	1.0295	353.4	4,020	1.0216	212.7	4,610	1.0274	309.5
Average	978	.....	70.7	804	.....	42.5	922	.....	61.9
Entire after period:									
Total	9,970	1.0296	721.8	8,620	1.0200	421.2	9,330	1.0275	627.5
Average	997	.....	72.2	862	.....	42.1	933	.....	62.8

TABLE V.—*Urine determinations—Volume, specific gravity, and total solids, Series VII*—Continued.

[Averages are per day.]

Period.	No. 7.			No. 8.			No. 9.		
	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 5°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).
Fore period.									
First subperiod:	*cc.*		*Grams.*	*cc.*		*Grams.*	*cc.*		*Grams.*
Total	[a] 4,325	1.0220	[a] 233.1	[a] 7,625	1.0160	[a] 298.9	4,550	1.0258	287.6
Average	865	.....	46.6	1,525	.....	59.8	910	.....	57.5
Second subperiod:									
Total	4,970	1.0200	243.5	7,735	1.0165	312.7	5,335	1.0244	318.9
Average	994	.....	48.7	1,547	.....	62.5	1,067	.....	63.8
Entire fore period:									
Total	9,295	1.0210	476.6	15,360	1.0162	611.6	9,885	1.0251	606.5
Average	930	.....	47.7	1,536	.....	61.2	989	.....	60.7
Preservative period.									
First subperiod:									
Total	5,790	1.0187	265.3	9,850	1.0131	318.5	5,580	1.0238	325.4
Average	1,158	.....	53.1	1,970	.....	63.7	1,116	.....	65.1
Second subperiod:									
Total	3,925	1.0231	269.4	9,155	1.0139	311.7	5,650	1.0237	328.1
Average	785	.....	53.9	1,831	.....	62.3	1,130	.....	65.6
Third subperiod:									
Total	[a] 5,850	1.0187	[a] 268.8	10,470	1.0120	307.8	5,845	1.0221	316.5
Average	1,170	.....	53.8	2,094	.....	61.6	1,169	.....	63.3
Fourth subperiod:									
Total	.....	.....	.....	9,705	1.0140	332.9	5,840	1.0254	363.4
Average	.....	.....	.....	1,941	.....	66.6	1,168	.....	72.7
First, second, and third subperiods:									
Total	15,565	1.0202	803.5	.....	.....	.....	.....	.....	.....
Average	1,038	.....	53.6	.....	.....	.....	.....	.....	.....
Entire preservative period:									
Total	.....	.....	.....	39,180	1.0133	1,270.9	22,915	1.0237	1,333.4
Average	.....	.....	.....	1,959	.....	63.5	1,146	.....	66.7
After period.									
First subperiod:									
Total	.....	.....	.....	11,320	1.0111	307.8	5,300	1.0257	333.7
Average	.....	.....	.....	2,264	.....	61.6	1,060	.....	66.7
Second subperiod:									
Total	.....	.....	.....	9,160	1.0137	307.4	5,450	1.0246	328.5
Average	.....	.....	.....	1,832	.....	61.5	1,090	.....	65.7
Entire after period:									
Total	.....	.....	.....	20,480	1.0124	615.2	10,750	1.0251	662.2
Average	.....	.....	.....	2,048	.....	61.5	1,075	.....	66.2

[a] Average added to complete record.

TABLE V.—*Urine determinations—Volume, specific gravity, and total solids, Series VII*—Continued.

[Averages are per day.]

Period.	No. 10.			No. 11.			No. 12.		
	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).
Fore period.									
First subperiod:	*cc.*		*Grams.*	*cc.*		*Grams.*	*cc.*		*Grams.*
Total	4,555	1.0257	286.8	6,565	1.0222	357.1	5,850	1.0230	329.6
Average	911	.....	57.4	1,313	.....	71.4	1,170	.....	65.9
Second subperiod:									
Total	4,810	1.0257	302.9	6,640	1.0221	359.5	5,710	1.0237	331.5
Average	962	.....	60.6	1,328	.....	71.9	1,142	.....	66.3
Entire fore period:									
Total	9,365	1.0257	589.7	13,205	1.0221	716.6	11,560	1.0233	661.1
Average	937	.....	59.0	1,321	.....	71.7	1,156	.....	66.1
Preservative period.									
First subperiod:									
Total	4,540	1.0247	274.7	6,385	1.0226	353.5	6,750	1.0208	344.0
Average	908	.....	54.9	1,277	.....	70.7	1,350	.....	68.8
Second subperiod:									
Total	5,850	1.0166	237.9	6,520	1.0196	313.1	8,015	1.0185	363.3
Average	1,170	.....	47.6	1,304	.....	62.6	1,603	.....	72.7
Third subperiod:									
Total	6,190	1.0180	273.0	6,920	1.0198	335.7	6,605	1.0222	359.2
Average	1,238	.....	54.6	1,384	.....	67.1	1,321	.....	71.8
Fourth subperiod:									
Total	6,260	1.0194	297.5	7,405	1.0200	362.8	6,400	1.0207	324.6
Average	1,252	.....	59.5	1,481	.....	72.6	1,280	.....	64.9
Entire preservative period:									
Total	22,840	1.0197	1,083.1	27,230	1.0205	1,365.1	27,770	1.0205	1,391.1
Average	1,142	.....	54.2	1,361	.....	68.3	1,388	.....	69.6
After period.									
First subperiod:									
Total	7,140	1.0174	304.4	5,720	1.0238	333.5	5,500	1.0232	312.6
Average	1,428	.....	66.9	1,144	.....	66.7	1,100	.....	62.5
Second subperiod:									
Total	5,160	1.0213	269.3	[a] 7,350	1.0205	[a] 369.1	5,730	1.0238	334.1
Average	1,032	.....	53.9	1,470	.....	73.8	1,146	.....	66.8
Entire after period:									
Total	12,300	1.0193	573.7	13,070	1.0221	702.6	11,230	1.0235	646.7
Average	1,230	.....	57.4	1,307	.....	70.3	1,123	.....	64.7

TABLE V.—*Urine determinations—Volume, specific gravity, and total solids, Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Period.	Nos. 1, 2, 3, 4, 5, and 6.			Nos. 1 and 4.			Nos. 5 and 6.		
	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).
Fore period.									
First subperiod:	*cc.*		*Grams.*	*cc.*		*Grams.*	*cc.*		*Grams.*
Total	[a]26,704	[a]1.0262	[a]1,658.3	9,415	1.0304	700.1	.....	.....	.....
Average	1,068	.....	66.3	942	.....	70.0	.....	.....	.....
Second subperiod:									
Total	33,380	1.0247	1,940.4	9,530	1.0297	693.9	8,920	1.0254	552.7
Average	1,113	.....	64.7	953	.....	69.4	892	.....	55.3
Entire fore period:									
Total	60,084	1.0254	3,598.7	18,945	1.0300	1,394.0	.....	.....	.....
Average	1,092	.....	65.4	947	.....	69.7	.....	.....	.....
Preservative period.									
First subperiod:									
Total	33,630	1.0239	1,924.7	10,160	1.0272	676.2	10,495	1.0238	602.6
Average	1,121	.....	64.2	1,016	.....	67.6	1,049	.....	60.3
Second subperiod:									
Total	35,120	1.0247	2,039.0	9,490	1.0295	681.7	10,180	1.0249	617.8
Average	1,171	.....	68.0	949	.....	68.2	1,018	.....	61.8
Third subperiod:									
Total	33,765	1.0252	2,027.4	9,660	1.0307	725.1	9,710	1.0243	572.6
Average	1,126	.....	67.6	966	.....	72.5	971	.....	57.3
Fourth subperiod:									
Total	.....	.....	.....	10,725	1.0294	771.6	9,200	1.0226	510.3
Average	.....	.....	.....	1,073	.....	77.2	920	.....	51.0
First, second, and third subperiods:									
Total	102,515	1.0246	5,991.1	.....	.....	.....	.....	.....	.....
Average	1,139	.....	66.6	.....	.....	.....	.....	.....	.....
Entire preservative period:									
Total	.....	.....	.....	40,035	1.0292	2,854.6	39,585	1.0239	2,303.3
Average	.....	.....	.....	1,001	.....	71.4	990	.....	57.6
After period.									
First subperiod:									
Total	33,799	1.0239	1,931.7	10,050	1.0292	719.1	9,320	1.0230	526.5
Average	1,127	.....	64.4	1,005	.....	71.9	932	.....	52.7
Second subperiod:									
Total	30,775	1.0253	1,880.3	9,360	1.0301	689.6	8,630	1.0245	522.2
Average	1,026	.....	62.7	936	.....	69.0	863	.....	52.2
Entire after period:									
Total	64,574	1.0246	3,812.0	19,410	1.0297	1,408.7	17,950	1.0237	1,048.7
Average	1,076	.....	63.5	971	.....	70.4	697	.....	52.4

[a] No. 5 absent.

TABLE V.—*Urine determinations—Volume, specific gravity, and total solids, Series VII*—Continued.

[Averages are per man per day.]

Period.	Nos. 7, 8, 9, 10, 11, and 12.			Nos. 8, 9, 10, and 11.			Nos. 7 and 12.		
	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).	Volume.	Specific gravity at 25°/25° C.	Total solids (factor 0.245).
Fore period.									
First subperiod:	*cc.*		*Grams.*	*cc.*		*Grams.*	*cc.*		*Grams.*
Total	33,470	1.0224	1,793.1	23,295	1.0224	1,230.4	10,175	1.0225	562.7
Average	1,116	.....	59.8	1,165	.....	61.5	1,017	.....	56.3
Second subperiod:									
Total	35,200	1.0221	1,869.0	24,520	1.0222	1,294.0	10,680	1.0218	575.0
Average	1,173	.....	62.3	1,226	.....	64.7	1,068	.....	57.5
Entire fore period:									
Total	68,670	1.0223	3,662.1	47,815	1.0223	2,524.4	20,855	1.0222	1,137.7
Average	1,145	.....	61.0	1,195	.....	63.1	1,043	.....	56.9
Preservative period.									
First subperiod:									
Total	38,895	1.0206	1,881.4	26,355	1.0211	1,272.1	12,540	1.0198	609.3
Average	1,296	.....	62.7	1,318	.....	63.6	1,254	.....	60.9
Second subperiod:									
Total	39,115	1.0192	1,823.5	27,175	1.0184	1,190.8	11,940	1.0208	632.7
Average	1,304	.....	60.8	1,359	.....	59.5	1,194	.....	63.3
Third subperiod:									
Total	41,880	1.0188	1,861.0	29,425	1.0180	1,233.0	12,455	1.0204	628.0
Average	1,396	.....	62.0	1,471	.....	61.7	1,245	.....	62.8
Fourth subperiod:									
Total	.....	.....	.....	29,210	1.0197	1,356.6	.....	.....	.....
Average	.....	.....	.....	1,460	.....	67.8	.....	.....	.....
First, second, and third subperiods:									
Total	119,890	1.0195	5,565.9	.....	.....	.....	36,935	1.0203	1,870.0
Average	1,332	.....	61.8	.....	.....	.....	1,231	.....	62.3
Entire preservative period:									
Total	.....	.....	.....	112,165	1.0193	5,052.5	.....	.....	.....
Average	.....	.....	.....	1,402	.....	63.2	.....	.....	.....
After period.									
First subperiod:									
Total	.....	.....	.....	29,480	1.0195	1,279.4	.....	.....	.....
Average	.....	.....	.....	1,474	.....	64.0	.....	.....	.....
Second subperiod:									
Total	.....	.....	.....	27,120	1.0200	1,274.3	.....	.....	.....
Average	.....	.....	.....	1,356	.....	63.7	.....	.....	.....
Entire after period:									
Total	.....	.....	.....	56,600	1.0198	2,553.7	.....	.....	.....
Average	.....	.....	.....	1,415	.....	63.8	.....	.....	.....

SERIES XIII.

INDIVIDUAL DATA.

In order to confirm or disprove the marked tendency shown by the preservative in the original series to diminish the red blood cells, a special study of six young men was inaugurated, beginning December 1, 1906, and extending to December 20, 1906. (See p. 882.) In addition to the effects noted on the blood, data for the fore and preservative periods were obtained in regard to the volume and acidity of the urine. The data on acidity will be considered under the following caption.

The data for No. 1 show an average excretion of 1,109 cc per day in the fore period and 969 cc in the preservative period, indicating a considerable diminution in the volume of urine. In the case of No. 2 the average quantity of urine excreted in the fore period is 1,296 cc and in the preservative period 1,150 cc, showing again a decided decrease in volume. In the case of No. 3 the average quantity of urine excreted in the fore period is 1,053 cc and in the preservative period 1,142 cc, showing a marked increase.

These three men received sulphurous acid in the form of sodium sulphite. For Nos. 4, 5, and 6, who received sulphurous acid in the form of a gas in solution, the following results were obtained:

In the case of No. 4 the average quantity of urine excreted in the fore period is 687 cc and in the preservative period 1,028 cc, showing a marked increase. In the case of No. 5 the average quantity excreted in the fore period is 1,198 cc and in the preservative period 1,170 cc—practically no change in volume. In the case of No. 6 the average quantity of urine excreted in the fore period is 953 cc and in the after period 1,080 cc, showing a marked increase.

SUMMARIES.

The summary for Nos. 1, 2, and 3, receiving sodium sulphite, shows the average quantity of urine excreted in the fore period to be 1,153 cc and in the preservative period 1,087 cc, a notable decrease in volume. In the case of Nos. 4, 5, and 6 the average quantity of urine excreted in the fore period is 945 cc and in the preservative period 1,093 cc, showing a notable increase.

The summary for the six subjects shows that the average quantity of urine excreted in the fore period is 1,056 cc and in the preservative period 1,090 cc, showing only a slight increase in volume.

The data in regard to the volume, while not showing as distinct a diuretic effect as in the original series, still shows some relationship. In the average for Nos. 1, 2, and 3, who received sodium sulphite, there is seen some tendency to diminish the quantity of urine excreted during the preservative period. On the other hand, in the original series an increase in the volume is observed. The quantity of preservative administered, it may be well to note, was considerably smaller during the preservative period of this special study than during Series VII—a fact which probably influenced the results considerably. Nevertheless, in the case of those subjects receiving sulphurous acid there is seen a slight increase in the volume during the preservative period, which seems to bear out the conclusion indicated in the original study, namely, that free sulphurous acid exerts more of a diuretic effect than when administered as sodium sulphite.

TABLE VI.—*Urine determinations—Supplemental study of volume and acidity, Series XIII.*

Period.	No. 1.				No. 2.				No. 3.			
	Volume.	Acidity.			Volume.	Acidity.			Volume.	Acidity.		
		N/10 NaOH per 100 cc.	By litmus.			N/10 NaOH per 100 cc.	By litmus.			N/10 NaOH per 100 cc.	By litmus.	
			Times acid.	Times amphoteric.			Times acid.	Times amphoteric.			Times acid.	Times amphoteric.
1906.												
Fore period:	cc.	cc.			cc.	cc.			cc.	cc.		
Dec. 1	2,765	.....	.....	.....	2,750	.....	.....	.....	2,750	.....	.....	.....
2												
3	835	.....	.....	.....	1,260	.....	.....	.....	630	.....	.....	.....
4	820	.....	.....	.....	1,320	.....	.....	.....	845	.....	.....	.....
5	1,125	.....	.....	.....	1,150	.....	.....	.....	1,040	.....	.....	.....
Total	5,545	.....	.....	.....	6,480	.....	.....	.....	5,265	.....	.....	.....
Average	1,109	30.9	0	4	1,296	26.6	3	1	1,053	26.9	1	3
First preservative subperiod:												
Dec. 6	790	.....	.....	.....	880	.....	.....	.....	1,020	.....	.....	.....
7	950	.....	.....	.....	1,150	.....	.....	.....	1,300	.....	.....	.....
8	2,000	.....	.....	.....	2,650	.....	.....	.....	2,640	.....	.....	.....
9												
10	810	.....	.....	.....	960	.....	.....	.....	685	.....	.....	.....
Total	4,550	.....	.....	.....	5,640	.....	.....	.....	5,645	.....	.....	.....
Average	910	52.3	4	0	1,128	41.8	4	0	1,129	27.7	3	1
Second preservative subperiod:												
Dec. 11	1,040	.....	.....	.....	1,370	.....	.....	.....	840	.....	.....	.....
12	990	.....	.....	.....	1,350	.....	.....	.....	1,230	.....	.....	.....
13	1,020	.....	.....	.....	1,200	.....	.....	.....	1,310	.....	.....	.....
14	900	.....	.....	.....	1,300	.....	.....	.....	1,530	.....	.....	.....
15	1,015	.....	.....	.....	1,075	.....	.....	.....	1,010	.....	.....	.....
Total	4,965	.....	.....	.....	6,295	.....	.....	.....	5,920	.....	.....	.....
Average	993	53.9	5	0	1,259	45.7	5	0	1,184	28.7	4	1
Third preservative subperiod:												
Dec. 16	1,015	.....	.....	.....	1,075	.....	.....	.....	1,010	.....	.....	.....
17	920	.....	.....	.....	940	.....	.....	.....	880	.....	.....	.....
18	1,060	.....	.....	.....	1,250	.....	.....	.....	1,550	.....	.....	.....
19	1,100	.....	.....	.....	1,100	.....	.....	.....	1,315	.....	.....	.....
20	920	.....	.....	.....	950	.....	.....	.....	810	.....	.....	.....
Total	5,015	.....	.....	.....	5,315	.....	.....	.....	5,565	.....	.....	.....
Average	1,003	51.9	5	0	1,063	44.7	5	.....	1,113	32.2	4	1
Entire preservative period:												
Total	14,530	.....	.....	.....	17,250	.....	.....	.....	17,130	.....	.....	.....
Average	969	52.7	14	0	1,150	44.0	14	0	1,142	29.5	11	3

TABLE VI.—*Urine determinations—Supplemental study of volume and acidity, Series XIII*—Continued.

Period.	No. 4.				No. 5.				No. 6.				Amount of preservative.			
	Volume.	Acidity.			Volume.	Acidity.			Volume.	Acidity.			Nos. 1-3 received sodium sulphite.		Nos. 4-6 received sulphurous acid.	
		N/10 NaOH per 100 cc.	By litmus.			N/10 NaOH per 100 cc.	By litmus.			N/10 NaOH per 100 cc.	By litmus.		As Na_2SO_3.	As SO_2.	As SO_2.	As SO_2.
			Times acid.	Times amphoteric.			Times acid.	Times amphoteric.			Times acid.	Times amphoteric.				
1906.	*cc.*	*cc.*			*cc.*	*cc.*			*cc.*	*cc.*			*Gm.*	*Mg.*	*Nos. 4 & 5 Mg.*	*No. 6 Mg.*
Fore period:																
Dec. 1	1,680	.....	...	....	2,250	.....	...	....	.....	.....	...	....	.....	.....	.....	.....
2																
3	485	.....	...	....	1,010	.....	...	....	1,040	.....	...	....	.....	.....	.....	.....
4	600	.....	...	....	1,420	.....	...	....	900	.....	...	....	.....	.....	.....	.....
5	670	.....	...	....	1,310	.....	...	....	920	.....	...	....	.....	.....	.....	.....
Total	3,435	.....	...	....	5,990	.....	...	....	2,860	.....	...	....	.....	.....	.....	.....
Average	687	36.7	2	2	1,198	24.5	4	0	953	28.8	3	0	.....	.....	.....	.....
First preservative subperiod:																
Dec. 6	480	.....	...	....	1,120	.....	...	....	960	.....	...	....	1.0	508	300	.....
7	740	.....	...	....	1,415	.....	...	....	960	.....	...	....	1.0	508	300	.....
8	2,620	.....	...	....	2,760	.....	...	....	880	.....	...	....	1.0	508	300	.....
9									800	.....	...	....	1.0	508	300	.....
10	485	.....	...	....	1,100	.....	...	....	1,210	.....	...	....	1.0	508	300	.....
Total	4,325	.....	...	....	6,395	.....	...	....	4,810	.....	...	....	5.0	2,540	1,500	.....
Average	865	36.9	4	0	1,279	27.2	3	1	962	36.6	5	0	1.0	508	300	.....
Second preservative subperiod:																
Dec. 11	1,260	.....	...	....	1,300	.....	...	....	1,540	.....	...	...	1.5	[a] 200 762	400	300
12	1,200	.....	...	....	1,100	.....	...	....	1,210	.....	...	....	2.0	1,016	400	300
13	840	.....	...	....	960	.....	...	....	1,400	.....	...	....	2.0	1,016	400	300
14	1,100	.....	...	....	1,060	.....	...	....	920	.....	...	....	2.0	1,016	400	300
15	1,270	.....	...	....	990	.....	...	....	920	.....	...	....	2.0	1,016	400	300
Total	5,670	.....	...	....	5,410	.....	...	....	5,990	.....	...	....	9.5	5,026	2,000	1,500
Average	1,134	25.9	5	0	1,082	36.6	5	0	1,198	30.3	5	0	1.9	1,005	400	300
Third preservative subperiod:																
Dec. 16	1,270	.....	...	....	1,280	.....	...	....	.....	.....	...	....	3.0	1,524	500	400
17	960	.....	...	....	990	.....	...	....	.....	.....	...	....	3.0	1,524	500	400
18	1,160	.....	...	....	1,020	.....	...	....	.....	.....	...	....	3.0	1,524	500	400
19	1,170	.....	...	....	1,120	.....	...	....	.....	.....	...	....	3.0	1,524	500	400
20	870	.....	...	....	1,340	.....	...	....	.....	.....	...	....	3.0	1,524	500	400
Total	5,430	.....	...	....	5,750	.....	...	....	.....	.....	...	....	15.0	7,620	2,500	2,000
Average	1,086	31.6	5	0	1,152	36.0	5	0	.....	.....	...	0	3.0	1,524	500	400
Entire preservative period:																
Total	15,425	.....	...	....	17,555	.....	...	....	10,800	.....	...	....	29.5	15,186	6,000	3,500
Average	1,028	31.5	14	0	1,170	33.3	13	1	1,080	33.5	10	0	1.3	1,612	400	350

[a] As sulphurous acid at breakfast of this date.

TABLE VI.—*Urine determinations—Supplemental study of volume and acidity, Series XIII*—Continued.

SUMMARIES.

Period.	Nos. 1, 2, and 3 received sodium sulphite.				Nos. 4, 5, and 6 received sulphurous acid.				Nos. 1 to 6.			
	Volume.	Acidity.			Volume.	Acidity.			Volume.	Acidity.		
		N/10 NaOH per 100 cc.	By litmus.			N/10 NaOH per 100 cc.	By litmus.			N/10 NaOH per 100 cc.	By litmus.	
			Times acid.	Times amphoteric.			Times acid.	Times amphoteric.			Times acid.	Times amphoteric.
1906.		cc.	Per cent.	Per cent.	cc.	cc.	Per cent.	Per cent.	cc.	cc.	Per cent.	Per cent.
Fore period	1,153	28.1	33	67	945	30.0	83	17	1,056	29.1	58	42
First preservative subperiod	1,056	40.6	.....	.....	1,035	33.6	.....	.....	1,046	37.1	.....	.....
Second preservative subperiod	1,145	42.8	.....	.....	1,138	30.9	.....	.....	1,142	36.9	.....	.....
Third preservative subperiod	1,060	42.9	.....	.....	[a] 1,106	[a] 33.7	.....	.....	1,083	38.3	.....	.....
Entire preservative period	1,087	42.1	93	7	1,093	32.7	98	2	1,090	37.4	96	4

[a] Average of first and second preservative periods added to complete record for No. 6.

PRESENCE OF ALBUMIN AND THE REACTION OF THE URINE.

During Series VII the presence of albumin was qualitatively determined only a limited number of times. The reaction of the urine was not observed in this series, but was determined in connection with additional data on albumin in the two special series, XI (see p. 1021) and XIII, recorded in the preceding pages.

In the case of No. 1, during the fore period there was no positive test for albumin obtained, and the same condition continued during the first preservative subperiod and part of the second. During the latter part of this subperiod, however, a very minute trace was observed, which continued throughout the remainder of the experiment with the one exception of an observation made in the fourth preservative subperiod, when no albumin was found.

In the case of No. 2 there is a positive test for albumin throughout the entire period of observation. Minute traces were observed during the preservative period, while the two observations made during the after period indicated the presence of a trace.

No positive reactions were obtained for No. 3 until the latter part of the preservative period, when a minute trace was reported. During the after period a very minute trace is recorded.

In the cases of Nos. 4 and 5 negative results were obtained throughout the period of observation, while No. 6 shows a small quantity in every instance without regard to the administration of the preservative.

There is only a broken record for No. 7, and all the observations recorded are negative. In the case of No. 8 the tests for the presence

of albumin are all negative with the exception of that for the third preservative subperiod, when a very minute trace is reported. Nos. 9 and 10 are negative throughout. No. 11 is negative until the third preservative subperiod is reached, when a very minute trace is recorded, which continues throughout the remaining periods of observation with the exception of one negative result in the after period. No. 12 is negative until the fourth preservative subperiod, when a minute trace is reported, which continues throughout the after period.

These limited data are not sufficiently decisive to establish any general effect as produced by the preservative, and further studies were made of this point in the special series, as before mentioned, where the same contradictory evidence is furnished by the data obtained for five men, which precludes the drawing of any positive conclusion in regard to the production of albumin in the urine by this preservative. In the cases of Nos. 1, 3, 11, and 12 of Series VII, however, a slight tendency is shown on the part of the sulphurous acid, whether combined as a sulphite or in a free state, to develop albumin in the urine when it is not present.

In the special Series XIII before mentioned (see Table VI) the question of the influence of the preservative on the acidity of the urine is considered.

The acidity is expressed as cubic centimeters of tenth-normal sodium hydroxid per 100 cc of urine, and the number of acid and amphoteric reactions obtained with litmus paper is also given. With the exception of No. 4, an increase in acidity is shown in every case throughout the preservative period. Summarizing the average figures according to the form of preservative administered, it is seen that for those receiving sodium sulphite the acidity in the fore period is expressed by 28.1 and for the preservative period by 42.1. There is also a marked increase shown by the reactions obtained by testing with litmus paper, 33 per cent of the tests being acid in the fore period and 93 per cent in the preservative period.

In the case of Nos. 4, 5, and 6, who received sulphurous acid, a slight increase is also shown, from 30 in the fore period to 32.7 during the preservative period. The litmus-paper tests show an increase in these cases also, from 83 to 98 per cent. Considering the set of subjects together, it is seen that as an average 29.1 cc of tenth-normal sodium hydroxid were required to neutralize 100 cc of urine during the fore period and 37.4 cc during the preservative period. Litmus paper gives an acid reaction in 58 per cent of the tests during the fore period and in 96 per cent in the preservative period.

There is evidenced a strong tendency to render the urine acid, which tendency is much more marked when sodium sulphite was administered. This subject is further discussed under Series XI, page 1021.

RATIO OF SULPHUR, SULPHATES, AND PHOSPHATES TO THE NITROGEN EXCRETED IN THE URINE.

In Table VII a study is given of the relations of sulphur as total sulphur and as sulphates, and phosphorus as phosphoric anhydrid to the nitrogen. Inasmuch as in this case the quantity of sulphur and sulphates is largely increased in the preservative period and increased to a certain extent in the after period, theoretically the ratio of these bodies to the nitrogen would be smaller in the preservative period and in the after period than in the fore period. The practical point, therefore, to be kept in view would be the influence exerted by the sulphurous acid upon the relative proportions of nitrogen to phosphoric acid in the urine. For this purpose the small variations in the amounts of these two bodies ingested in the various periods may be left out of consideration. In the case of No. 1 the ratio of phosphoric acid to the nitrogen rises in the preservative period from 1:6.1 to 1:6.4. This increase is maintained also in the after period, where the ratio rises to 1:6.5.

In the case of No. 2 the phosphoric acid ratio in the preservative period remains almost the same as in the fore period, and is the same in the after period as in the preservative period, namely, 1:5.3. In No. 3 the ratio of phosphoric acid to the nitrogen is increased, rising from 1:6.8 to 1:7.1. This increase is practically maintained in the after period, where it is 1:7.0.

The ratio of phosphoric acid to nitrogen in the case of No. 4 is considerably decreased in the preservative period, falling from 1:6.0 to 1:5.2, and remaining practically the same in the after period, namely, 1:5.3. In the case of No. 5 the data are incomplete for the fore period, and a comparison is of little value. For No. 6 the ratio of phosphoric acid to nitrogen is increased from 1:5.0 to 1:6.0 in the preservative period and maintained almost at the same point in the after period, namely, 1:5.9, the phosphoric acid in this case being greatly reduced.

In the case of No. 7 there is a marked increase in the magnitude of the phosphoric acid ratio, which rises from 1:6.6 in the fore period to 1:7.2 in the preservative period. There is a decrease in the ratio of phosphoric acid to nitrogen in the case of No. 8, where it falls from 1:6.2 in the fore period to 1:5.7 in the preservative period, rising, however, in the after period to 1:6.6. The ratio of phosphoric acid to nitrogen is decreased in the case of No. 9 in the preservative period from 1:6.5 to 1:6.2. A slight increase is observed in the after period, the magnitude of the ratio reaching 1:6.3. The phosphoric acid ratio rises in the case of No. 10 from 1:5.9 in the fore period to 1:6.0 in the preservative period, falling again in the after period to the same magnitude as at first.

In the case of No. 11 there is again an increase in the magnitude of the phosphoric acid ratio in the preservative period, rising from

1:5.9 in the fore period to 1:6.2 in the preservative period and increasing to 1:6.3 in the after period.

In the case of No. 12 there is a gradual decline throughout the observation in the ratio of phosphoric acid to nitrogen, falling from 1:6.2 in the fore period to 1:5.9 in the preservative period and to 1:5.3 in the after period.

Comparing the summaries of Nos. 1 to 6, inclusive, with those of Nos. 8 to 11, inclusive, it is seen that the ratio of the phosphoric acid to nitrogen for Nos. 1 to 6 in the fore period is 1:5.8, in the preservative period 1:5.9, and in the after period 1:5.8.

This shows a slight tendency on the part of the preservative, namely, sodium sulphite, either to increase the excretion of nitrogen or to diminish the excretion of phosphorus in relation to each other. In this case it is noticed that the quantities of nitrogen and of phosphorus excreted are both decreased somewhat. In the after period the ratio is restored to the same magnitude as that in the fore period.

In the summaries for Nos. 8 to 11, inclusive, the ratio of the phosphoric acid to nitrogen is 1:6.1 in the fore period, 1:6.0 in the preservative period, and 1:6.3 in the after period. In this case the opposite condition obtains from that noted in the preceding instance. The administration of the sulphurous acid in the form of a free acid or gas has apparently increased the excretion of phosphoric acid in relation to the nitrogen excreted, since the ratio is less.

The disturbances which have been caused by the administration of the preservative between the relative excretion of nitrogen and phosphoric acid are not of a sufficient magnitude to warrant any certain conclusions. If the two summaries be considered together, it is evident that there has been practically no disturbance of the relation between the excretion of these two substances. Considering the two summaries separately, it would appear that the administration of the sulphurous acid in the form of sulphites tends to decrease the elimination of phosphoric acid in relation to nitrogen, while if administered in the form of uncombined acid it tends to increase the excretion of phosphoric acid in relation to nitrogen. This change, however, is so minute that it may be said that very little influence is exerted by the preservative upon the relative excretions of phosphoric acid and nitrogen in the urine.

The problem may also be looked at from a different point of view, as illustrated in Table VIII. In this table the ratios are based on the amounts of nitrogen, sulphur, and phosphoric acid excreted in the urine, expressed as percentage of amounts ingested, instead of making the comparison between the actual amounts of these substances excreted. In the preservative period the calculation for sulphur excreted is made on the sulphur exhibited in the food plus the sulphur administered as a preservative.

In the case of No. 1 the ratio of the phosphoric acid in the preservative period remains unchanged, while it is slightly increased in the after period. In the case of No. 2 there is no change whatever in the ratio of the phosphoric acid to the percentage of nitrogen in the food excreted in the urine. In the case of No. 3 the ratio is slightly increased, and this increase is maintained in the after period. In the case of No. 4 the nitrogen is diminished in the preservative period, and this loss is partly regained in the after period. In the case of No. 5 the ratio is considerably increased in the preservative period, and decreases in the after period almost to the initial point. In the case of No. 6 the ratio of the phosphoric acid is again increased, and this increase is maintained in the after period. In the case of No. 7 the ratio in the preservative period is slightly increased. In the case of No. 8 the ratio is slightly increased in the preservative period and again in the after period. In the case of No. 9 the ratio remains unchanged throughout the three periods. In the case of No. 10 there is a slight increase in the preservative period, and this is maintained in the after period. The same remark is true of No. 11. In the case of No. 12 there is a slight diminution in the preservative period, and this diminution is maintained in the after period.

Summarizing the data for Nos. 1 to 6, inclusive, and Nos. 8 to 11, inclusive, we find in the first instance that the ratio of the percentage of phosphoric acid ingested that is excreted in the urine to the percentage of nitrogen excreted in the urine is 1 : 1.46 in the fore period, 1 : 1.55 in the preservative period, and 1 : 1.53 in the after period. These figures indicate a tendency on the part of the preservative administered in the form of sulphite to diminish the relative excretion of phosphoric acid, as compared with that of nitrogen. This tendency is also noticed in the after period, but to a less extent. In the second summary for Nos. 8 to 11, inclusive, having received sulphurous acid in a free state, it is noticed that the ratio in the fore period is 1 : 1.49, in the preservative period 1 : 1.53, and in the after period 1 : 1.58. In this series, as in the first one, there appears to be a tendency on the part of the preservative to diminish the quantity of phosphoric acid excreted in proportion to the quantity of nitrogen excreted, and this tendency is even more marked in the after period.

The average results expressed in this manner are concordant for both summaries, showing a slight tendency to diminish the relative excretion of phosphoric acid, with the one exception that the results as given in Table VII show a slight tendency on the part of free sulphurous acid to increase the relative excretion of phosphoric acid.

Taken as a whole, and considering the slight variations of the ratio from the normal, it is evident that the preservative does not exert any great influence in changing the relative amounts of phosphoric acid and nitrogen excreted.

TABLE VII.—*Urine determinations—Ratio of sulphur, sulphates, and phosphates to nitrogen, Series VII.*

[Averages are per day.]

Period.	No. 1.							No. 2.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S:N.	SO_3:N.	P_2O_5:N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S:N.	SO_3:N.	P_2O_5:N.
Fore period.														
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
Total	80.75	5.645	12.746	14.055	1:14.3	1:6.3	1:5.7	[a] 90.25	6.055	13.200	17.380	1:14.9	1:6.8	1:5.2
Average	16.15	1.129	2.549	2.811	.....	.....	.....	18.05	1.211	2.640	3.476	.....	.....	.....
Second subperiod:														
Total	79.85	5.686	12.445	12.401	1:14.0	1:6.4	1:6.4	88.28	5.850	12.670	16.734	1:15.1	1:7.0	1:5.3
Average	15.97	1.136	2.489	2.480	.....	.....	.....	17.66	1.170	2.534	3.347	.....	.....	.....
Entire fore period:														
Total	160.60	11.326	25.191	26.456	1:14.2	1:6.4	1:6.1	178.53	11.905	25.870	34.114	1:15.0	1:6.9	1:5.2
Average	16.06	1.133	2.519	2.646	.....	.....	.....	17.85	1.191	2.587	3.411	.....	.....	.....
Preservative period.														
First subperiod:														
Total	75.62	6.054	13.060	11.718	1:12.5	1:5.8	1:6.5	80.36	5.893	13.080	14.035	1:13.6	1:6.1	1:5.7
Average	15.12	1.211	2.612	2.344	.....	.....	.....	16.07	1.179	2.616	2.807	.....	.....	.....
Second subperiod:														
Total	69.40	6.487	14.250	11.235	1:10.7	1:4.9	1:6.2	81.48	7.025	15.130	17.011	1:11.6	1:5.4	1:4.8
Average	13.88	1.297	2.850	2.247	.....	.....	.....	16.30	1.405	3.026	3.402	.....	.....	.....
Third subperiod:														
Total	74.89	7.909	16.700	12.143	1:9.5	1:4.5	1:6.2	91.36	8.483	18.490	16.587	1:10.8	1:4.9	1:5.5
Average	14.98	1.582	3.340	2.429	.....	.....	.....	18.27	1.697	3.698	3.317	.....	.....	.....
Fourth subperiod:														
Total	77.89	8.217	17.340	11.414	1:9.5	1:4.5	1:6.8	(b)	.....	.....	.....	.....	.....	.....
Average	15.58	1.643	3.468	2.283	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
First, second, and third subperiods:														
Total	.....	.....	.....	.....	.....	.....	.....	253.20	21.401	46.700	47.633	1:11.8	1:5.4	1:5.3
Average	.....	.....	.....	.....	.....	.....	.....	16.88	1.427	3.113	3.176	.....	.....	.....
Entire preservative period:														
Total	297.80	28.667	61.350	46.510	1:10.4	1:4.9	1:6.4	.....	.....	.....	.....	.....	.....	.....
Average	14.89	1.433	3.068	2.326	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
After period.														
First subperiod:														
Total	77.01	6.113	12.790	12.450	1:12.6	1:6.0	1:6.2	85.31	6.093	12.740	16.738	1:14.0	1:6.7	1:5.1
Average	15.40	1.223	2.558	2.490	.....	.....	.....	17.06	1.219	2.548	3.348	.....	.....	.....
Second subperiod:														
Total	76.66	5.581	12.160	11.095	1:13.7	1:6.3	1:6.9	83.80	5.681	12.410	15.054	1:14.8	1:6.8	1:5.6
Average	15.33	1.116	2.432	2.219	.....	.....	.....	16.76	1.136	2.482	3.011	.....	.....	.....
Entire after period:														
Total	153.67	11.694	24.950	23.545	1:13.2	1:6.2	1:6.5	169.11	11.774	25.150	31.792	1:14.4	1:6.7	1:5.3
Average	15.37	1.169	2.495	2.355	.....	.....	.....	16.91	1.177	2.515	3.179	.....	.....	.....

[a] Average added to complete record.

[b] Results mixed for Nos. 2 and 3.

TABLE VII.—*Urine determinations—Ratio of sulphur, sulphates, and phosphates to nitrogen, Series VII*—Continued.

[Averages are per day.]

Period.	No. 3.							No. 4.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.
Fore period.														
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
Total	76.22	5.220	11.830	11.298	1:14.6	1:6.4	1:6.7	82.76	5.619	12.490	12.080	1:14.7	1:6.6	1:6.9
Average	15.24	1.044	2.366	2.260	.....	.....	.....	16.55	1.124	2.498	2.416	.....	.....	.....
Second subperiod:														
Total	83.50	5.716	12.440	12.183	1:14.6	1:6.7	1:6.9	86.94	5.728	12.880	16.309	1:15.2	1:6.8	1:5.3
Average	16.70	1.143	2.488	2.437	.....	.....	.....	17.39	1.146	2.576	3.262	.....	.....	.....
Entire fore period:														
Total	159.72	10.936	24.270	23.481	1:14.6	1:6.6	1:6.8	169.70	11.347	25.370	28.389	1:15.0	1:6.7	1:6.0
Average	15.97	1.094	2.427	2.348	.....	.....	.....	16.97	1.135	2.537	2.839	.....	.....	.....
Preservative period.														
First subperiod:														
Total	80.62	6.129	13.560	10.049	1:13.1	1:5.9	1:8.0	83.52	6.053	13.560	15.300	1:13.8	1:6.2	1:5.5
Average	16.12	1.226	2.712	2.010	.....	.....	.....	16.70	1.211	2.712	3.060	.....	.....	.....
Second subperiod:														
Total	81.70	7.064	15.850	13.029	1:11.6	1:5.2	1:6.3	75.32	6.684	15.050	15.489	1:11.3	1:5.0	1:4.9
Average	16.34	1.413	3.170	2.606	.....	.....	.....	15.06	1.337	3.010	3.098	.....	.....	.....
Third subperiod:														
Total	81.70	7.995	17.280	11.504	1:10.2	1:4.7	1:7.1	78.63	7.709	16.620	15.329	1:10.2	1:4.7	1:5.1
Average	16.34	1.599	3.456	2.301	.....	.....	.....	15.73	1.542	3.324	3.066	.....	.....	.....
Fourth subperiod:														
Total	(b)	.....	.....	.....	.....	.....	.....	77.57	8.074	18.190	14.328	1:9.6	1:4.3	1:5.4
Average	.....	.....	.....	.....	.....	.....	.....	15.51	1.615	3.638	2.866	.....	.....	.....
First, second, and third subperiod:														
Total	244.02	21.188	46.690	34.582	1:11.5	1:5.2	1:7.1	.....	.....	.....	.....	.....	.....	.....
Average	16.27	1.413	3.113	2.305	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Entire preservative period:														
Total	.....	.....	.....	.....	.....	.....	.....	315.04	28.520	63.420	60.446	1:11.1	1:5.0	1:5.2
Average	.....	.....	.....	.....	.....	.....	.....	15.75	1.426	3.171	3.022	.....	.....	.....
After period.														
First subperiod:														
Total	a 76.19	5.679	12.190	10.946	1:13.4	1:6.3	1:7.0	84.27	5.969	12.940	17.079	1:14.1	1:6.5	1:4.9
Average	15.24	1.136	2.438	2.189	.....	.....	.....	16.85	1.194	2.588	3.416	.....	.....	.....
Second subperiod:														
Total	80.71	5.556	12.190	11.353	1:14.5	1:6.6	1:7.1	83.59	5.682	12.450	14.350	1:14.7	1:6.7	1:5.8
Average	16.14	1.111	2.438	2.271	.....	.....	.....	16.72	1.136	2.490	2.870	.....	.....	.....
Entire after period:														
Total	156.90	11.235	24.380	22.299	1:14.0	1:6.4	1:7.0	167.86	11.651	25.390	31.429	1:14.4	1:6.6	1:5.3
Average	15.69	1.124	2.438	2.230	.....	.....	.....	16.79	1.165	2.539	3.143	.....	.....	.....

Period.	No. 5.							No. 6.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S:N.	SO_3:N.	P_2O_5:N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S:N.	SO_3:N.	P_2O_5:N.
Fore period.														
First subperiod:	*Grams*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
Total	.....	.....	.....	.....	.....	.....	.....	57.87	4.012	8.900	13.554	1:14.4	1:6.5	1:4.3
Average	.....	.....	.....	.....	.....	.....	.....	11.57	.802	1.780	2.711	.....	.....	.....
Second subperiod:														
Total	64.63	4.467	9.510	11.034	1:14.5	1:6.8	1:5.9	63.20	4.190	9.000	10.829	1:15.1	1:7.0	1:5.8
Average	12.93	.893	1.902	2.207	.....	.....	.....	12.64	.838	1.800	2.166	.....	.....	.....
Entire fore period:														
Total	.....	.....	.....	.....	.....	.....	.....	121.07	8.202	17.900	24.383	1:14.8	1:6.8	1:5.0
Average	.....	.....	.....	.....	.....	.....	.....	12.11	.820	1.790	2.438	.....	.....	.....
Preservative period.														
First subperiod:														
Total	75.68	5.690	12.360	12.263	1:13.3	1:6.1	1:6.2	66.07	5.040	10.880	11.323	1:13.1	1:6.1	1:5.8
Average	15.14	1.138	2.472	2.453	.....	.....	.....	13.21	1.008	2.176	2.265	.....	.....	.....
Second subperiod:														
Total	68.16	6.171	13.500	11.599	1:11.0	1:5.1	1:5.9	71.35	6.276	13.970	12.329	1:11.4	1:5.1	1:5.8
Average	13.63	1.234	2.700	2.320	.....	.....	.....	14.27	1.255	2.794	2.466	.....	.....	.....
Third subperiod:														
Total	62.27	5.804	12.030	9.970	1:10.7	1:5.2	1:6.2	68.59	7.044	15.300	11.274	1:9.7	1:4.5	1:6.1
Average	12.45	1.161	2.406	1.994	.....	.....	.....	13.72	1.409	3.060	2.255	.....	.....	.....
Fourth subperiod:														
Total	48.38	3.488	7.100	8.837	1:13.9	1:6.8	1:5.5	69.55	4.843	10.250	10.705	1:14.4	1:6.8	1:6.5
Average	9.68	.698	1.420	1.767	.....	.....	.....	13.91	.969	2.050	2.141	.....	.....	.....
Entire preservative period:														
Total	254.49	21.153	44.990	42.669	1:12.0	1:5.7	1:6.0	275.56	23.203	50.400	45.641	1:11.9	1:5.5	1:6.0
Average	12.72	1.058	2.250	2.133	.....	.....	.....	13.78	1.160	2.520	2.282	.....	.....	.....
After period.														
First subperiod:														
Total	46.74	3.317	6.930	9.703	1:14.1	1:6.7	1:4.8	71.15	5.098	10.500	12.072	1:13.9	1:6.8	1:5.9
Average	9.35	.663	1.386	1.941	.....	.....	.....	14.23	1.020	2.100	2.414	.....	.....	.....
Second subperiod:														
Total	51.00	3.384	7.480	9.355	1:15.1	1:6.8	1:5.5	67.81	5.071	10.760	11.681	1:13.4	1:6.3	1:5.8
Average	10.20	.677	1.496	1.871	.....	.....	.....	13.56	1.014	2.152	2.336	.....	.....	.....
Entire after period:														
Total	97.74	6.701	14.410	19.058	1:14.6	1:6.8	1:5.1	138.96	10.169	21.260	23.753	1:13.7	1:6.5	1:5.9
Average	9.77	.670	1.441	1.906	.....	.....	.....	13.90	1.017	2.126	2.375	.....	.....	.....

[a] Average added to complete record.

[b] Results mixed for Nos. 2 and 3.

TABLE VII.—*Urine determinations—Ratio of sulphur, sulphates, and phosphates to nitrogen, Series VII*—Continued.

[Averages are per day.]

Period.	No. 7.							No. 8.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S:N.	SO_3:N.	P_2O_5:N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S:N.	SO_3:N.	P_2O_5:N.
Fore period.														
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
Total	[a] 56.21	3.663	8.150	8.498	1:15.3	1:6.9	1:6.6	[a] 57.36	4.208	8.650	9.489	1:13.6	1:6.6	1:6.0
Average	11.24	.733	1.630	1.700	.....	.....	.....	11.47	.842	1.730	1.898	.....	.....	.....
Second subperiod:														
Total	56.64	3.884	8.440	8.593	1:14.6	1:6.7	1:6.6	65.14	4.483	9.440	10.232	1:14.5	1:6.9	1:6.4
Average	11.33	.777	1.688	1.719	.....	.....	.....	13.03	.897	1.888	2.046	.....	.....	.....
Entire fore period:														
Total	112.85	7.547	16.590	17.091	1:15.0	1:6.8	1:6.6	122.50	8.691	18.090	19.721	1:14.1	1:6.8	1:6.2
Average	11.29	.755	1.659	1.709	.....	.....	.....	12.25	.869	1.809	1.972	.....	.....	.....
Preservative period.														
First subperiod:														
Total	58.18	4.454	9.340	7.342	1:13.1	1:6.2	1:7.9	66.91	5.006	10.510	9.801	1:13.4	1:6.4	1:6.8
Average	11.64	.891	1.868	1.468	.....	.....	.....	13.38	1.001	2.102	1.960	.....	.....	.....
Second subperiod:														
Total	47.15	3.984	8.690	5.886	1:11.8	1:5.4	1:8.0	61.42	5.513	11.610	9.485	1:11.1	1:5.3	1:6.5
Average	9.43	.797	1.738	1.177	.....	.....	.....	12.28	1.103	2.322	1.897	.....	.....	.....
Third subperiod:														
Total	[a] 57.96	4.869	10.440	8.295	1:11.9	1:5.6	1:7.0	62.16	5.314	11.020	9.653	1:11.7	1:5.6	1:6.4
Average	11.59	.974	2.088	1.659	.....	.....	.....	12.43	1.063	2.204	1.931	.....	.....	.....
Fourth subperiod:														
Total	.....	.....	.....	.....	.....	.....	.....	60.48	5.298	11.440	15.024	1:11.4	1:5.3	1:4.0
Average	.....	.....	.....	.....	.....	.....	.....	12.10	1.060	2.288	3.005	.....	.....	.....
First, second, and third subperiods:														
Total	163.29	13.307	28.470	22.523	1:12.3	1:5.7	1:7.2	.....	.....	.....	.....	.....	.....	.....
Average	10.89	.887	1.898	1.502	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Entire preservative period:														
Total	.....	.....	.....	.....	.....	.....	.....	250.97	21.131	44.580	43.963	1:11.9	1:5.6	1:5.7
Average	.....	.....	.....	.....	.....	.....	.....	12.55	1.057	2.229	2.198	.....	.....	.....
After period.														
First subperiod:														
Total	.....	.....	.....	.....	.....	.....	.....	63.87	4.851	9.780	9.999	1:13.2	1:6.5	1:6.4
Average	.....	.....	.....	.....	.....	.....	.....	12.77	.970	1.956	2.000	.....	.....	.....
Second subperiod:														
Total	.....	.....	.....	.....	.....	.....	.....	64.28	5.070	9.590	9.355	1:12.7	1:6.7	1:6.9
Average	.....	.....	.....	.....	.....	.....	.....	12.86	1.014	1.918	1.871	.....	.....	.....
Entire after period:														
Total	.....	.....	.....	.....	.....	.....	.....	128.15	9.921	19.370	19.354	1:12.9	1:6.6	1:6.6
Average	.....	.....	.....	.....	.....	.....	.....	12.82	.992	1.937	1.935	.....	.....	.....

Period.	No. 9.							No. 10.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.
Fore period.														
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
Total	65.14	4.071	9.500	9.535	1:16.0	1:6.9	1:6.8	71.45	4.545	10.390	12.230	1:15.7	1:6.9	1:5.8
Average	13.03	.814	1.900	1.907	.....	.....	.....	14.29	.909	2.078	2.446	.....	.....	.....
Second subperiod:														
Total	69.49	4.542	10.120	11.320	1:15.3	1:6.9	1:6.1	73.35	4.962	10.700	12.347	1:14.8	1:6.9	1:5.9
Average	13.90	.908	2.024	2.264	.....	.....	.....	14.67	.992	2.140	2.469	.....	.....	.....
Entire fore period:														
Total	134.63	8.613	19.620	20.855	1:15.6	1:6.9	1:6.5	144.80	9.507	21.090	24.577	1:15.2	1:6.9	1:5.9
Average	13.46	.861	1.962	2.086	.....	.....	.....	14.48	.951	2.109	2.458	.....	.....	.....
Preservative period.														
First subperiod:														
Total	75.81	5.437	12.060	12.170	1:13.9	1:6.3	1:6.2	69.23	5.076	11.030	11.941	1:13.6	1:6.3	1:5.8
Average	15.16	1.087	2.412	2.434	.....	.....	.....	13.85	1.015	2.206	2.388	.....	.....	.....
Second subperiod.														
Total	69.30	6.085	13.470	11.554	1:11.4	1:5.1	1:6.0	53.20	4.342	9.330	8.932	1:12.3	1:5.7	1:6.0
Average	13.86	1.217	2.694	2.311	.....	.....	.....	10.64	.868	1.866	1.786	.....	.....	.....
Third subperiod:														
Total	69.73	5.523	12.460	11.075	1:12.6	1:5.6	1:6.3	71.41	5.364	11.730	10.800	1:13.3	1:6.1	1:6.6
Average	13.95	1.105	2.492	2.215	.....	.....	.....	14.28	1.073	2.346	2.160	.....	.....	.....
Fourth subperiod:														
Total	75.57	6.496	13.460	11.934	1:11.6	1:5.6	1:6.3	68.00	5.528	12.130	12.297	1:12.3	1:5.6	1:5.5
Average	15.11	1.299	2.692	2.387	.....	.....	.....	13.60	1.106	2.426	2.459	.....	.....	.....
Entire preservative period:														
Total	290.41	23.541	51.450	46.733	1:12.3	1:5.6	1:6.2	261.84	20.310	44.220	43.970	1:12.9	1:5.9	1:6.0
Average	14.52	1.177	2.573	2.337	.....	.....	.....	13.09	1.016	2.211	2.198	.....	.....	.....
After period.														
First subperiod:														
Total	71.86	5.034	11.070	11.389	1:14.3	1:6.5	1:6.3	72.75	5.167	10.940	13.085	1:14.1	1:6.6	1:5.6
Average	14.37	1.007	2.214	2.278	.....	.....	.....	14.55	1.033	2.188	2.617	.....	.....	.....
Second subperiod:														
Total	72.05	5.265	11.410	11.344	1:13.7	1:6.3	1:6.4	65.03	4.621	9.670	10.340	1:14.1	1:6.7	1:6.3
Average	14.41	1.053	2.282	2.269	.....	.....	.....	13.01	.924	1.934	2.068	.....	.....	.....
Entire after period:														
Total	143.91	10.299	22.480	22.733	1:14.0	1:6.4	1:6.3	137.78	9.788	20.610	23.425	1:14.1	1:6.7	1:5.9
Average	14.39	1.030	2.248	2.273	.....	.....	.....	13.78	.979	2.061	2.343	.....	.....	.....

[a] Average added to complete record.

TABLE VII.—*Urine determinations—Ratio of sulphur, sulphates, and phosphates to nitrogen, Series VII*—Continued.

[Averages are per day.]

Period.	No. 11.							No. 12.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.
Fore period.														
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
Total	82.93	5.618	12.450	14.181	1:14.8	1:6.7	1:5.8	77.34	5.194	11.690	12 637	1:14.9	1:6.6	1:6.1
Average	16.59	1.124	2.490	2.836	.....	.....	.....	15.47	1.039	2.338	2.527	.....	.....	.....
Second subperiod:														
Total	85.92	5.436	12.050	14.263	1:15.8	1:7.1	1:6.0	76.77	5.211	11.430	12.414	1:14.7	1:6.7	1:6.2
Average	17.18	1.087	2.410	2.853	.....	.....	.....	15.35	1.042	2.286	2.483	.....	.....	.....
Entire fore period:														
Total	168.85	11.054	24.500	28.444	1:15.3	1:6.9	1:5.9	154.11	10.405	23.120	25.051	1:14 8	1:6.7	1:6.2
Average	16.89	1.105	2.450	2.844	.....	.....	.....	15.41	1.041	2.312	2.505	.....	.....	.....
Preservative period.														
First subperiod:														
Total	81.73	6.067	13.270	12.885	1:13.5	1:6.2	1:6.3	79.58	5.781	12.680	13.527	1:13.8	1:6.3	1:5.9
Average	16.35	1.213	2.654	2.577	.....	.....	.....	15.92	1.156	2.536	2.705	.....	.....	.....
Second subperiod:														
Total	69.36	5.525	11.970	10.399	1:12.6	1:5.8	1:6.7	81.89	6.644	14.660	13.985	1:12.3	1:5.6	1:5.9
Average	13.87	1.105	2.394	2.080	.....	.....	.....	16.38	1.329	2.932	2.797	.....	.....	.....
Third subperiod:														
Total	74.98	5.998	13.250	12.453	1:12.5	1:5.7	1:6.0	81.94	6.450	13.760	13.777	1:12.7	1:6.0	1:5.9
Average	15.00	1.200	2.650	2.491	.....	.....	.....	16.39	1.290	2.752	2.755	.....	.....	.....
Fourth subperiod:														
Total	75.66	6.316	13.540	13.277	1:12.0	1:5.6	1:5.7	75.81	5.423	11.340	13.078	1:14.0	1:6.7	1:5.8
Average	15.13	1.263	2.708	2.655	.....	.....	.....	15.16	1.085	2.268	2.616	.....	.....	.....
Entire preservative period:														
Total	301.73	23.906	52.030	49.014	1:12 6	1:5.8	1:6.2	319.22	24.298	52.440	54.367	1:13.1	1:6.1	1:5.9
Average	15.09	1.195	2.602	2.451	.....	.....	.....	15.96	1.215	2.622	2.718	.....	.....	.....
After period.														
First subperiod:														
Total	77.07	5.468	11.900	12.593	1:14.1	1:6.5	1:6.1	73.64	5.205	11.200	13.777	1:14.1	1:6.6	1:5.3
Average	15.41	1.094	2.380	2.519	.....	.....	.....	14.73	1.041	2.240	2.755	.....	.....	.....
Second subperiod:														
Total	[a] 82.53	[a] 5.644	[a] 11.950	[a] 12.828	1:14.6	1:6.9	1:6.4	74.47	5.202	11.300	14.001	1:14.3	1:6.6	1:5.3
Average	16.51	1.129	2.390	2.566	.....	.....	.....	14.89	1.040	2.260	2.800	.....	.....	.....
Entire after period:														
Total	159.60	11.112	23.850	25.421	1:14.4	1:6.7	1:6.3	148.11	10.407	22.500	27.778	1:14.2	1:6.6	1:5.3
Average	15.96	1.111	2.385	2.542	.....	.....	.....	14.81	1.041	2.250	2.778	.....	.....	.....

SUMMARIES.

[Averages are per man per day.]

Period.	Nos. 1, 2, 3, 4, 5, and 6.							Nos. 1 and 4.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.
Fore period.	*Grams.*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
First subperiod:														
Total	[b] 387.85	26.551	59.166	68.367	1:14.6	1:6.6	1:5.7	163.51	11.264	25.236	26.135	1:14.5	1:6.5	1:6.3
Average	15.51	1.062	2.367	2.735	.....	.....	.....	16.35	1.126	2.524	2.614	.....	.....	.....
Second subperiod:														
Total	466.40	31.632	68.945	79.490	1:14.7	1:6.8	1:5.9	166.79	11.409	25.325	28.710	1:14.6	1:6.6	1:5.8
Average	15.55	1.054	2.298	2.650	.....	.....	.....	16.68	1.141	2.533	2.871	.....	.....	.....
Entire fore period:														
Total	854.25	58.183	128.111	147.857	1:14.7	1:6.7	1:5.8	330.30	22.673	50.561	54.845	1:14.6	1:6.5	1:6.0
Average	15.53	1.058	2.329	2.688	.....	.....	.....	16.52	1.134	2.528	2.742	.....	.....	.....
Preservative period.														
First subperiod:														
Total	461.86	34.859	76.500	74.688	1:13.2	1:6.0	1:6.2	159.14	12.107	26.620	27.018	1:13.1	1:6.0	1:5.9
Average	15.40	1.162	2.550	2.490	.....	.....	.....	15.91	1.211	2.662	2.702	.....	.....	.....
Second subperiod:														
Total	447.41	39.707	87.750	80.692	1:11.3	1:5.1	1:5.5	144.72	13.171	29.300	26.724	1:11.0	1:4.9	1:5.4
Average	14.91	1.324	2.925	2.690	.....	.....	.....	14.47	1.317	2.930	2.672	.....	.....	.....
Third subperiod:														
Total	457.44	44.944	96.420	76.807	1:10.2	1:4.7	1:6.0	153.52	15.618	33.320	27.472	1:9.8	1:4.6	1:5.6
Average	15.25	1.498	3.214	2.560	.....	.....	.....	15.35	1.562	3.332	2.747	.....	.....	.....
Fourth subperiod:														
Total	.....	.....	.....	.....	.....	.....	.....	155.46	16.291	35.530	25.742	1:9.5	1:4.4	1:6.0
Average	.....	.....	.....	.....	.....	.....	.....	15.55	1.629	3.553	2.574	.....	.....	.....
First, second, and third subperiods:														
Total	1,366.71	119.510	260.670	232.187	1:11.4	1:5.2	1:5.9	.....	.....	.....	.....	.....	.....	.....
Average	15.19	1.328	2.896	2.580	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Entire preservative period:														
Total	.....	.....	.....	.....	.....	.....	.....	612.84	57.187	124.770	106.956	1:10.7	1:4.9	1:5.7
Average	.....	.....	.....	.....	.....	.....	.....	15.32	1.430	3.119	2.674	.....	.....	.....
After period.														
First subperiod:														
Total	440.66	32.269	68.090	78.988	1:13.7	1:6.5	1:5.6	161.28	12.082	25.730	29.529	1:13.3	1:6.3	1:5.5
Average	14.68	1.076	2.270	2.633	.....	.....	.....	16.13	1.208	2.573	2.953	.....	.....	.....
Second subperiod:														
Total	443.56	30.955	67.450	72.888	1:14.3	1:6.6	1:6.1	160.25	11.263	24.610	25.445	1:14.2	1:6.5	1:6.3
Average	14.79	1.032	2.248	2.430	.....	.....	.....	16.03	1.126	2.461	2.545	.....	.....	.....
Entire after period:														
Total	884.22	63.224	135.540	151.876	1:14.0	1:6.5	1:5.8	321.53	23.345	50.340	54.974	1:13.8	1:6.4	1:5.8
Average	14.74	1.054	2.259	2.531	.....	.....	.....	16.08	1.167	2.517	2.749	.....	.....	.....

[a] Average added to complete record.

[b] No. 5 absent.

TABLE VII.—*Urine determinations—Ratio of sulphur, sulphates, and phosphates to nitrogen, Series VII*—Continued.

[Averages are per man per day.]

Period.	Nos. 5 and 6.							Nos. 7, 8, 9, 10, 11, and 12.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.
Fore period.														
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
Total	.....	.....	.....	.....	.....	.....	.....	410.43	27.299	60.830	66.570	1:15.0	1:6.7	1:6.2
Average	.....	.....	.....	.....	.....	.....	.....	13.68	.910	2.028	2.219	.....	.....	.....
Second subperiod:														
Total	127.83	8.657	18.510	21.863	1:14.8	1:6.9	1:5.8	427.31	28.518	62.180	69.169	1:15.0	1:6.9	1:6.2
Average	12.78	.866	1.851	2.186	.....	.....	.....	14.24	.951	2.073	2.306	.....	.....	.....
Entire fore period:														
Total	.....	.....	.....	.....	.....	.....	.....	837.74	55.817	123.010	135.739	1:15.0	1:6.8	1:6.2
Average	.....	.....	.....	.....	.....	.....	.....	13.96	.930	2.050	2.262	.....	.....	.....
Preservative period.														
First subperiod:														
Total	141.75	10.730	23.240	23.586	1:13.2	1:6.1	1:6.0	431.44	31.821	68.890	67.666	1:13.6	1:6.3	1:6.4
Average	14.18	1.073	2.324	2.359	.....	.....	.....	14.38	1.061	2.296	2.256	.....	.....	.....
Second subperiod:														
Total	139.51	12.447	27.470	23.928	1:11.2	1:5.1	1:5.8	382.32	32.093	69.730	60.241	1:11.9	1:5.5	1:6.3
Average	13.95	1.245	2.747	2.393	.....	.....	.....	12.74	1.070	2.324	2.008	.....	.....	.....
Third subperiod:														
Total	130.86	12.848	27.330	21.244	1:10.2	1:4.8	1:6.2	418.18	33.518	72.660	66.053	1:12.5	1:5.8	1:6.3
Average	13.09	1.285	2.733	2.124	.....	.....	.....	13.94	1.117	2.422	2.202	.....	.....	.....
Fourth subperiod:														
Total	117.93	8.331	17.350	19.542	1:14.2	1:6.8	1:6.0	.....	.....	.....	.....	.....	.....	.....
Average	11.79	.833	1.735	1.954	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
First, second, and third subperiods:														
Total	.....	.....	.....	.....	.....	.....	.....	1,231.94	97.432	211.280	193.960	1:12.6	1:5.8	1:6.4
Average	.....	.....	.....	.....	.....	.....	.....	13.69	1.083	2.348	2.155	.....	.....	.....
Entire preservative period:														
Total	530.05	44.356	95.390	88.300	1:11.9	1:5.6	1:6.0	.....	.....	.....	.....	.....	.....	.....
Average	13.25	1.109	2.385	2.208	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
After period.														
First subperiod:														
Total	117.88	8.415	17.430	21.775	1:14.0	1:6.8	1:5.4	.....	.....	.....	.....	.....	.....	.....
Average	11.79	.842	1.743	2.178	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Second subperiod:														
Total	118.81	8.455	18.240	21.036	1:14.1	1:6.5	1:5.6	.....	.....	.....	.....	.....	.....	.....
Average	11.88	.846	1.824	2.104	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Entire after period:														
Total	236.69	16.870	35.670	42.811	1:14.0	1:6.6	1:5.5	.....	.....	.....	.....	.....	.....	.....
Average	11.84	.844	1.784	2.141	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Period.	Nos. 8, 9, 10, and 11.							Nos. 7 and 12.						
	Quantity.				Ratio.			Quantity.				Ratio.		
	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.	Nitrogen.	Sulphur.	SO_3.	P_2O_5.	S: N.	SO_3: N.	P_2O_5: N.
Fore period.	*Grams.*	*Grams.*	*Grams.*	*Grams.*				*Grams.*	*Grams.*	*Grams.*	*Grams.*			
First subperiod:														
Total	276.88	18.442	40.990	45.435	1:15.0	1:6.8	1:6.1	133.55	8.857	19.840	21.135	1:15.1	1:6.7	1:6.3
Average	13.84	.922	2.050	2.272	.....	.....	.....	13.36	.886	1.984	2.114	.....	.....	.....
Second subperiod:														
Total	293.90	19.423	42.310	48.162	1:15.1	1:6.9	1:6.1	133.41	9.095	19.870	21.007	1:14.7	1:6.7	1:6.4
Average	14.70	.971	2.116	2.408	.....	.....	.....	13.34	.910	1.987	2.101	.....	.....	.....
Entire fore period:														
Total	570.78	37.865	83.300	93.597	1:15.1	1:6.9	1:6.1	266.96	17.952	39.710	42.142	1:14.9	1:6.7	1:6.3
Average	14.27	.947	2.083	2.340	.....	.....	.....	13.35	.898	1.986	2.107	.....	.....	.....
Preservative period.														
First subperiod:														
Total	293.68	21.586	46.870	46.797	1:13.6	1:6.3	1:6.3	137.76	10.235	22.020	20.869	1:13.5	1:6.3	1:6.6
Average	14.68	1.079	2.344	2.340	.....	.....	.....	13.78	1.024	2.202	2.087	.....	.....	.....
Second subperiod:														
Total	253.28	21.465	46.380	40.370	1:11.8	1:5.5	1:6.3	129.04	10.628	23.350	19.871	1:12.1	1:5.5	1:6.5
Average	12.66	1.073	2.319	2.018	.....	.....	.....	12.90	1.063	2.335	1.987	.....	.....	.....
Third subperiod:														
Total	278.28	22.199	48.460	43.981	1:12.5	1:5.7	1:6.3	139.90	11.319	24.200	22.072	1:12.4	1:5.8	1:6.3
Average	13.91	1.110	2.423	2.199	.....	.....	.....	13.99	1.132	2.420	2.207	.....	.....	.....
Fourth subperiod:														
Total	279.71	23.638	50.570	52.532	1:11.8	1:5.5	1:5.3	.....	.....	.....	.....	.....	.....	.....
Average	13.99	1.182	2.529	2.627	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
First, second, and third subperiods:														
Total	.....	.....	.....	.....	.....	.....	.....	406.70	32.182	69.570	62.812	1:12.6	1:5.8	1:6.5
Average	.....	.....	.....	.....	.....	.....	.....	13.56	1.073	2.319	2.094	.....	.....	.....
Entire preservative period:														
Total	1,104.95	88.888	192.280	183.680	1:12.4	1:5.7	1:6.0	.....	.....	.....	.....	.....	.....	.....
Average	13.81	1.111	2.404	2.296	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
After period.														
First subperiod:														
Total	285.55	20.520	43.690	47.066	1:13.9	1:6.5	1:6.1	.....	.....	.....	.....	.....	.....	.....
Average	14.28	1.026	2.185	2.353	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Second subperiod:														
Total	283.89	20.600	42.620	43.867	1:13.8	1:6.7	1:6.5	.....	.....	.....	.....	.....	.....	.....
Average	14.19	1.030	2.131	2.193	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Entire after period:														
Total	569.44	41.120	86.310	90.933	1:13.8	1:6.6	1:6.3	.....	.....	.....	.....	.....	.....	.....
Average	14.24	1.028	2.158	2.273	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE VIII.—*Urine determinations—Relative amounts of nitrogen, sulphur, and phosphoric acid excreted, expressed as percentages of amounts ingested, Series VII.*

Period.	No. 1.					No. 2.					No. 3.					No. 4.				
	Quantity.			Ratio.		Quantity.			Ratio.		Quantity.			Ratio.		Quantity.			Ratio.	
	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.
	Per ct.	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*		
Fore period	91.38	86.90	64.38	1:1.1	1:1.4	91.30	86.61	66.97	1:1.1	1:1.4	88.90	83.47	49.88	1:1.1	1:1.8	100.12	93.51	65.04	1:1.10	1:1.5
Preservative period	87.74	95.27	61.28	1: .9	1:1.4	84.71	86.53	62.03	1: .97	1:1.4	88.96	90.04	47.59	1: .98	1:1.9	92.08	93.76	68.81	1: .98	1:1.3
After period	90.64	89.41	59.31	1:1.0	1:1.5	85.94	82.63	61.34	1:1.0	1:1.4	84.07	80.97	44.24	1:1.0	1:1.9	98.27	92.78	69.42	1:1.10	1:1.4

Period.	No 5.					No. 6.					No. 7.					No. 8.				
	Quantity.			Ratio.		Quantity.			Ratio.		Quantity.			Ratio.		Quantity.			Ratio.	
	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.
	Per ct.	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*		
Fore period	76.63	75.80	51.20	1:1.0	1:1.5	70.24	65.26	58.04	1:1.1	1:1.2	74.41	67.05	56.03	1:1.1	1:1.3	80.43	77.00	58.78	1:1.00	1:1.3
Preservative period	112.29	95.84	59.39	1:1.2	1:1.9	81.66	83.97	54.63	1: .97	1:1.5	79.17	79.00	53.90	1:1.0	1:1.5	81.51	82.71	56.48	1: .99	1:1.4
After period	89.50	86.41	57.38	1:1.0	1:1.6	81.79	80.81	54.93	1:1.0	1:1.5	.....	.....	.....	.....	.....	83.88	85.72	55.44	1: .98	1:1.5

Period.	No. 9.					No. 10.					No. 11.					No. 12.				
	Quantity.			Ratio.		Quantity.			Ratio.		Quantity.			Ratio.		Quantity.			Ratio.	
	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.	Nitrogen.	Sulphur.	P_2O_5.	S:N.	P_2O_5:N.
	Per ct.	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*	*Per ct.*		
Fore period	79.87	71.19	49.55	1:1.1	1:1.6	80.16	74.81	56.75	1:1.1	1:1.4	81.54	73.63	51.28	1:1.1	1:1.6	87.15	80.18	56.15	1:1.1	1:1.6
Preservative period	88.33	88.34	56.13	1:1.0	1:1.6	74.83	72.52	51.33	1:1.0	1:1.5	73.54	72.46	44.04	1:1.0	1:1.7	88.01	86.00	58.25	1:1.0	1:1.5
After period	86.92	85.28	53.21	1:1.0	1:1.6	78.73	78.20	53.56	1:1.0	1:1.5	76.52	73.91	44.69	1:1.0	1:1.7	90.68	86.09	62.35	1:1.1	1:1.5

TABLE VIII.—*Urine determinations—Relative amounts of nitrogen, sulphur, and phosphoric acid excreted, expressed as percentages of amounts ingested, Series VII*—Continued.

SUMMARIES.

Period.	Nos. 1 to 6.			Nos. 8 to 11.		
	Quantity.		Ratio.	Quantity.		Ratio.
	Nitrogen.	P_2O_5.	P_2O_5:N.	Nitrogen.	P_2O_5.	P_2O_5:N.
	Per cent.	*Per cent.*		*Per cent.*	*Per cent.*	
Fore period	86.43	59.26	1:1.46	80.50	54.09	1:1.49
Preservative period	91.24	58.96	1:1.55	79.55	52.00	1:1.53
After period	88.37	57.77	1:1.53	81.51	51.73	1:1.58

CHANGES IN THE RELATIVE QUANTITIES OF SULPHUR COMPOUNDS EXCRETED IN THE URINE.

The fact that sulphur was administered both in the form of a preservative and in the food presents a very interesting problem in tracing its final elimination from the body. This point is also considered in the discussion of the sulphur balances. Since the kidneys practically have the entire duty of eliminating the preservative, the urine in this case is worthy of special study in regard to the sulphur content. In Table XI are the data for the various sulphur determinations made on the urine, including total sulphur as S and as SO_3, and the following determinations as SO_3: Total sulphates; neutral sulphur (representing the sulphur which is held in organic combination and is not completely oxidized) which is the difference between the total sulphur and total sulphates as SO_3; ethereal sulphates; inorganic sulphates (total minus the ethereal sulphates), and the ratio of the ethereal to the inorganic sulphates. In addition, neutral sulphur, and total ethereal and inorganic sulphates are expressed in percentage of the total sulphur eliminated.

To determine whether any of the preservative was excreted as sulphites or sulphurous acid the distillation method for the determination of sulphurous acid was used.[a] Volumetric determinations of the iodin were useless, as small amounts were found on blank determinations. The iodin was boiled off and the sulphates formed precipitated by barium chlorid. By this method blank determinations on normal urine gave 0.08 milligram of SO_2 in 200 cc of urine. Determinations during the various preservative periods on 200 cc of the urine never gave over 1 milligram, the average being 0.07.

INDIVIDUAL DATA.

It is seen in the case of No. 1 that there is an average daily increase of 300 milligrams of total sulphur eliminated in the preservative period and an average increase of 36 milligrams in the after period

[a] U. S. Dept. Agr., Bureau of Chemistry, Bul. 107, p. 187.

over the fore period. Referring to the table of administration of the preservative it is seen that 564 milligrams of SO_2, equivalent to 282 milligrams of sulphur, were given in the form of sodium sulphite. The feces, however, showed a marked decrease in sulphur during the preservative and after periods (Table X), which might be thought to account for the increase of sulphur excreted in the urine above the amount exhibited in the preservative. The average data given in Table X do not indicate, however, that such an influence was exerted.

One point worthy of notice is the increase of neutral sulphur during the preservative and after periods. This increase during the preservative period amounts to 203 milligrams of SO_3, or 81 milligrams of sulphur. There is a little over half this increase in the after period over the fore period. Considering the sulphates determined as such it is seen that there is an increase of 549 milligrams of SO_3, which is equivalent to 219 milligrams of sulphur. There is a decrease in the after period to a quantity less than in the fore period. Further, it is seen that this increase is entirely in the quantity of inorganic or preformed sulphates, the quantity of ethereal or organically combined sulphuric acid remaining remarkably constant in the case of this subject throughout the period of observation. If, as is said to be the case, the ethereal sulphates are an indication of putrefactive changes taking place in the intestines, there seems no evidence of such a condition in this instance.

The average ratio of ethereal sulphates to inorganic sulphates is commonly given as 1 : 10. In the case of No. 1, this ratio in the fore period is 1 : 13.4, in the preservative period 1 : 17.0, and in the after period 1 : 13. Naturally the ratio would be greatly disturbed when sulphur is exhibited in the preservative, but it is of interest to note the magnitude of this disturbance in the individuals and that it is due, in every case but two, to a large increase in the amount of inorganic sulphates.

The results expressed in percentage of the total sulphur eliminated show a large increase of neutral sulphur in the preservative period which is slightly increased in the after period. The total sulphates show a gradual falling off during the observation which is quite marked in the preservative period. The ethereal sulphates fall from 6.2 per cent in the fore period to 4.8 per cent in the preservative period, rising again to 6.1 per cent in the after period, while the inorganic sulphates gradually decrease in percentage amount throughout, notwithstanding their large increase in actual amount eliminated.

A point worthy of comment here is the increase in the actual and percentage amount of neutral sulphur and the decrease in the per cent of ethereal sulphates. Since the total sulphur is so largely increased it does not follow that the decrease in the percentage amounts of the other forms means a decrease in the actual amounts,

and as is seen, such is not the case, but the increase of neutral sulphur shows an increase of unoxidized sulphur from some source.

The data for No. 2, as given in Table XI, agree very closely with those discussed for No. 1. One notable exception is the decrease in this case of the percentage amount of neutral sulphur during the preservative period, though there is an increase in actual amount of 63 milligrams of neutral sulphur, as SO_3. The ethereal sulphates in this instance are again constant, ranging from 213 milligrams of sulphur as SO_3 in the fore period to 216 milligrams during the preservative period and 205 milligrams during the after period. The ratio of ethereal sulphates to the inorganic varies from 1:11.2 in the fore period to 1:13.4 in the preservative period, and 1:11.3 in the after period. As in the case of No. 1, the greatest increase of sulphur is in the form of inorganic sulphates.

In the case of No. 3 there is an increase in total sulphur, sulphates, and neutral sulphur, and also a notable increase in the ethereal sulphates during the preservative period. The percentage amount of neutral sulphur and inorganic sulphates is slightly increased during the preservative period, while the total sulphates show a slight decrease in percentage amount and the ethereal sulphates a considerable decrease during the preservative period. The ratio of the ethereal sulphates to the inorganic varies from 1:11.7 in the fore period to 1:14.0 in the preservative period, and 1: 11.9 in the after period.

With one exception the data for No. 4 agree with those of No. 1 in every respect. The percentage of inorganic sulphates of the total sulphur excreted shows an increase of 0.8 per cent in the preservative period, while there is a decrease in the case of No. 1. There is a continued decrease in the after period in both instances. The ratio of the ethereal sulphates to the inorganic is 1:15 in the fore period, 1:19.5 in the preservative period, and 1:17.4 in the after period.

In the case of No. 5 there is an increase in all the sulphur constituents during the preservative period, with a decrease in the after period to a less amount than is shown in the fore period. The percentage amounts of these substances remain practically the same in the preservative period as in the fore period. The neutral sulphur and inorganic sulphates show a decrease in the after period over the fore period, while the total ethereal sulphates show an increase. The average ratio of the ethereal sulphates to the inorganic is 1:16.9, 1:17.2, and 1:12.7 for the three periods respectively.

No. 6 shows an increase of neutral sulphur throughout the observation, while in the case of the ethereal sulphates there is an increase during the preservative period, returning, however, in the after period to the same amount as in the fore period. The chief increase, as in the previous subjects, was in the amount of inorganic sulphates. The ratio of ethereal sulphates to the inorganic is 1:14.3 in the fore

period, 1:17.8 in the preservative period, and 1:17.1 in the after period.

The amounts of sulphur expressed in percentage of the total sulphur excreted shows practically the same variations as those previously mentioned. The data for No. 7, being incomplete, are not included in the averages, but are inserted as a matter of record.

For No. 8 there is seen an increase in the amount of total sulphur, neutral sulphur, and inorganic sulphates. The ethereal sulphates in this case remain practically constant, there being a slight diminution in the preservative and after periods as compared with the fore period. The ratio of ethereal sulphates to inorganic sulphates is 1:9.2 in the fore period, 1:12.1 in the preservative period, and 1:10.3 in the after period. The percentage amounts of neutral sulphur for this subject show a decrease in the preservative period from the fore period, with a large increase in the after period, to an amount greater than in the fore period. The total sulphates show an increase in the preservative period and a decrease in the after period. The ethereal sulphates are decreased in the preservative period, while the inorganic sulphates show a corresponding increase.

In the case of No. 9 the data in a general way agree closely with those for No. 8. A striking contrast, however, is the decrease during the preservative period of the ratio of ethereal to inorganic sulphates, falling from 1:14.1 in the fore period to 1:13.4 in the preservative period, remaining constant, namely, 1:13.3 in the after period. This decrease is due to the relatively larger increase of ethereal sulphates over the inorganic during the preservative period. This is also seen where the amounts are expressed in per cent of the total sulphur. The ethereal sulphates are practically constant throughout.

The data for No. 10 agree in a general way very closely with those of No. 8. The increase in the sulphur elimination is shown entirely by the neutral and inorganic sulphates, the ethereal sulphates remaining practically constant throughout.

No. 11 shows a noticeable increase in the ethereal sulphates and a ratio of this form to the inorganic sulphates which is abnormally high throughout. In the fore period it is 1:21.4, in the preservative period 1:20.3, and in the after period 1:21.4. This ratio is similar to that of No. 9 in the fact that it is lower in the preservative period.

The neutral sulphur shows an increase throughout the period of observation, while the inorganic sulphates are largely increased in the preservative period, but fall to an amount less than in the fore period during the after period.

In the case of No. 12 there is a notable increase in the actual amount of ethereal sulphates which causes the ratio to inorganic sulphates to be but slightly higher during the preservative period. The neutral

sulphur shows a decided increase during the preservative period, which is maintained during the after period, but to a less extent. The inorganic sulphates again bear the greater part of the increase. The percentage elimination of neutral sulphur is increased during the preservative period, while the other forms are decreased.

Reviewing the entire individual data, there is seen an increase in every instance in the amount of neutral sulphur, while there is a decrease in the percentage amount in the cases of Nos. 2 and 8 and a noticeable increase in the actual amount of ethereal sulphates in the cases of Nos. 3, 5, 6, 9, 11, and 12. The percentage amount of neutral sulphur is largely increased in the cases of Nos. 6 and 8 in the after period. Nos. 9 and 11 present a peculiar condition, namely, a decrease in the preservative period in the ratio of the ethereal to inorganic sulphates. This shows a relatively larger increase in the ethereal sulphates for these subjects than in the inorganic sulphates.

The relative increase or decrease in the sulphur compounds which are affected by the administration of the preservative are shown in Table IX. In the case of those subjects receiving sodium sulphite it is strikingly shown that when there is a decrease or but a slight increase in the percentage amount of neutral sulphur eliminated there is an increase in the inorganic sulphates. In the case of No. 1 the converse is true, there being a large increase in neutral sulphur and a corresponding decrease in inorganic sulphur.

The subjects receiving sulphurous acid show that when the percentage amounts of neutral sulphur are largely increased the inorganic sulphates show a corresponding decrease. In this instance the converse is true of No. 8, which shows a decrease in neutral sulphur and an increase in inorganic sulphates.

TABLE IX.—*Urine determinations—Daily increase or decrease of the percentage amounts of neutral sulphur and inorganic sulphates eliminated during the preservative period, Series VII.*

Number.	Received sodium sulphite.		Number.	Received sulphurous acid.	
	Neutral sulphur.	Inorganic sulphates.		Neutral sulphur.	Inorganic sulphates.
1	+3.3	−2.0	7	+2.3	−1.8
2	− .4	+1.4	8	−1.1	+2.8
3	+ 7	+ .5	9	+3.7	−3.8
4	+ .4	+ .8	10	+1.6	−1.4
5	+ .1	±0.0	11	+1.6	−1.7
6	+ .4	+ .7	12	+2.6	−2.2

SUMMARIES.

In the summary for Nos. 1 to 6, inclusive, complete data are given for the fore period, the first three subperiods of the preservative period, and the after period. In this summary the increase in the total sulphur excreted in the preservative period amounts to 270

milligrams. The amount of sulphur in the after period is 4 milligrams less than that excreted in the fore period. There is an increase of 107 milligrams as neutral sulphur over that found in the fore period and an increase of 60 milligrams in the after period over the fore period. The total sulphates show an increase of 567 milligrams in the preservative period and in the after period a decrease from that of the fore period of 70 milligrams. The amount of ethereal sulphates is practically constant throughout the fore period and preservative period, falling to 156 milligrams in the after period. Inorganic sulphates show an increase, namely, 565 milligrams. The ratio of the ethereal to the inorganic sulphates for the fore period is 1:13.1, for the preservative period 1:16.4, and for the after period 1:13.5. This increase in magnitude in the preservative period is due wholly to the increase in the inorganic sulphates, which points to the fact that the sulphur ingested in the preservative has all been oxidized. It should be noted in this table that the data for the after period fall to the same amounts, or even less, than the amounts eliminated in the fore period. In considering this, it should be explained that the fourth preservative subperiod is omitted in the summary for these subjects, as three of them, namely, Nos. 3, 5, and 6, did not receive the preservative during the fourth subperiod and No. 5 during only part of the third subperiod. Since the actual after period in the case of these subjects covered fifteen days, it is only natural that the data for the after period as given have returned to normal, showing that all the sulphur ingested was eliminated during this length of time. It is seen that there is a slight increase in the percentage amount of neutral sulphur eliminated, which increase is shown also in the after period. The percentage of total sulphates is fairly constant for the fore period and the preservative period, but is reduced somewhat in the after period. There is a decrease in the percentage of ethereal sulphates in the preservative period and a slight increased percentage elimination of the inorganic sulphates, which decreases in the after period to a quantity less than in the fore period. In this summary it is seen that the large increase of sulphur excreted is found as inorganic sulphates. The average daily amount of sulphur ingested in the preservative for these six men for the three subperiods is 484 milligrams, as SO_2 or 242 milligrams of sulphur as S, and the total sulphur eliminated in the preservative period is 270 milligrams above that of the fore period. It is evident, therefore, that there has been an increase in the excretion of metabolized sulphur during the preservative period over the amount of sulphur given in the preservative, indicating an increased katabolism. There is also an increase in the amount of neutral sulphur eliminated, which tends to show that some of the sulphur, whether obtained directly from katabolism or from the sulphur

ingested in the preservative or food, has been eliminated in an unoxidized or organically combined form.

In the summary for Nos. 8 to 11, inclusive, the increase in sulphur eliminated in the preservative period is 164 milligrams. In the after period there is also an increase of 81 milligrams over that of the fore period. Taking the fore period as the normal elimination of sulphur for these men, it is seen that the total elimination of sulphur during the preservative and after period is 245 milligrams (as S) above that of the fore period. In tracing the course of the preservative, this manner of calculation—namely, including the increased elimination in the after period—may be considered permissible, as whatever disorder is occasioned by the administration of the preservative may still influence the excretion during the after period. The amount of neutral sulphur is here increased during the period of observation, there being an increase of only 90 milligrams in the preservative period and 128 milligrams in the after period over that of the fore period. The total sulphates show an increase of 321 milligrams over the fore period, there being a slight increase also in the after period over the fore period, amounting to 75 milligrams per day. There is also an increase in this case of ethereal sulphates in the preservative period, returning however, to practically the same magnitude in the after period as in the fore period. The increase in the amount of inorganic sulphates, therefore, is not the increase of the total sulphates, but, as is seen, is 306 milligrams, the ethereal sulphates increasing 15 milligrams, while in the after period there is a strong tendency to return to normal, only 73 milligrams of sulphur being excreted in excess of that in the fore period. The ratio of ethereal sulphates to inorganic sulphates is 1:13.9 in the fore period, 1:14.5 in the preservative period, and 1:14.2 in the after period.

As is seen, the relation between the ethereal sulphates and the inorganic sulphates is not so strongly marked as in the case of Nos. 1 to 6, where the sulphur, in the form of sodium sulphite, and in a large quantity, was ingested. In the summary for Nos. 8 to 11, who received sulphurous acid, this relation was disturbed by the increase in the ethereal sulphates.

The percentage elimination of the neutral sulphur in the fore period is 11.9, in the preservative period 13.4, and in the after period 15.9. The total sulphates show a corresponding decrease throughout the period. There is very little difference in the percentage excretion of ethereal sulphates in this summary, while the percentage of inorganic sulphates shows a gradual diminution for the three periods. The average amount of sulphur in the cases of Nos. 8, 9, 10, and 11, ingested in the form of sulphurous acid, is 343 milligrams of sulphur as SO_2, equivalent to 172 milligrams of sulphur as S. The increase in sulphur eliminated in the preservative period alone is 164 milligrams per day. It

is evident, therefore, after considering the preservative period alone, that practically the entire amount of sulphur was eliminated in the urine. The increase in the total sulphates, which is 321 milligrams (as SO_3, equivalent to 128 milligrams sulphur as S) accounts for the greater amount of sulphur which is ingested in the preservative. In addition to this there is an increase in the amount of neutral sulphur of 36 milligrams (as S), which, if added to the increase in sulphates during the preservative periods, amounts to 164 milligrams, 8 milligrams less than enough to account for the sulphur given in the form of sulphurous acid. Taking into account the increase of sulphur in the after period, it is again apparent that more sulphur has been eliminated than was ingested as preservative and in the food and that the greater part (nearly 75 per cent) of the sulphur, which was given in the form of sulphurous acid gas, is eliminated in a completely oxidized form, namely, sulphates. One point of difference shown in the comparison of these two summaries is a considerable increase in the amount of ethereal sulphates eliminated in the preservative period for Nos. 8 to 11. It may be well to mention in this connection the opinion held by some authorities that the ethereal sulphates result from free sulphurous acid formed in the intestines during digestion.

The data, as a whole, show the same tendency throughout, namely, the elimination of practically all of the sulphur in an oxidized form. In the case of the subjects Nos. 1 to 6, who received the preservative as sodium sulphite, there is a greater excretion of neutral sulphur during the preservative period than in the cases of Nos. 8 to 11, who received sulphurous acid, while in the after period the converse is true. In the case of sodium sulphite more sulphur is eliminated during the preservative period than is ingested in the preservative.

In order to obtain the data in a more comprehensive form for comparison, Table X is compiled from the sulphur balance sheets (Table XVII), schedule of administration (Table II), and Table XI, and shows the amount of increase or decrease of sulphur in the food in the preservative and after periods over the fore period; also the amount of increase or decrease of sulphur in the feces, the average amount of sulphur given in the preservative, and the increase of total sulphur, of neutral sulphur, and of total sulphates in the urine.

For ready comparison with the amount of preservative administered the numerical values of the increase or decrease of the sulphur compounds are expressed in terms of the element S in Table X, though the data in Table XI are expressed as SO_3 and in the table of administration in terms of SO_2. This is done in order to compare more easily the ingestion and excretion of the preservative, and the figures are easily obtained from the other tables by taking one-half the value expressed as SO_2 and two-fifths of the value when expressed as SO_3.

TABLE X.—*Urine determinations—Average daily increase or decrease of sulphur excreted in the preservative and after periods over the fore period, as compared with the amounts ingested, Series VII.*

PRESERVATIVE PERIOD.

Individuals, totals, and averages.	Sulphur ingested as preservative.	Increase or decrease of sulphur.		Average increase of sulphur in the urine.		
		In food.	In feces.	As total sulphur.	As total sulphates.	As neutral sulphur.
	Grams.	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
No. 1	0.282	−0.081	−0.020	0.300	0.219	0.081
2	.282	+ .026	+ .010	.236	.210	.025
3	.186	+ .010	+ .043	.319	.274	.044
4	.315	− .008	+ .001	.291	.255	.038
5	.155	− .230	+ .014	.165	.139	.025
6	.187	− .062	+ .003	.340	.292	.048
7	.106	− .145	− .012	.132	.095	.036
8	.172	− .023	+ .005	.188	.168	.019
9	.172	− .049	± .000	.316	.244	.071
10	.172	− .042	+ .020	.065	.040	.024
11	.172	− .023	− .001	.090	.061	.029
12	.112	+ .003	− .015	.174	.124	.050
Total (12 men)	2.313	− .624	+ .048	2.616	2.221	.490
Average	.193	− .052	+ .004	.218	.185	.041
Total (Nos. 1-6)	1.407	− .345	+ .051	1.651	1.389	.261
Average	.235	− .058	+ .009	.275	.232	.043
Total (Nos. 8-11)	.688	− .137	+ .024	.659	.513	.143
Average	.172	− .034	+ .006	.165	.128	.036

AFTER PERIOD.

No. 1	0	+0.005	−0.057	0.036	−0.010	0.046
2	0	+ .051	− .011	− .014	− .029	.016
3	0	+ .078	− .010	.030	.004	.025
4	0	+ .042	− .007	.030	.003	.030
5	0	− .403	− .008	− .223	− .285	− .039
6	0	+ .001	− .005	.197	.134	.062
7	.....	.....	.....	.....	.....	.....
8	0	+ .028	− .009	.123	.051	.072
9	0	− .002	+ .046	.169	.114	.054
10	0	− .019	+ .030	.028	− .020	.047
11	0	+ .003	− .032	.006	− .026	.032
12	0	− .089	− .051	.000	− .025	.025
Total (11 men)	.....	− .305	− .114	.382	− .089	.370
Average	0	− .028	− .010	.035	− .008	.034
Total (Nos. 1-6)	.....	− .226	− .098	.056	− .183	.140
Average	0	− .038	− .016	.009	− .031	.023
Total (Nos. 8-11)	.....	+ .010	+ .035	.326	.119	.205
Average	0	+ .002	+ .009	.081	.030	.051

The sulphur increase or decrease in the food and feces is added to the table in order to show whether the apparently abnormal increase in the elimination could be due to an increase in the amount ingested in food or to a diminution in the amount eliminated in the feces.

An inspection of the table shows in all but three of the cases a decrease in the amount of sulphur in the food during the preservative period, the average for the 12 men showing 52 milligrams of sulphur less than in the fore period. The sulphur in the feces shows some variation, but not enough in magnitude or regularity to warrant the conclusion that any of the sulphur of the preservative was eliminated through this channel, the average increase for the 12 men amounting

to only 4 milligrams. The average daily amount of sulphur as preservative given to each man throughout the entire preservative period amounted to 193 milligrams. The total increased elimination of sulphur in the urine is 218 milligrams, and of this amount 185 milligrams is in the form of sulphates and 41 milligrams in the form of neutral sulphur.

The summary for Nos. 1 to 6, inclusive, who received sodium sulphite, shows an average decrease of 58 milligrams of sulphur in the food during the preservative period and an increase of 9 milligrams in the feces, both of which would tend to decrease the amount of sulphur in the urine, though this influence would be small.

There is an average ingestion of 235 milligrams of sulphur per man per day in the preservative period from the administered preservative and a total increased elimination of 275 milligrams, 232 milligrams of which is in the form of sulphates and 43 milligrams as neutral sulphur.

Nos. 8 to 11 show practically no influence by the decrease of sulphur in the food, which is but 34 milligrams less than in the fore period, while the amount eliminated in the feces is only 6 milligrams greater than in the fore period. The average daily ingestion of sulphur in the form of sulphurous acid amounted to 172 milligrams per day. The increase in total sulphur eliminated amounted to 165 milligrams; 128 milligrams of this was in the form of sulphates and 36 milligrams as neutral sulphur.

A comparison of the averages of Nos. 1 to 6 and 8 to 11, who received sodium sulphite and sulphurous acid, respectively, shows in the case of Nos. 1 to 6 a considerably greater quantity of sulphur eliminated than was given in the preservative, while the amount of sulphur which was eliminated in an oxidized form is practically the same as that administered in the preservative. In the case of Nos. 8 to 11, the increase of total sulphur eliminated in the preservative period and the administered sulphur agree very closely. In the after period the conditions seem to be reversed for these two summaries. Nos. 1 to 6 show more of a tendency to return to normal, with an average decrease in the excretion of sulphates as compared with the fore period, while Nos. 8 to 11 still show an increase of sulphates excreted in the after period. This difference may be partly due, as is explained in the discussion of the summary, to the comparison of only three preservative subperiods for Nos. 1 to 6 with the four preservative subperiods for Nos. 8 to 11. The neutral sulphur in the cases of Nos. 8 to 11 is seen to be increased, and this increase still persists to a greater degree during the after period.

Presch[a] found a large increase of neutral sulphur after the ingestion of flowers of sulphur in experiments on men, and concluded that

[a] Virchow's Archiv, 1890, **119**: 148.

the elimination was in part in form of organic compounds, and indicated that the organism synthetically made use of inorganic sulphur. Whether sulphurous acid and sulphites would be used in this manner is somewhat doubtful, and from the data it would be difficult to say with any assurance that these two substances were used in the body economy, even though the neutral sulphur is largely increased, particularly in case of sulphites where the total sulphur eliminated is in excess of the sulphur ingested, and would indicate an increased tissue katabolism. That the sulphurous acid is disposed of in a somewhat different manner is evident. In the preservative period 95.93 per cent of the preservative sulphur is immediately eliminated, assuming that the total increase of sulphur is derived from the sulphur ingested in the preservative; 74.4 per cent of this being as sulphates and 21.5 per cent as neutral sulphur, while in the after period the increased elimination of sulphur is still marked, particularly as neutral sulphur. In the after period the variations of the quantities in excess of the fore period are naturally not so marked and, in fact, not much more marked than one would expect to find in the period following any derangement of the metabolic processes. This without doubt shows a very rapid elimination of the preservative from the body, with scarcely any accumulative action.

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII.*

[Averages are per day.]

No. 1.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	5.645	14.096	1.350	12.746	0.953	11.793	1:12.4	9.6	90.4	6.8	83.6
Average	1.129	2.819	.270	2.549	.191	2.359	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.681	14.185	1.740	12.445	.791	11.654	1:14.7	12.3	87.7	5.6	82.2
Average	1.136	2.837	.348	2.489	.158	2.331	.....	.....	.....	.....	.....
Entire fore period:											
Total	11.326	28.281	3.090	25.191	1.744	23.447	1:13.4	11.0	89.0	6.2	82.9
Average	1.133	2.828	.309	2.519	.174	2.345	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	6.054	15.117	2.057	13.060	.772	12.288	1:15.9	13.6	86.4	5.1	81.3
Average	1.211	3.023	.411	2.612	.154	2.458	.....	.....	.....	.....	.....
Second subperiod											
Total	6.487	16.198	1.948	14.250	.839	13.411	1:16.0	12.0	88.0	5.2	82.8
Average	1.297	3.240	.390	2.850	.168	2.682	.....	.....	.....	.....	.....
Third subperiod											
Total	7.909	19.749	3.049	16.700	.797	15.903	1:20.0	15.4	84.6	4.0	80.5
Average	1.582	3.950	.610	3.340	.159	3.181	.....	.....	.....	.....	.....
Fourth subperiod											
Total	8.217	20.518	3.178	17.340	1.009	16.331	1:16.2	15.5	84.5	4.9	79.5
Average	1.643	4.104	.636	3.468	.202	3.266	.....	.....	.....	.....	.....
Entire preservative period:											
Total	28.667	71.582	10.232	61.350	3.417	57.933	1:17.0	14.3	85.7	4.8	80.9
Average	1.433	3.579	.512	3.068	.171	2.897	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	6.113	15.264	2.474	12.790	.903	11.887	1:13.2	16.2	83.8	5.9	77.9
Average	1.223	3.053	.495	2.558	.181	2.377	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.581	13.936	1.776	12.160	.878	11.282	1:12.8	12.7	87.3	6.3	81.0
Average	1.116	2.787	.355	2.432	.176	2.256	.....	.....	.....	.....	.....
Entire after period:											
Total	11.694	29.200	4.250	24.950	1.781	23.169	1:13.0	14.6	85.4	6.1	79.3
Average	1.169	2.920	.425	2.495	.178	2.317	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 2.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	[a] 6.055	15.119	1.919	13.200	1.030	12.170	1:11.8	12.7	87.3	6.8	80.5
Average	1.211	3.024	.384	2.640	.206	2.434	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.850	14.607	1.937	12.670	1.095	11.575	1:10.6	13.3	86.7	7.5	79.2
Average	1.170	2.921	.387	2.534	.219	2.315	.....	.....	.....	.....	.....
Entire fore period:											
Total	11.905	29.726	3.856	25.870	2.125	23.745	1:11.2	13.0	87.0	7.2	79.9
Average	1.191	2.973	.386	2.587	.213	2.375	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	5.893	14.715	1.635	13.080	1.043	12.037	1:11.5	11.1	88.9	7.1	81.8
Average	1.179	2.943	.327	2.616	.209	2.407	.....	.....	.....	.....	.....
Second subperiod:											
Total	7.025	17.541	2.411	15.130	1.134	13.996	1:12.3	13.7	86.3	6.5	79.8
Average	1.405	3.508	.482	3.026	.227	2.799	.....	.....	.....	.....	.....
Third subperiod:											
Total	8.483	21.182	2.692	18.490	1.060	17.430	1:16.4	12.7	87.3	5.0	82.3
Average	1.697	4.236	.538	3.698	.212	3.486	.....	.....	.....	.....	.....
Subperiods 1,2 and 3:											
Total	21.401	53.438	6.738	46.700	3.237	43.463	1:13.4	12.6	87.4	6.1	81.3
Average	1.427	3.563	.449	3.113	.216	2.898	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	6.093	15.214	2.474	12.740	1.061	11.679	1:11.0	16.3	83.7	7.0	76.7
Average	1.219	3.043	.495	2.548	.212	2.336	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.681	14.185	1.775	12.410	.989	11.421	1:11.5	12.5	87.5	7.0	80.5
Average	1.136	2.837	.355	2.482	.198	2.284	.....	.....	.....	.....	.....
Entire after period:											
Total	11.774	29.399	4.249	25.150	2.050	23.100	1:11.3	14.5	85.5	7.0	78.6
Average	1.177	2.940	.425	2.515	.205	2.310	.....	.....	.....	.....	.....

[a] Average added to complete record.

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 3.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	5.220	13.034	1.204	11.830	0.923	10.907	1:11.8	9.2	90.8	7.1	83.7
Average	1.044	2.607	.241	2.366	.185	2.181	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.716	14.273	1.833	12.440	.994	11.446	1:11.5	12.8	87.2	7.0	80.2
Average	1.143	2.855	.367	2.488	.199	2.289	.....	.....	.....	.....	.....
Entire fore period:											
Total	10.936	27.307	3.037	24.270	1.917	22.353	1:11.7	11.1	88.9	7.0	81.9
Average	1.094	2.731	.304	2.427	.192	2.235	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	6.129	15.304	1.744	13.560	1.076	12.484	1:11.6	11.4	88.6	7.0	81.6
Average	1.226	3.061	.349	2.712	.215	2.497	.....	.....	.....	.....	.....
Second subperiod:											
Total	7.064	17.639	1.789	15.850	1.060	14.790	1:14.0	10.1	89.9	6.0	83.8
Average	1.413	3.528	.358	3.170	.212	2.958	.....	.....	.....	.....	.....
Third subperiod:											
Total	7.995	19.964	2.684	17.280	.975	16.305	1:16.7	13.4	86.6	4.9	81.7
Average	1.599	3.993	.537	3.456	.195	3.261	.....	.....	.....	.....	.....
Subperiods 1, 2, and 3:											
Total	21.188	52.907	6.217	46.690	3.111	43.579	1:14.0	11.8	88.2	5.9	82.4
Average	1.413	3.527	.414	3.113	.207	2.905	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	[a] 5.679	14.180	1.990	12.190	.940	11.250	1:12.0	14.0	86.0	6.6	79.3
Average	1.136	2.836	.398	2.438	.188	2.250	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.556	13.873	1.683	12.190	.957	11.233	1:11.7	12.1	87.8	5.9	80.9
Average	1.111	2.775	.337	2.438	.191	2.247	.....	.....	.....	.....	.....
Entire after period:											
Total	11.235	28.053	3.673	24.380	1.897	22.483	1:11.9	13.1	86.9	6.8	80.1
Average	1.124	2.805	.367	2.438	.190	2.248	.....	.....	.....	.....	.....

[a] Average added to complete record.

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 4.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	5.619	14.031	1.541	12.490	0.884	11.606	1:13.1	11.0	89.0	6.3	82.7
Average	1.124	2.806	.308	2.498	.177	2.321	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.728	14.303	1.423	12.880	.705	12.175	1:17.3	9.9	90.1	4.9	85.1
Average	1.146	2.861	.285	2.576	.141	2.435	.....	.....	.....	.....	.....
Entire fore period:											
Total	11.347	28.334	2.964	25.370	1.589	23.781	1:15.0	10.5	89.5	5.6	83.9
Average	1.135	2.833	.296	2.537	.159	2.378	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	6.053	15.114	1.554	13.560	.746	12.814	1:17.2	10.3	89.7	4.9	84.8
Average	1.211	3.023	.311	2.712	.149	2.563	.....	.....	.....	.....	.....
Second subperiod:											
Total	6.684	16.690	1.640	15.050	.831	14.219	1:17.1	9.8	90.2	5.0	85.2
Average	1.337	3.338	.328	3.010	.166	2.844	.....	.....	.....	.....	.....
Third subperiod:											
Total	7.709	19.250	2.630	16.620	.750	15.870	1:21.2	13.7	86.3	3.9	82.4
Average	1.542	3.850	.526	3.324	.150	3.174	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	8.074	20.161	1.971	18.190	.761	17.429	1:22.9	9.8	90.2	3.8	86.4
Average	1.615	4.032	.394	3.638	.152	3.486	.....	.....	.....	.....	.....
Entire preservative period:											
Total	28.520	71.215	7.795	63.420	3.088	60.332	1:19.5	10.9	89.1	4.3	84.7
Average	1.426	3.561	.390	3.171	.154	3.017	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	5.969	14.905	1.965	12.940	.639	12.301	1:19.3	13.2	86.8	4.3	82.5
Average	1.194	2.981	.393	2.588	.128	2.460	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.682	14.188	1.738	12.450	.738	11.712	1:15.9	12.2	87.8	5.2	82.5
Average	1.136	2.838	.348	2.490	.148	2.342	.....	.....	.....	.....	.....
Entire after period:											
Total	11.651	29.093	3.703	25.390	1.377	24.013	1:17.4	12.7	87.3	4.7	82.5
Average	1.165	2.909	.370	2.539	.138	2.401	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 5.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Average	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Second subperiod:											
Total	4.467	11.154	1.644	9.510	0.531	8.979	1:16.9	14.7	85.3	4.8	80.5
Average	.893	2.231	.329	1.902	106	1.796	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	5.690	14.208	1.848	12.360	.572	11.788	1:20.6	13.0	87.0	4.0	83.0
Average	1.138	2.842	.370	2.472	.114	2.358	.....	.....	.....	.....	.....
Second subperiod:											
Total	6.171	15.409	1.909	13.500	.853	12.647	1:14.8	12.4	87.6	5.5	82.1
Average	1.234	3.082	.382	2.700	.171	2.529	.....	.....	.....	.....	.....
Third subperiod:											
Total	5.804	14.493	2.463	12.030	.531	11.499	1:21.7	17.0	83.0	3.7	79.3
Average	1.161	2.899	.493	2.406	.106	2.300	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	3.488	8.710	1.610	7.100	.516	6.584	1:12.8	18.5	81.5	5.9	75.6
Average	.698	1.742	.322	1.420	.103	1.317	.....	.....	.....	.....	.....
Entire preservative period:											
Total	21.153	52.820	7.830	44.990	2.472	42.518	1:17.2	14.8	85.2	4.7	80.5
Average	1.058	2.641	.392	2.250	.124	2.126	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	3.317	8.283	1.353	6.930	.514	6.416	1:12.5	16.3	83.7	6.2	77.5
Average	.663	1.657	.271	1.386	.103	1.283	.....	.....	.....	.....	.....
Second subperiod:											
Total	3.384	8.450	.970	7.480	.538	6.942	1:12.9	11.5	88.5	6.4	82.1
Average	.677	1.690	.194	1.496	.108	1.388	.....	.....	.....	.....	.....
Entire after period:											
Total	6.701	16.733	2.323	14.410	1.052	13.358	1:12.7	13.9	86.1	6.3	79.8
Average	.670	1.673	.232	1.441	.105	1.336	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 6.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	4.012	10.018	1.118	8.900	0.515	8.385	1:16.3	11.2	88.8	5.1	83.7
Average	.802	2.004	.224	1.780	.103	1.677	.....	.....	.....	.....	.....
Second subperiod:											
Total	4.190	10.462	1.462	9.000	.656	8.344	1:12.7	14.0	86.0	6.3	79.8
Average	.838	2.092	.292	1.800	.131	1.669	.....	.....	.....	.....	.....
Entire fore period:											
Total	8.202	20.480	2.580	17.900	1.171	16.729	1:14.3	12.6	87.4	5.7	81.7
Average	.820	2.048	.258	1.790	.117	1.673	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	5.040	12.585	1.705	10.880	.673	10.207	1:15.2	13.5	86.5	5.3	81.1
Average	1.008	2.517	.341	2.176	.135	2.041	.....	.....	.....	.....	.....
Second subperiod:											
Total	6.276	15.671	1.701	13.970	.741	13.229	1:17.9	10.9	89.1	4.7	84.4
Average	1.255	3.134	.340	2.794	.148	2.646	.....	.....	.....	.....	.....
Third subperiod:											
Total	7.044	17.589	2.289	15.300	.564	14.736	1:26.1	13.0	87.0	3.2	83.8
Average	1.409	3.518	.458	3.060	.113	2.947	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	4.843	12.093	1.843	10.250	.706	9.544	1:13.5	15.2	84.8	5.8	78.9
Average	.969	2.419	.369	2.050	.141	1.909	.....	.....	.....	.....	.....
Entire preservative period:											
Total	23.203	57.938	7.538	50.400	2.684	47.716	1:17.8	13.0	87.0	4.6	82.4
Average	1.160	2.897	.377	2.520	.134	2.386	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	5.098	12.730	2.230	10.500	.651	9.849	1:15.1	17.5	82.5	5.1	77.4
Average	1.020	2.546	.446	2.100	.130	1.970	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.071	12.662	1.902	10.760	.522	10.238	1:19.6	15.0	85.0	4.1	80.9
Average	1.014	2.532	.380	2.152	.104	2.048	.....	.....	.....	.....	.....
Entire after period:											
Total	10.169	25.392	4.132	21.260	1.173	20.087	1:17.1	16.3	83.7	4.6	79.1
Average	1.017	2.539	.413	2.126	.117	2.009	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 7.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	[a] 3.663	9.147	0.997	8.150	0.420	7.730	1:18.4	10.9	89.1	4.6	84.5
Average	.733	1.829	.199	1.630	0.84	1.546	.....	.....	.....	.....	.....
Second subperiod:											
Total	3.884	9.698	1.258	8.440	.539	7.901	1:14.7	13.0	87.0	5.6	81.5
Average	.777	1.940	.252	1.688	.108	1.580	.....	.....	.....	.....	.....
Entire fore period:											
Total	7.547	18.845	2.255	16.590	.959	15.631	1:16.3	12.0	88.0	5.1	82.9
Average	.755	1.885	.226	1.659	.096	1.563	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	4.454	11.122	1.782	9.340	.563	8.777	1:15.6	16.0	84.0	5.1	78.9
Average	.891	2.224	.356	1.868	.113	1.755	.....	.....	.....	.....	.....
Second subperiod:											
Total	3.984	9.948	1.258	8.690	.493	8.197	1:16.6	12.6	87.4	5.0	82.4
Average	.797	1.990	.252	1.738	.099	1.639	.....	.....	.....	.....	.....
Third subperiod:											
Total	[a] 4.869	12.158	1.718	10.440	.475	9.965	1:21.0	14.1	85.9	3.9	82.0
Average	.974	2.432	.344	2.088	.095	1.993	.....	.....	.....	.....	.....
Subperiods 1, 2, and 3:											
Total	13.307	33.228	4.758	28.470	1.531	26.939	1:17.6	14.3	85.7	4.6	81.1
Average	.887	2.215	.317	1.898	.102	1.796	.....	.....	.....	.....	.....

[a] Average added to complete record.

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 8.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	[a] 4.208	10.507	1.857	8.650	0.834	7.816	1:9.4	17.7	82.3	7.9	74.4
Average	.842	2.101	.371	1.730	.167	1.563	.....	.....	.....	.....	.....
Second subperiod:											
Total	4.483	11.194	1.754	9.440	.936	8.504	1:9.1	15.7	84.3	8.4	76.0
Average	.897	2.239	.351	1.888	.187	1.701	.....	.....	.....	.....	.....
Entire fore period:											
Total	8.691	21.701	3.611	18.090	1.770	16.320	1:9.2	16.6	83.4	8.2	75.2
Average	.869	2.170	.361	1.809	.177	1.632	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	5.006	12.500	1.990	10.510	.899	9.611	1:10.7	15.9	84.1	7.2	76.8
Average	1.001	2.500	.398	2.102	.180	1.922	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.513	13.766	2.156	11.610	.848	10.762	1:12.7	15.7	84.3	6.2	78.2
Average	1.103	2.753	.431	2.322	.170	2.152	.....	.....	.....	.....	.....
Third subperiod:											
Total	5.314	13.269	2.249	11.020	.813	10.207	1:12.6	16.9	83.1	6.1	77.0
Average	1.063	2.654	.450	2.204	.163	2.041	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	5.298	13.229	1.789	11,440	.855	10.585	1:12.4	13.5	86.5	6.5	80.0
Average	1.060	2.646	.358	2.288	.171	2.117	.....	.....	.....	.....	.....
Entire preservative period:											
Total	21.131	52.764	8.184	44.580	3.415	41.165	1:12.1	15.5	84.5	6.5	78.0
Average	1.057	2.638	.409	2.229	.171	2.058	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	4.851	12.113	2.333	9.780	.803	8.977	1:11.2	19.3	80.7	6.6	74.1
Average	.970	2.423	.467	1.956	.161	1.795	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.070	12.660	3.070	9.590	.917	8.673	1:9.5	24.2	75.8	7.2	68.5
Average	1.014	2.532	.614	1.918	.183	1.735	.....	.....	.....	.....	.....
Entire after period:											
Total	9.921	24.773	5.403	19.370	1.720	17.650	1:10.3	21.8	78.2	6.9	71.2
Average	.992	2.477	.540	1.937	.172	1.765	.....	.....	.....	.....	.....

[a] Average added to complete record.

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 9.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	4.071	10.165	0.665	9.500	0.404	9.096	1:22.5	6.5	93.5	4.0	89.5
Average	.814	2.033	.133	1.900	.081	1.819	.....	.....	.....	.....	.....
Second subperiod:											
Total	4.542	11.341	1.221	10.120	.896	9.224	1:10.3	10.8	89.2	7.9	81.3
Average	.908	2.268	.244	2.024	.179	1.845	.....	.....	.....	.....	.....
Entire fore period:											
Total	8.613	21.506	1.886	19.620	1.300	18.320	1:14.1	8.8	91.2	6.0	85.2
Average	.861	2.151	.189	1.962	.130	1.832	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	5.437	13.576	1.516	12.060	.968	11.092	1:11.5	11.2	88.8	7.1	81.7
Average	1.087	2.715	.303	2.412	.194	2.218	.....	.....	.....	.....	.....
Second subperiod:											
Total	6.085	15.194	1.724	13.470	.955	12.515	1:13.1	11.3	88.7	6.3	82.4
Average	1.217	3.039	.345	2.694	.191	2.503	.....	.....	.....	.....	.....
Third subperiod:											
Total	5.523	13.791	1.331	12.460	.801	11.659	1:14.6	9.7	90.3	5.8	84.5
Average	1.105	2.758	.266	2.492	.160	2.332	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	6.496	16.221	2.761	13.460	.857	12.603	1:14.7	17.0	83.0	5.3	77.7
Average	1.299	3.244	.552	2.692	.171	2.521	.....	.....	.....	.....	.....
Entire preservative period:											
Total	23.541	58.782	7.332	51.450	3.581	47.869	1:13.4	12.5	87.5	6.1	81.4
Average	1.177	2.939	.367	2.573	.179	2.393	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	5.034	12.570	1.500	11.070	.786	10.284	1:13.1	11.9	88.1	6.3	81.8
Average	1.007	2.514	.300	2.214	.157	2.057	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.265	13.147	1.737	11.410	.786	10.624	1:13.5	13.2	86.8	6.0	80.3
Average	1.053	2.629	.347	2.282	.157	2.125	.....	.....	.....	.....	.....
Entire after period:											
Total	10.299	25.717	3.237	22.480	1.572	20.908	1:13.3	12.6	87.4	6.1	81.8
Average	1.030	2.572	.324	2.248	.157	2.091	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

Averages are per day.]

No. 10.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	4.545	11.349	0.959	10.390	0.668	9.722	1:14.6	8.5	91.5	5.9	85.7
Average	.909	2.270	.192	2.078	.134	1.944	.....	.....	.....	.....	.....
Second subperiod:											
Total	4.962	12.390	1.690	10.700	.755	9.945	1:13.2	13.6	86.4	6.1	80.3
Average	.992	2.478	.338	2.140	.151	1.989	.....	.....	.....	.....	.....
Entire fore period:											
Total	9.507	23.739	2.649	21.090	1.423	19.667	1:13.8	11.2	88.8	6.0	82.8
Average	.951	2.374	.265	2.109	.142	1.967	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	5.076	12.675	1.645	11.030	.764	10.266	1:13.4	13.0	87.0	6.0	81.0
Average	1.015	2.535	.329	2.206	.153	2.053	.....	.....	.....	.....	.....
Second subperiod:											
Total	4.342	10.842	1.512	9.330	.678	8.652	1:12.8	13.9	86.1	6.3	79.8
Average	.868	2.168	.302	1.866	.136	1.730	.....	.....	.....	.....	.....
Third subperiod:											
Total	5.364	13.394	1.664	11.730	.609	11.121	1:18.3	12.4	87.6	4.6	83.0
Average	1.073	2.679	.333	2.346	.122	2.224	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	5.528	13.803	1.673	12.130	.884	11.246	1:12.7	12.1	87.9	6.4	81.5
Average	1.106	2.761	.335	2.426	.177	2.249	.....	.....	.....	.....	.....
Entire preservative period:											
Total	20.310	50.714	6.494	44.220	2.935	41.285	1:14.1	12.8	87.2	5.8	81.4
Average	1.016	2.536	.325	2.211	.147	2.064	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	5.167	12.902	1.962	10.940	.624	10.316	1:16.5	15.2	84.8	4.8	80.0
Average	1.033	2.580	.392	2.188	.125	2.063	.....	.....	.....	.....	.....
Second subperiod:											
Total	4.621	11.539	1.869	9.670	.684	8.986	1:13.1	16.2	83.8	5.9	77.9
Average	.924	2.308	.374	1.934	.137	1.797	.....	.....	.....	.....	.....
Entire after period:											
Total	9.788	24.441	3,831	20.610	1.308	19.302	1:14.8	15.7	84.3	5.3	79.0
Average	.979	2.444	.383	2.061	.131	1.930	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 11.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Etheral sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	5.618	14.028	1.578	12.450	0.574	11.876	1:20.7	11.2	88.8	4.1	84.7
Average	1.124	2.806	.316	2.490	.115	2.375	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.436	13.574	1.524	12.050	.522	11.528	1:22.1	11.2	88.8	3.8	84.9
Average	1.087	2.715	.305	2.410	.104	2.306	.....	.....	.....	.....	.....
Entire fore period:											
Total	11.054	27.602	3.102	24.500	1.096	23.404	1:21.4	11.2	88.8	4.0	84.8
Average	1.105	2.760	.310	2.450	.110	2.340	.....	.....	.....	.....	...
Preservative period.											
First subperiod:											
Total	6.067	15.149	1.879	13.270	.666	12.604	1:18.9	12.4	87.6	4.4	83.2
Average	1.213	3.030	.376	2.654	.133	2.521	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.525	13.796	1.826	11.970	.588	11.382	1:19.4	13.2	86.8	4.3	82.5
Average	1.105	2.759	.365	2.394	.118	2.276	.....	.....	.....	.....	.....
Third subperiod:											
Total	5.998	14.977	1.727	13.250	.591	12.659	1:21.4	11.5	88.5	3.9	84.5
Average	1.200	2.995	.345	2.650	.118	2.532	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	6.316	15.771	2.231	13.540	.602	12.938	1:21.5	14.1	85.9	3.8	82.0
Average	1.263	3.154	.446	2.708	.120	2.588	.....	.....	.....	.....	.....
Entire preservative period:											
Total	23.906	59.693	7.663	52.030	2.447	49.583	1:20.3	12.8	87.2	4.1	83.1
Average	1.195	2.985	.383	2.602	.122	2.479	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	5.468	13.654	1.754	11.900	.500	11.400	1:22.8	12.8	87.2	3.7	83.5
Average	1.094	2.731	.351	2.380	.100	2.280	.....	.....	.....	.....	.....
Second subperiod:											
Total	[a] 5.644	14.093	2.143	11.950	.564	11.386	1:20.2	15.2	84.8	4.0	80.8
Average	1.129	2.819	.429	2.390	.113	2.277	.....	.....	.....	.....	.....
Entire after period:											
Total	11.112	27.747	3.897	23.850	1.064	22.786	1:21.4	14.0	86.0	3.8	82.1
Average	1.111	2.775	.390	2.385	.106	2.279	.....	.....	.....	.....	.....

[a] Average added to complete record.

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per day.]

No. 12.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	5.194	12.969	1.279	11.690	0.832	10.858	1:13.1	9.9	90.1	6.4	83.7
Average	1.039	2.594	.256	2.338	.166	2.172	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.211	13.012	1.582	11.430	.863	10.567	1:12.2	12.2	87.8	6.6	81.2
Average	1.042	2.602	.316	2.286	.173	2.113	.....	.....	.....	.....	.....
Entire fore period:											
Total	10.405	25.981	2.861	23.120	1.695	21.425	1:12.6	11.0	89.0	6.5	82.5
Average	1.041	2.598	.286	2.312	.170	2.143	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	5.781	14.435	1.755	12.680	.995	11.685	1:11.7	12.2	87.8	6.9	80.9
Average	1.156	2.887	.351	2.536	.199	2.337	.....	.....	.....	.....	.....
Second subperiod:											
Total	6.644	16.590	1.930	14.660	.961	13.699	1:14.3	11.6	88.4	5.8	82.6
Average	1.329	3.318	.386	2.932	.192	2.740	.....	.....	.....	.....	.....
Third subperiod:											
Total	6.450	16.106	2.346	13.760	.913	12.847	1:14.1	14.6	85.4	5.7	79.8
Average	1.290	3.221	.469	2.752	.183	2.569	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	5.423	13.541	2.201	11.340	.834	10.506	1:12.6	16.3	83.7	6.2	77.6
Average	1.085	2.708	.440	2.268	.167	2.101	.....	.....	.....	.....	.....
Entire preservative period:											
Total	24.298	60.672	8.232	52.440	3.703	48.737	1:13.2	13.6	86.4	6.1	80.3
Average	1.215	3.034	.412	2.622	.185	2.437	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	5.205	12.997	1.797	11.200	.829	10.371	1:12.5	13.8	86.2	6.4	79.8
Average	1.041	2.599	.359	2.240	.166	2.074	.....	.....	.....	.....	.....
Second subperiod:											
Total	5.202	12.989	1.689	11.300	.956	10.344	1:10.8	13.0	87.0	7.4	79.6
Average	1.040	2.598	.338	2.260	.191	2.069	.....	.....	.....	.....	.....
Entire after period:											
Total	10.407	25.986	3.486	22.500	1.785	20.715	1:11.6	13.4	86.6	6.9	79.7
Average	1.041	2.599	.349	2.250	.179	2.072	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Nos. 1 to 6.

Period.	Total sulphur as S	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	[a]26.551	66.298	7.132	59.166	4.305	54.861	1:12.7	10.8	89.2	6.5	82.7
Average	1.062	2.652	.285	2.367	.172	2.194	.....	.....	.....	.....	.....
Second subperiod:											
Total	31.632	78.985	10.040	68.945	4.772	64.173	1:13.4	12.7	87.3	6.0	81.2
Average	1.054	2.633	335.	2.298	.159	2.139	.....	.....	.....	.....	.....
Entire fore period:											
Total	58.183	145.283	17.172	128.111	9.077	119.034	1:13.1	11.8	88.2	6.2	81.9
Average	1.058	2.642	.312	2.329	.165	2.164	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	34.859	87.043	10.543	76.500	4.882	71.618	1:14.7	12.1	87.9	5.6	82.3
Average	1.162	2.901	.351	2.550	.163	2.387	.....	.....	.....	.....	.....
Second subperiod:											
Total	39.707	99.148	11.398	87.750	5.458	82.292	1:15.1	11.5	88.5	5.5	83.0
Average	1.324	3.305	.380	2.925	.182	2.743	.....	.....	.....	.....	.....
Third subperiod:											
Total	44.944	112.225	15.805	96.420	4.677	91.743	1:19.6	14.1	85.9	4.2	81·7
Average	1.498	3.741	.527	3.214	.156	3.058	.....	.....	.....	.....	.....
Subperiods 1, 2, and 3:											
Total	119.510	298.416	37.746	260.670	15.017	245.653	1:16.4	12.6	87.4	5.0	82.3
Average	1.328	3.316	.419	2.896	.167	2.729	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	32.269	80.576	12.486	68.090	4.708	63.382	1:13.5	15.5	84.5	5.8	78.7
Average	1.076	2.686	.416	2.270	.157	2.113	.....	.....	.....	.....	.....
Second subperiod:											
Total	30.955	77.295	9.845	67.450	4.622	62.828	1:13.6	12.7	87.3	6.0	81.3
Average	1.032	2.577	.328	2.248	.154	2.094	.....	.....	.....	.....	.....
Entire after period:											
Total	63.224	157.871	22.331	135.540	9.330	126.210	1:13.5	14.1	85.9	5.9	79.9
Average	1.054	2.631	.372	2.259	.156	2.104	.....	.....	.....	.....	.....

[a] No. 5 absent.

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per man per day.]

Nos. 8 to 11.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	18.442	46.050	5.060	40.990	2.480	38.510	1:15.5	11.0	89.0	5.4	83.6
Average	.922	2.303	.253	2.050	.124	1.926	.....	.....	.....	.....	.....
Second subperiod:											
Total	19.423	48.499	6.189	42.310	3.109	39.201	1:12.6	12.8	87.2	6.4	80.8
Average	.971	2.425	.309	2.116	.155	1.960	.....	.....	.....	.....	.....
Entire fore period:											
Total	37.865	94.549	11.249	83.300	5.589	77.711	1:13.9	11.9	88.1	5.9	82.2
Average	.947	2.364	.281	2.083	.140	1.943	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	21.586	53.900	7.030	46.870	3.297	43.573	1:13.2	13.0	87.0	6.1	80.8
Average	1.079	2.695	.352	2.344	.165	2.179	.....	.....	.....	.....	.....
Second subperiod:											
Total	21.465	53.598	7.218	46.380	3.069	43.311	1:14.1	13.5	86.5	5.7	80.8
Average	1.073	2.680	.361	2.319	.153	2.166	.....	.....	.....	.....	.....
Third subperiod:											
Total	22.199	55.431	6.971	48.460	2.814	45.646	1:16.2	12.6	87.4	5.1	82.3
Average	1.110	2.772	.349	2.423	.141	2.282	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	23.638	59.024	8.454	50.570	3.198	47.372	1:14.8	14.3	85.7	5.4	80.3
Average	1.182	2.951	.423	2.529	.160	2.369	.....	.....	.....	.....	.....
Entire preservative period:											
Total	88.888	221.953	29.673	192.280	12.378	179.902	1:14.5	13.4	86.6	5.6	81.1
Average	1.111	2.774	.371	2.404	.155	2.249	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	20.520	51.238	7.548	43.690	2.713	40.977	1:15.1	14.7	85.3	5.3	80.0
Average	1.026	2.562	.377	2.185	.136	2.049	.....	.....	.....	.....	.....
Second subperiod:											
Total	20.600	51.438	8.818	42.620	2.951	39.669	1:13.4	17.1	82.9	5.7	77.1
Average	1.030	2.572	.441	2.131	.148	1.983	.....	.....	.....	.....	.....
Entire after period:											
Total	41.120	102.676	16.366	86.310	5.664	80.646	1:14.2	15.9	84.1	5.5	78.5
Average	1.028	2.567	.409	2.158	.142	2.016	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per man per day.]

Nos. 1 and 4.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	11.264	28.126	2.890	25.236	1.837	23.399	1:12.7	10.3	89.7	6.5	83.2
Average	1.126	2.813	.289	2.524	.184	2.340	.....	.....	.....	.....	.....
Second subperiod:											
Total	11.409	28.488	3.163	25.325	1.496	23.829	1:15.9	11.1	88.9	5.3	83.6
Average	1.141	2.849	.316	2.533	.150	2.383	.....	.....	.....	.....	.....
Entire fore period:											
Total	22.673	56.614	6.053	50.561	3.333	47.228	1:14.2	10.7	89.3	5.9	83.4
Average	1.134	2.831	.303	2.528	.167	2.361	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	12.107	30.231	3.611	26.620	1.518	25.102	1:16.5	11.9	88.1	5.0	83.0
Average	1.211	3.023	.361	2.662	.152	2.510	.....	.....	.....	.....	.....
Second subperiod:											
Total	13.171	32.888	3.588	29.300	1.670	27.630	1:16.5	10.9	89.1	5.1	84.0
Average	1.317	3.289	.359	2.930	.167	2.763	.....	.....	.....	.....	.....
Third subperiod:											
Total	15.618	38.998	5.678	33.320	1.547	31.773	1:20.5	14.6	85.4	4.0	81.5
Average	1.562	3.900	.568	3.332	.155	3.177	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	16.291	40.679	5.149	35.530	1.770	33.760	1:19.1	12.7	87.3	4.4	83.0
Average	1.629	4.068	.515	3.553	.177	3.376	.....	.....	.....	.....	.....
Entire preservative period:											
Total	57.187	142.796	18.026	124.770	6.505	118.265	1:18.2	12.6	87.4	4.6	82.8
Average	1.430	3.570	.451	3.119	.163	2.957	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	12.082	30.169	4.439	25.730	1.542	24.188	1:15.7	14.7	85.3	5.1	80.2
Average	1.208	3.017	.444	2.573	.154	2.419	.....	.....	.....	.....	.....
Second subperiod:											
Total	11.263	28.124	3.514	24.610	1.616	22.994	1:14.2	12.5	87.5	5.7	81.8
Average	1.126	2.812	.351	2.461	.162	2.299	.....	.....	.....	.....	.....
Entire after period:											
Total	23.345	58.293	7.953	50.340	3.158	47.182	1:14.9	13.6	86.4	5.4	80.9
Average	1.167	2.915	.398	2.517	.158	2.359	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per man per day.]

Nos. 5 and 6.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	8.657	21.617	3.107	18.510	1.187	17.323	1:14.6	14.4	85.6	5.5	80.1
Average	.866	2.162	.311	1.851	.119	1.732	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	10.730	26.793	3.553	23.240	1.245	21.995	1:17.7	13.3	86.7	4.6	82.1
Average	1.073	2.679	.355	2.324	.125	2.200	.....	.....	.....	.....	.....
Second subperiod:											
Total	12.447	31.080	3.610	27.470	1.594	25.876	1:16.2	11.6	88.4	5.1	83.3
Average	1.245	3.108	.361	2.747	.159	2.588	.....	.....	.....	.....	.....
Third subperiod:											
Total	12.848	32.081	4.751	27.330	1.095	26.235	1:24.0	14.8	85.2	3.4	81.8
Average	1.285	3.208	.475	2.733	.110	2.624	.....	.....	.....	.....	.....
Fourth subperiod:											
Total	8.331	20.803	3.453	17.350	1.222	16.128	1:13.2	16.6	83.4	5.9	77.5
Average	.833	2.080	.345	1.735	.122	1.613	.....	.....	.....	.....	.....
Entire preservative period:											
Total	44.356	110.757	15.367	95.390	5.156	90.234	1:17.5	13.9	86.1	4.7	81.5
Average	1.109	2.769	.384	2.385	.129	2.256	.....	.....	.....	.....	.....
After period.											
First subperiod:											
Total	8.415	21.012	3.582	17.430	1.165	16.265	1:14.0	17.0	83.0	5.5	77.4
Average	.842	2.101	.358	1.743	.117	1.627	.....	.....	.....	.....	.....
Second subperiod:											
Total	8.455	21.112	2.872	18.240	1.060	17.180	1:16.2	13.6	86.4	5.0	81.4
Average	.846	2.111	.287	1.824	.106	1.718	.....	.....	.....	.....	.....
Entire after period:											
Total	16.870	42.124	6.454	35.670	2.225	33.445	1:15.0	15.3	84.7	5.3	79.4
Average	.844	2.106	.323	1.784	.111	1.672	.....	.....	.....	.....	.....

TABLE XI.—*Urine determinations—Ratio of preformed sulphates to ethereal sulphates and neutral sulphur, Series VII*—Continued.

[Averages are per man per day.]

Nos. 7 and 12.

Period.	Total sulphur as S.	Total sulphur as SO_3.	Neutral sulphur as SO_3.	Total sulphates as SO_3.	Ethereal sulphates as SO_3.	Inorganic sulphates as SO_3.	Ratio of ethereal to inorganic sulphates.	Results expressed in per cent of total sulphur in terms of SO_3.			
								Neutral sulphur.	Total sulphates.	Ethereal sulphates.	Inorganic sulphates.
Fore period.											
First subperiod:	*Grams.*	*Grams*	*Grams.*	*Grams.*	*Grams.*	*Grams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Total	8.857	22.116	2.276	19.840	1.252	18.588	1:14.8	10.3	89.7	5.7	84.0
Average	.886	2.212	.228	1.984	.125	1.859	.....	.....	.....	.....	.....
Second subperiod:											
Total	9.095	22.710	2.840	19.870	1.402	18.468	1:13.2	12.5	87.5	6.2	81.3
Average	.910	2.271	.284	1.987	.140	1.847	.....	.....	.....	.....	.....
Entire fore period:											
Total	17.952	44.826	5.116	39.710	2.654	37.056	1:14.0	11.4	88.6	5.9	82.7
Average	.898	2.241	.256	1.986	.133	1.853	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	10.235	25.557	3.537	22.020	1.558	20.462	1:13.1	13.8	86.2	6.1	80.1
Average	1.024	2.556	.354	2.202	.156	2.046	.....	.....	.....	.....	.....
Second subperiod:											
Total	10.628	26.538	3.188	23.350	1.454	21.896	1:15.1	12.0	88.0	5.5	82.5
Average	1.063	2.654	.319	2.335	.145	2.190	.....	.....	.....	.....	.....
Third subperiod:											
Total	11.319	28.264	4.064	24.200	1.388	22.812	1:16.4	14.3	85.7	4.9	80.8
Average	1.132	2.826	.406	2.420	.139	2.281	.....	.....	.....	.....	.....
Subperiods 1,2, and 3:											
Total	32.182	80.359	10.789	69.570	4.400	65.170	1:14.8	13.4	86.6	5.5	81.1
Average	1.073	2.679	.360	2.319	.147	2.172	.....	.....	.....	.....	.....

Nos. 7 to 12.

Fore period.											
First subperiod:											
Total	27.299	68.166	7.336	60.830	3.732	57.098	1:15.3	10.8	89.2	5.5	83.8
Average	.910	2.272	.245	2.028	.124	1.903	.....	.....	.....	.....	.....
Second subperiod:											
Total	28.518	71.209	9.029	62.180	4.511	57.669	1:12.8	12.7	87.3	6.3	81.0
Average	.951	2.374	.301	2.073	.150	1.922	.....	.....	.....	.....	.....
Entire fore period:											
Total	55.817	139.375	16.365	123.010	8.243	114.767	1:13.9	11.7	88.2	5.9	82.3
Average	.930	2.323	.273	2.050	.137	1.913	.....	.....	.....	.....	.....
Preservative period.											
First subperiod:											
Total	31.821	79.457	10.567	68.890	4.855	64.035	1:13.2	13.3	86.7	6.1	80.6
Average	1.061	2.649	.352	2.296	.162	2.135	.....	.....	.....	.....	.....
Second subperiod:											
Total	32.093	80.136	10 406	69.730	4.523	65.207	1:14.4	13.0	87.0	5.6	81.4
Average	1.070	2.671	.347	2.324	.151	2.174	.....	.....	.....	.....	.....
Third subperiod:											
Total	33.518	83.694	11.034	72.660	4.202	68.458	1:16.3	13.2	86.8	5.0	81.8
Average	1.117	2.790	.368	2.422	.140	2.282	.....	.....	.....	.....	.....
Subperiods 1,2, and 3:											
Total	97.432	243.287	32.007	211.280	13.580	197.700	1:14.6	13.2	86.8	5.6	81.3
Average	1.083	2.703	.356	2.348	.151	2.197	.....	.....	.....	.....	.....

MICROSCOPICAL EXAMINATION OF THE URINE.[a]

This examination includes the bodies enumerated in Table XII. The numbers are interpreted by the following key, namely, 0 = none. 1 = very few, 2 = few, 3 = fairly numerous, 4 = numerous, 5 = extremely numerous. The method of procedure was that described in Part II, page 574.

URIC ACID CRYSTALS.

No uric acid crystals are found in the case of No. 1 during the fore period. They are numerous in the second part of the preservative period, very few in the third part, and few in the after period. In this case the formation of uric acid crystals was slightly greater in the preservative period.

In the cases of Nos. 2, 3, 4, 5, 6, 9, and 12 no uric acid crystals are observed during any period of the experiment.

In the case of No. 7 there are a very few in the fore period and at the second test in the preservative period.

For No. 8 there are very few found in the first test in the preservative period and at the close of the after period.

In the case of No. 10 there are very few found in the fore period and in the first part of the preservative period, and a few at the second test in the preservative period.

For No. 11 there are very few present in the second preservative period only.

With the exception of No. 1, therefore, it may be said that there is no tendency shown on the part of the sulphurous acid to affect the formation of uric acid crystals.

The figures expressing the relative occurrence indicate a slight tendency to increase the formation of uric acid crystals during the preservative period, the figures for the three periods being 18.2, 31.4, and 22.7, respectively.

URATES.

No urates are found in any case during the whole period of observation.

CRYSTALS OF CALCIUM OXALATE.

In the case of No. 1 there are very few crystals found during the first part of the preservative period, a few at the second test, a very few during the last part of the preservative period, a very few at the first test in the after period, and a few at the close of the period. In the case of No. 2 there are no crystals found except a very few in the after period.

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[a] These examinations were made by B. J. Howard, chief of the microchemical laboratory.

In the case of No. 3 a very few crystals are found in the fore period, the first test in the preservative period, and both observations of the after period.

For No. 4 there are a very few crystals found in the latter part of the preservative period and in the first part of the after period.

In the case of No. 5 there are no crystals observed except a very few in the after period.

In the case of No. 6 there are no crystals observed except in the first part of the preservative period.

No. 7 shows a very few crystals at the first and second tests in the preservative periods.

For No. 8 no crystals are observed except a very few in the after period.

In the case of No. 9 a very few are found in the last part of the preservative period and also in the after period.

For No. 10 a very few crystals are reported in the fore period, a few in the first part and a very few in the latter part of the preservative period, and a very few in the latter part of the after period.

No. 11 shows a very few crystals in the fore period and at the second and third tests in the preservative period and none in the after period.

For No. 12 a very few crystals are reported in the last part of the preservative period. There is a slight indication of an increase in the oxalate of lime crystals during the preservative and after periods, which is about in proportion as expressed by the figures representing the aggregate relative occurrence, namely, 27.3 for fore period, 45.7 for the preservative period, and 54.5 for the after period.

CRYSTALLINE PHOSPHATES.

No crystalline phosphates are observed in the urine of Nos. 2, 3, 4, 5, 6, 7, 8, 9, and 12.

A very few crystals are found in the case of No. 1 in the first part of the preservative period.

A few are found in the case of No. 10, and a very few in the case of No. 11, in the fore period.

AMORPHOUS PHOSPHATES.

No amorphous phosphates are found in any case with the exception of No. 5 in the after period, and No. 10 in the fore period, a few being observed in both cases. Both forms of phosphates are seen to occur infrequently in the urine; a slight tendency is indicated, however, to suppress these forms during the preservative period, as shown by the figures for their relative occurrence.

EPITHELIUM CELLS.

These forms are found in many instances during the whole period of observation. In the case of No. 1 a few are found in the fore period, the first part of the preservative period, and the after period, and very few during the second and third parts of the preservative period. In the case of No. 2 a few are found in the fore period, and they are fairly numerous in the other periods. In the case of No. 3 a very few are found in the fore period, a few in the first and second parts of the preservative period and in the after period, and very few in the last part of the preservative period. In the case of No. 4 a very few are found in the fore period, the first part of the preservative period, and the last part of the after period, and a few at all other tests. In the case of No. 5 a few are found in the first and second parts of the preservative period and in the after period, and a very few in the third part of the preservative period. In the case of No. 6 a few are found at all observations. No. 7 shows a very few in the fore period and a few in the first and second parts of the preservative period. No. 8 exhibits a very few cells in the fore period, in the last part of the preservative period, and in the after period. No. 9 shows a few cells in the fore period, the first and second parts of the preservative period, and a very few at all other observations. No. 10 shows a very few cells in the fore period, a few during the whole of the preservative period and in the first part of the after period, and very few in the latter part of the after period. No. 11 shows a very few cells at all tests, except in the latter part of the after period when a few are found. No. 12 exhibits a few cells in the fore period and in the first part of the preservative period, and a very few at the other observations.

The figures expressing the relative occurrence show a notable increase during the period in which the preservative was administered, and a slight decrease in the after period as compared with the preservative period.

LEUCOCYTES.

These occur regularly through all the periods of observation. They are especially evident in the case of No. 12. In the case of No. 1 a very few are found in all the periods, except at the second test in the preservative period, when they disappear. In the case of No. 2 a few are found in the fore period and the second and third parts of the preservative period, a very few in the first part of the preservative period and the last part of the after period, and none in the first part. In the case of No. 3 a very few cells are found in all the periods, and the same is true of Nos. 4, 8, 10, and 11. In the case of No. 5 a very few cells are found in the first part of the preservative period, a few in the second and third parts and in the last

part of the after period, and a very few in the first part of the after period. In the case of No. 6 a very few cells are found in the fore period and the first part of the preservative period, and a few at the other observations. In the case of No. 7 none is found in the fore period and a very few in the first and second parts of the preservative period. In the case of No. 9 a very few cells are found in the fore period, in the first part of the preservative period, and in the after period, and a few in the second and third parts of the preservative period. In the case of No. 12 a very few cells are found in the fore period and the first part of the preservative period; they are fairly numerous in the second part of the preservative period and in the last of the after period, numerous in the third part of the preservative period, and extremely numerous in the first part of the after period. Here also is shown by the relative occurrence figures a tendency to increase these bodies during the preservative period, which tendency in this case continues during the after period.

RED BLOOD CELLS.

In no instance during any of the periods of observation are any red blood cells found.

HYALINE CASTS.

Hyaline casts are present during the most of the periods of observation. No. 1 exhibits a few of these casts in the fore period and the first part of the after period, and a very few during the other periods of observation.

In the case of No. 2 there are found a few of these casts in the fore period, the last part of the preservative period, and the first part of the after period. A very few are found in the other periods.

In the case of No. 3 are found a few casts in the fore period, none in the first part of the preservative period, and a very few at the other observations.

No. 4 shows a very few casts at all observations except the first one in the preservative period.

In the case of No. 5 are found a very few at the first and third preservative periods, and the first in the after period.

No. 6 exhibits a very few casts in the fore period, in the second part of the preservative period and in the after period, and a few toward the last of the preservative period.

No. 7 is only under observation a part of the time and shows a very few casts at the first and second observations of the preservative period.

The urine of No. 8 is almost free from hyaline casts, only a very few being discovered during the last of the preservative period and the first of the after period.

In the case of No. 9 there seems to be quite an increase in the number of hyaline casts during the preservative period, none being found in the fore period and a very few in the after period.

No. 10 shows a few casts in the first part of the preservative period, very few at the second and third observations in the preservative period and the first of the after period, and a few toward the end of the after period.

No. 11 shows extremely few casts in all the periods except the first part of the preservative period, where a few are found.

No. 12 shows a very few casts at all the observations except in the first part of the after period. The numbers expressing relative occurrence are 90.9, 100.0, and 100.0, respectively, for the three periods, which evidently indicate a slight increase of these casts during the preservative period.

FINELY GRANULAR CASTS.

In the case of No. 1 these casts are observed only in very small numbers in the first part of the after period.

In No. 2 a similar amount are observed at the first and last observations of the preservative period and in the first of the after period.

In the case of No. 3 a very few casts are observed in the fore period, and in the case of No. 4 the same toward the end of the preservative period.

No. 5 shows a very few casts at the second observation in the preservative period, and a few at the third observation, and a very few in the first of the after period.

No casts are found in the case of No. 6, except a very few in the last part of the preservative period.

In the case of No. 7 are found a very few casts in the first part of the preservative period.

No. 8 has a very few at only one examination, which is at the last of the preservative period.

In the case of No. 9 there are no casts in the fore period and a very few at each of the other observations.

No. 10 has no casts except a very few in the first and third parts of the preservative period and the first part of the after period.

In No. 11 are found a very few casts in the fore period and the first and third parts of the preservative period, and the same observation is true of No. 12. The figures expressing the relative occurrence of these bodies show that there is quite an increase during the preservative period, the greater part of which occurs in the latter part of the period.

COARSELY GRANULAR CASTS.

These do not appear in very great quantities in any part of the observation. A very few are found in the first of the after period of

Nos. 1 and 2, in the first of the preservative period and last of the after period of No. 3, in the last of the preservative period and first of the after period of No. 4. In the case of No. 5 the casts are fairly numerous in the last of the preservative period, but appear at no other time. In the case of No. 6 a very few casts are found in the fore period and none at any other time of the observation. In the case of No. 7 these casts are found only in very small numbers in the second part of the preservative period. Nos. 8, 10, and 12 have no coarsely granular casts at any time of the observations. No. 9 shows a very few in the second part of the preservative period and the first part of the after period, and No. 11 a very few in the first and second parts of the preservative period and the first part of the after period. Here is also shown a tendency to increase the occurrence of these forms of casts in the urine during the preservative period, and the increase continues in the after period.

EPITHELIAL AND OTHER FORMS OF CASTS.

No epithelial or other forms of casts were observed in any of the cases in any of the periods.

MUCOUS CYLINDROIDS.

In the case of No. 1 there are few mucous cylindroids found during the fore period, the first part of the preservative period, and the last of the after period; they are fairly numerous during the second part of the preservative period and the first part of the after period, and numerous during the last part of the preservative period.

Nos. 2 and 4 present the same record, namely, a very few of these bodies present during all the periods of observation with the exception of the first after period, when a few are found.

No. 3 shows a very few during the fore and preservative periods and an increase to a few during the after period.

In the case of No. 5 a very few are reported during the first and second part of the preservative period, and a few during the latter part of the preservative period and the after period.

No. 6 showed the largest quantity of these bodies of any of the subjects, being numerous in the fore period and the second part of the preservative period, fairly numerous during the first part and increasing until extremely numerous at the end of the preservative period, which condition continues throughout the after period.

In the case of No. 7 there are very few of these bodies reported in the fore period, they are fairly numerous in the first part of the preservative period, and a few in the second part. This subject is not under observation during the remainder of the experiment.

No. 8 shows very few of these bodies during the fore period and the after period; they are fairly numerous during the first part of the preservative period, and there are a few during the latter part.

In the case of No. 9 a very few are recorded during the fore period and the first part of the after period, and at the other observations a few are found.

No. 10 shows a very few in the fore period and the second part of the preservative period. At the other observations a few of these bodies are observed.

In the case of No. 11 a very few are found in the fore period, a few in the first and latter part of the preservative period and the latter part of the after period. In the second part of the preservative period they are numerous, and are fairly numerous in the first part of the after period.

No. 12 shows a few of these bodies in all the periods with the exception of the latter part of the preservative period and the first part of the after period, when a very few are found.

The figures for the relative occurrence of these bodies are 145.5, 200, and 209.1 for the three periods respectively, which shows a considerable increase of these bodies during the preservative period, which increase is maintained in the after period.

MUCOUS STRANDS.

Mucous strands were observed in all cases and in all periods. They occur most abundantly in the cases of No. 1 and No. 6, being fairly numerous in the fore period of No. 1, numerous in the preservative, and extremely numerous in the after period.

In the case of No. 2 there were very few in the fore period and the preservative period and a few in the after period.

No. 3 shows a very few casts in the fore period and the first part of the preservative period, a few at the second and third observations of the preservative period, a few in the first part of the after period, and a very few in the second part of the after period.

No. 4 shows a few casts in the fore period, in the second part of the preservative period and in the first part of the after period, and a very few at the other observations.

No. 5 shows very few casts at the first and second observations of the preservative period, a few in the last part of the preservative period and in the after period.

In the case of No. 6, the mucous strands occur in the greatest abundance, being numerous in the fore period and in the first and second parts of the preservative period and last part of the after period, and extremely numerous in the last part of the preservative period and the first of the after period.

No. 7 shows a few casts in the fore period; they are numerous in the first part of the preservative period, and fairly numerous in the second part of the preservative period. During the other periods No. 7 is not under observation.

No. 8 has a few casts in the fore and after periods, and in the second and third parts of the preservative periods, and they are fairly numerous in the first part of the preservative period.

No. 9 has a few casts in the fore period, and the second part of the preservative period and the latter part of the after period; they are fairly numerous at the first and third observations in the preservative period.

No. 10 shows a few casts in the fore period and the first part of the preservative period, very few in the second observation of the preservative period, fairly numerous at the third observation, and very few in the after period.

No. 11 exhibits a few casts in the fore period and the first and third parts of the preservative period; numerous casts are recorded in the second part of the preservative period, and they are fairly numerous in the after period.

No. 12 shows a few casts in the fore period and the first and second parts of the preservative period, and very few in the other periods. Judging by the figures obtained to express the relative occurrence of these bodies in the urine, there is a slight tendency to an increase during the preservative period.

For purposes of comparison an expression is obtained, as explained in Bulletin 84, Part II, page 575, showing the general summary of the occurrence of these bodies in the aggregate in the urine for the entire period of observation. In the fore period the number is 54.5 as representing the relative occurrence of all the bodies; in the preservative period 66.7, and in the after period 65.5, showing a tendency to increase the occurrence of these bodies, which is continued in the after period.

TABLE XII.—*Microscopical examination of the urine, Series VII.*

(None, 0; very few, 1; few, 2; fairly numerous, 3; numerous, 4; extremely numerous, 5.)

No.	Fore period.	Preservative period.			After period.	
	Feb. 2–4.	Feb. 11–13.	Feb. 18–20.	Feb. 25–27.	Mar. 3–5.	Mar. 10–12.
URIC ACID CRYSTALS.						
1	0	0	4	1	2	2
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	(a)	0	0	0	0	0
6	0	0	0	0	0	0
7	1	0	1	(a)	(a)	(a)
8	0	1	0	0	0	1
9	0	0	0	0	0	0
10	1	1	2	0	0	0
11	0	0	1	0	0	0
12	0	0	0	0	0	0
Total	2	2	8	1	2	3
Relative occurrence	18.2	31.4			22.7	
URATES.						
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	(a)	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	(a)	(a)	(a)
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
Total	0	0	0	0	0	0
Relative occurrence	0	0			0	
CRYSTALS OF CALCIUM OXALATE.						
1	0	1	2	0	1	2
2	0	0	0	0	0	1
3	1	1	0	0	1	1
4	0	0	0	1	1	0
5	(a)	0	0	0	1	0
6	0	2	0	0	0	0
7	0	1	1	(a)	(a)	(a)
8	0	0	0	0	0	1
9	0	0	1	1	1	1
10	1	2	0	1	0	1
11	1	0	1	1	0	0
12	0	0	0	1	0	0
Total	3	7	4	5	5	7
Relative occurrence	27.3	45.7			54.5	

No.	Fore period.	Preservative period.			After period.	
	Feb. 2–4.	Feb. 11–13.	Feb. 18–20.	Feb. 25–27.	Mar. 3–5.	Mar. 10–12.
CRYSTALLINE PHOSPHATES.						
1	0	1	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	(a)	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	(a)	(a)	(a)
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	2	0	0	0	0	0
11	1	0	0	0	0	0
12	0	0	0	0	0	0
Total	3	1	0	0	0	0
Relative occurrence	27.3	2.9			0	
AMORPHOUS PHOSPHATES.						
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	(a)	0	0	0	0	2
6	0	0	0	0	0	0
7	0	0	0	(a)	(a)	(a)
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	2	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
Total	2	0	0	0	0	2
Relative occurrence	18.2	0			9.1	
EPITHELIUM CELLS.						
1	2	2	1	1	b 2	4
2	2	3	b 3	b 3	b 3	b 3
3	1	2	2	1	2	b 2
4	1	1	2	2	2	1
5	(a)	2	2	1	b 2	2
6	2	b 2	2	b 2	2	2
7	1	2	2	(a)	(a)	(a)
8	1	2	2	1	b 1	1
9	2	2	2	1	1	1
10	1	b 2	2	2	2	1
11	1	1	1	1	1	2
12	2	2	1	1	1	1
Total	16	23	22	16	19	18
Relative occurrence	145.5	174.3			168.2	

a Not under observation.

b Some in sheets.

TABLE XII.—*Microscopical examination of the urine, Series VII*—Continued.

No.	Fore period.	Preservative period.			After period.	
	Feb. 2–4.	Feb. 11–13.	Feb. 18–20.	Feb. 25–27.	Mar. 3–5.	Mar. 10–12.
LEUCOCYTES.						
1	1	1	0	1	1	1
2	2	1	2	2	0	1
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	(a)	1	2	b 2	1	2
6	1	1	2	2	2	2
7	0	1	1	(a)	(a)	(a)
8	1	1	1	1	1	1
9	1	1	2	2	1	1
10	1	1	1	1	1	1
11	1	1	1	1	1	1
12	1	1	3	4	5	3
Total	11	12	17	18	15	15
Relative occurrence	100.0	134.3			136.4	
RED BLOOD CELLS.						
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	(a)	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	(a)	(a)	(a)
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
Total	0	0	0	0	0	0
Relative occurrence	0	0			0	
HYALINE CASTS.						
1	2	1	1	1	2	1
2	2	1	1	2	2	1
3	2	0	1	1	1	1
4	1	0	1	1	1	1
5	(a)	1	0	1	1	0
6	1	0	1	2	1	1
7	0	1	1	(a)	(a)	(a)
8	0	0	0	1	1	0
9	0	1	2	2	1	1
10	0	2	1	1	1	2
11	1	2	1	1	1	1
12	1	1	1	1	0	1
Total	10	10	11	14	12	10
Relative occurrence	90.9	100.0			100.0	

No.	Fore period.	Preservative period.			After period.	
	Feb. 2–4.	Feb. 11–13.	Feb. 18–20.	Feb. 25–27.	Mar. 3–5.	Mar. 10–12.
FINELY GRANULAR CASTS.						
1	0	0	0	0	1	0
2	0	1	0	1	1	0
3	1	0	0	0	0	0
4	0	0	0	1	0	0
5	(a)	0	1	2	1	0
6	0	0	0	1	0	0
7	0	1	0	(a)	(a)	(a)
8	0	0	0	1	0	0
9	0	1	1	1	1	1
10	0	1	0	1	1	0
11	1	1	0	1	0	0
12	1	1	0	1	0	0
Total	3	6	2	10	5	1
Relative occurrence	27.3	51.4			27.3	
COARSELY GRANULAR CASTS.						
1	0	0	0	0	1	0
2	0	0	0	0	1	0
3	0	1	0	0	0	1
4	0	0	0	1	1	0
5	(a)	0	0	3	0	0
6	1	0	0	0	0	0
7	0	0	1	(a)	(a)	(a)
8	0	0	0	0	0	0
9	0	0	1	0	1	0
10	0	0	0	0	0	0
11	0	1	1	0	1	0
12	0	0	0	0	0	0
Total	1	2	3	4	5	1
Relative occurrence	9.1	25.7			27.3	
EPITHELIAL CASTS.						
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	(a)	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	(a)	(a)	(a)
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
Total	0	0	0	0	0	0
Relative occurrence	.0	0			0	

a Not under observation.

b Some in shreds.

TABLE XII.—*Microscopical examination of the urine, Series VII*—Continued.

No.	Fore period.	Preservative period.			After period.	
	Feb. 2–4.	Feb. 11–13.	Feb. 18–20.	Feb. 25–27.	Mar. 3–5.	Mar. 10–12.
OTHER FORMS OF CASTS.						
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	(a)	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	(a)	(a)	(a)
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
Total	0	0	0	0	0	0
Relative occurrence	0	0			0	
MUCOUS CYLINDROIDS.						
1	2	2	3	4	3	2
2	1	1	1	1	2	1
3	1	1	1	1	2	2
4	1	1	1	1	2	1
5	(a)	1	1	2	2	2
6	4	3	4	5	5	5
7	1	3	2	(a)	(a)	(a)
8	1	3	2	2	1	1
9	1	2	2	2	1	2
10	1	2	1	2	2	2
MUCOUS CYLINDROIDS—Continued.						
11	1	2	4	2	3	2
12	2	2	2	1	1	2
Total	16	23	24	23	24	22
Relative occurrence	145.5	200.0			209.1	
MUCOUS STRANDS.						
1	3	4	4	4	5	5
2	1	1	1	1	2	2
3	1	1	2	2	2	1
4	2	1	2	1	2	1
5	(a)	1	1	2	2	2
6	4	4	4	5	5	4
7	2	4	3	(a)	(a)	(a)
8	2	3	2	2	2	2
9	2	3	2	3	1	2
10	2	2	1	3	1	1
11	2	2	4	2	3	3
12	2	2	2	1	1	1
Total	23	28	28	26	26	24
Relative occurrence	209.1	234.3			227.3	
General summary	90	350			216	
Relative occurrence	54.5	66.7			65.5	

[a] Not under observation.

MICROSCOPICAL EXAMINATION OF THE BLOOD.[a]

SERIES VII.

INDIVIDUAL DATA.

In Table XIII are given the numbers of red and white corpuscles per cubic millimeter and the percentage of hemogloblin in the blood, calculated according to the methods pursued in the previous experiments. A column giving the color index has been added to the table, which expresses the change in the relation between the red blood cells and the hemoglobin.

In the case of No. 1 it is seen that the number of red corpuscles is increased and the number of white corpuscles decreased during the administration of the preservative. The hemoglobin is also decreased.

[a] These examinations were made by B. J. Howard, chief of the microchemical laboratory.

In the after period the numbers of red and white corpuscles and the percentage of hemoglobin tend to return to the numbers for the fore period. The color index for this subject during the three periods is 0.98, 0.88, and 1.01, showing a decrease in this index during the preservative period.

In No. 2 there is noticed a decrease in the number of red and white corpuscles and in the amount of coloring matter during the preservative period. The decrease in the red corpuscles is more than compensated for in the increase in the after period, and the same is true of the white corpuscles, while the hemoglobin is restored almost to the initial point The color index, however, shows a slight decrease in the preservative period and a more marked decrease in the after period.

In No. 3 there is a marked decrease in the number of red corpuscles during the preservative period and a slight increase in the number of white corpuscles. The intensity of the coloring matter is almost the same, being slightly diminished. The number of red corpuscles continues to diminish during the after period, while the white show a slight increase over the fore period, but are diminished from the preservative period. The color index is increased during the preservative period.

In No. 4 there is a slight decrease in the number of red corpuscles and a very striking decrease in the number of white corpuscles during the preservative period. There is also a decrease in the percentage of hemoglobin. In the after period the number of red corpuscles is very largely increased and the number of white corpuscles is almost the same as in the fore period, and the intensity of the coloring matter exactly the same as in the fore period. The color index is decreased during the preservative period and the decrease is more marked during the after period.

In the case of No. 5 there is a marked decrease in the number both of red and white corpuscles during the preservative period and a slight decrease in the intensity of the coloring matter. There is an increase in the number of white and red corpuscles in the after period over the number in the preservative period. The color index again is decreased in the preservative period and the decrease is more marked in the after period.

No. 6 shows a decrease in the number of red and white corpuscles and a slight decrease in the intensity of the coloring matter in the preservative period. There is an increase in the number of red corpuscles in the after period and a very large increase in the number of white corpuscles, and a marked decrease in the coloring matter. The color index is very slightly increased during the preservative period and decreases in the after period.

In the case of No. 7 the data are fragmentary, but permit of a comparison between the fore and preservative periods. There is a decrease in the number of red corpuscles in the preservative period and an increase in the number of white corpuscles, the percentage of coloring matter remaining the same. The color index shows an increase in the pre ervative period and no data are available for the after period.

In the case of No. 8 there is a very marked decrease in the number of red corpuscles during the preservative period and this decrease is still further continued in the after period. There is a very large decrease in the number of white corpuscles in the preservative period which is only partially restored in the after period. There is a slight decrease in the preservative period in the percentage of coloring matter and this is continued in a somewhat more marked way in the after period. The color index is increased in the preservative period and the increase is maintained to a greater extent in the after period.

In the case of No. 9 there is an increase in the number of red corpuscles and an enormous increase in the number of white corpuscles during the preservative period. At the same time there is a slight decrease in the percentage of coloring matter. In the after period a tendency is manifested to restore the conditions which obtain in the fore period. The color index is decreased during the preservative period and rises again in the after period to practically the same figure as in the fore period.

The data in the case of No. 10 show a marked decrease in the number of red and white corpuscles during the preservative period and a slight decrease in the percentage of coloring matter. In the after period there is a restoration of the numbers of white and red corpuscles almost to the initial number in the fore period, but the percentage of coloring matter remains the same as in the preservative period. The color index is increased during the preservative period, returning to practically the same figure in the after period as in the fore period.

In the case of No. 11 there is a small decrease in the number of red corpuscles and a large increase in the number of white corpuscles during the preservative period. The percentage of coloring matter remains the same. There is a large increase in the number of red corpuscles in the after period, but the number of white corpuscles is smaller. The percentage of coloring matter remains almost the same in the three periods. The color index is increased during the preservative period, falling in the after period to a figure below that of the fore period.

In the case of No. 12 there is a slight decrease in the number of red corpuscles and an increase in the number of white corpuscles during the preservative period, the percentage of coloring matter

remaining the same. There is a large increase in the number of red corpuscles in the after period and a decrease in the number of white corpuscles, falling below the number in the fore period. The percentage of hemoglobin remains the same in all three periods. The color index is very slightly increased in the preservative period, falling in the after period to a figure below that of the fore period.

SUMMARIES.

Summaries are given for Nos. 1 to 6, inclusive, who received sodium sulphite, and for Nos. 8 to 11, who received sulphurous acid in the free state and practically completed the full period of observation.

The mean number of corpuscles in the blood of Nos. 1 to 6 for the fore period is very markedly greater than during the preservative period and slightly greater than during the after period. This summary shows that the administration of sulphurous acid in the form of sulphites exerts a marked tendency to decrease the number of red blood corpuscles. The same tendency is shown in respect of the number of white corpuscles, which are almost a thousand less in the preservative period than in the fore period and almost 2,000 less than in the after period. There is a tendency also on the part of the preservative to diminish the hemoglobin, and the diminution is maintained during the after period. The color index is very slightly increased in the preservative period, but is decreased in the after period below the figure for the fore period.

In the case of the men receiving sulphurous acid in a free state, there is also shown a marked tendency on the part of the preservative to diminish the number of red corpuscles in the blood. In this case the number of white corpuscles is slightly increased. There is also manifested a very slight tendency to diminish the percentage of hemoglobin, and this diminution continues in the after period. The color index shows a slight increase during the preservative period and a return to the figure of the fore period in the after period.

In respect of the number of white corpuscles mentioned above, attention is called to one abnormal result in the number of white corpuscles recorded in the case of No. 9. It is not possible at this time to trace the cause of this abnormality, but it is of a magnitude which seems to indicate an error, as the number is twice as great as would be expected under the circumstances. For this reason it is found advisable to omit No. 9 and make a new summary for Nos. 8, 10, and 11. This summary indicates a marked tendency on the part of the preservative to diminish the number of red corpuscles, which are almost 1,000,000 less in the preservative period than in the fore period. In the after period this loss is in great part restored, though not completely. There is also in this case a marked tendency

to diminish the number of white corpuscles, which are more than a thousand less than in the fore period. This loss is partially restored in the after period. The color index is increased during the preservative period, falling in the after period.

The data collected, therefore, are very striking in showing the tendency of the sulphurous acid to diminish the number of corpuscles in the blood, both red and white, and also to diminish slightly the intensity of the color of the blood. These results of the investigation are worthy of especial consideration.

TABLE XIII.—*Average, by periods, of corpuscles and hemoglobin in the blood, Series VII.*

Period.	Date.	No. 1.				No. 2.			
		Red corpuscles per cubic millimeter.	White corpuscles per cubic millimeter.	Hemoglobin.	Color index.[a]	Red corpuscles per cubic millimeter.	White corpuscles per cubic millimeter.	Hemoglobin.	Color index.
	1904.								
Fore period	Feb. 10–12	4,855,000	4,598	95	0.98	4,915,000	7,313	100	1.02
Preservative period	Feb. 26–Mar. 2	5,125,000	4,377	90	.88	4,755,000	6,593	95	1.00
After period	Mar. 10–12	4,775,000	4,875	93	1.01	5,405,000	8,975	98	.91

Period.	Date.	No. 3.				No. 4.			
	1904.								
Fore period	Feb. 10–12	6,075,000	5,097	97	0.80	4,970,000	9,433	95	0.96
Preservative period	Feb. 26–Mar. 2	4,770,000	5,817	96	1.01	4,877,000	4,764	90	.92
After period	Mar. 10–12	4,545,000	5,318	.....	.....	5,605,000	8,421	95	.85

Period.	Date.	No. 5.				No. 6.			
	1904.								
Fore period	Feb. 10–12	6,130,000	8,593	98	0.95	5,260,000	7,811	97	0.92
Preservative period	Feb. 26–Mar. 2	5,560,000	8,088	95	.86	5,125,000	7,756	96	.93
After period	Mar. 10–12	6,020,000	9,086	95	.79	5,565,000	11,191	90	.81

Period.	Date.	No. 7.				No. 8.			
	1904.								
Fore period	Feb. 10–12	5,230,000	6,371	95	0.90	6,050,000	9,900	98	0.81
Preservative period	Feb. 26–Mar. 2	4,965,000	7,978	95	.96	4,770,000	5,485	97	1.02
After period	Mar. 10–12	.....	.....	.....	.....	4,295,000	5,762	95	1.110

Period.	Date.	No. 9.				No. 10.			
	1904.								
Fore period	Feb. 10–12	4,470,000	6,925	99	1.11	6,085,000	7,368	97	0.80
Preservative period	Feb. 26–Mar. 2	5,610,000	13,240	97	.87	4,810,000	5,983	95	.99
After period	Mar. 10–12	4,905,000	7,424	98	1.00	5,995,000	7,091	95	.79

Period.	Date.	No. 11.				No. 12.			
	1904.								
Fore period	Feb. 10–12	4,965,000	4,820	98	0.99	5,640,000	5,485	95	0.84
Preservative period	Feb. 26–Mar. 2	4,715,000	6,703	93	1.04	5,510,000	6,205	95	.86
After period	Mar. 10–12	5,745,000	6,260	97	.84	6,315,000	5,318	95	.75

[a] Color index is the percentage of hemoglobin divided by the percentage of red blood corpuscles; 5,000,000 is taken as the normal number of red blood corpuscles.

TABLE XIII.—*Average, by periods, of corpuscles and homoglobin in the blood, Series VII*—Continued.

SUMMARIES.

Period.	Red corpuscles per cubic millimeter.	White corpuscles per cubic millimeter.	Hemoglobin.	Color index.
Nos. 1 to 6.				
Fore period:				
Total	32,205,000	42,845	582	.....
Average	5,367,500	7,141	97	0.91
Preservative period:				
Total	30,212,000	37,395	562	.....
Average	5,035,333	6,233	94	.93
After period:				
Total	31,915,000	47,866	5 men. 471	.....
Average	5,319,167	7,978	94	.89
Nos. 8 to 11.				
Fore period:				
Total	21,570,000	29,013	392	.....
Average	5,392,500	7,253	98	.91
Preservative period:				
Total	19,905,000	31,411	387	.....
Average	4,976,250	7,853	97	.97
After period:				
Total	20,940,000	26,537	385	.....
Average	5,235,000	6,634	96	.91
Nos. 8, 10, and 11.				
Fore period:				
Total	17,100,000	22,088	293	.....
Average	5,700,000	7,363	98	.86
Preservative period:				
Total	14,295,000	18,171	290	.....
Average	4,765,000	6,057	97	1.02
After period:				
Total	16,035,000	19,113	287	.....
Average	5,345,000	6,371	96	.90

SERIES XIII.

INDIVIDUAL DATA.

The effect of sulphurous acid in diminishing the number of corpuscles in the blood, as indicated in the preceding investigations, appeared to deserve further study. It was deemed advisable, therefore, to repeat that feature of the investigation, and accordingly a squad of six men was organized for the purpose of further determining this point, the special investigation being designated as Series XIII. The fore period opened on December 1, 1906, and continued for five days, followed by a preservative period of fifteen days and an after period of four days, during which time a special study was made of the percentage of hemoglobin, the number of red and white corpuscles, and the color index. The data determined are recorded in Table XIV, together with the schedule of administration of the preservative.

In the case of No. 1 the percentage of hemoglobin is slightly increased during the preservative period, remaining practically the same in the after period. The red corpuscles are decreased during

the preservative period but the number is restored in the after period and even increased beyond the number in the fore period. There is a very marked decrease in the number of white corpuscles, and this decrease continues in the after period. The color index rises in the preservative period, falling to a smaller figure in the after period than in the fore period.

In the case of No. 2 there is a slight increase in the hemoglobin, both in the preservative and in the after period. There is a decrease in the number of red corpuscles in the blood in the preservative period and an increase in the after period, though the number is not restored to that of the fore period. The white corpuscles in this case increase during the preservative period and still further increase in the after period. The entire data of No. 2 show that the administration of sulphurous acid in this case had no marked tendency to diminish the number of blood corpuscles, having decreased only slightly the number of red corpuscles and increased to a very marked extent the number of white corpuscles. Perhaps a better form of expression in this case is that the administration of the sulphurous acid was attended with a slight decrease in the number of red corpuscles and a marked increase in the number of white corpuscles. The color index increases in the preservative period and remains practically the same in the after period.

No. 3 shows a decrease in the number of red corpuscles during the preservative period and a notable increase in the corpuscles in the after period, the number rising to a higher figure than in the fore period. There is a slight increase in the number of white corpuscles during the preservative period and a marked increase during the after period. The hemoglobin data for No. 3 show an increase in the preservative period, which is maintained in the after period. The color index increases during the preservative period, falling in the after period to an amount less than in the fore period.

No. 4 shows a very marked decrease in the number of red corpuscles during the preservative period and a still further decrease in the after period. There is also a very marked decrease in the number of white corpuscles in both periods. Here the data show that the administration of the sulphurous acid was attended by a marked decrease of both the red and the white corpuscles.

The data for No. 5 show a very marked decrease in the number of red corpuscles during the preservative period and a slight recovery, that is, a slight increase in the number of red corpuscles in the after period over the preservative period, but not a complete restoration to the number present in the fore period. There is also a marked diminution in the number of white corpuscles during the preservative

period, but this loss is entirely recovered and a slight increase noted in the number of white corpuscles in the after period over the fore period.

The data for No. 6 are not so valuable for comparison because only one observation was made of the number of corpuscles in the fore period, the original No. 6, who was under observation for four days, having been unavoidably removed from the table and a new man substituted, for whom the count was made only once before the administration of the preservative. In this case there is an increase in the number of red corpuscles during the preservative period over the one count of the fore period, and a diminution in the number of white corpuscles. On account of the incompleteness of the data of No. 6 they are not used in the general summary.

SUMMARIES.

Nos. 1 to 3, inclusive, of the members of the squad received the sulphurous acid in the form of sodium sulphite, and Nos. 4 to 6, inclusive, in the form of free sulphurous acid. No. 6 is excluded from the summary, as the data are incomplete.

In the case of those who received sodium sulphite there was a marked decrease in the number both of the red and the white corpuscles during the period of observation. The data for Nos. 4 and 5, who completed the course with free sulphurous acid, show also a marked diminution in both the number of red and white corpuscles. The average percentage of decrease of the red corpuscles in the case of Nos. 1 to 3, inclusive, is 2.5, and of the white corpuscles, 3.1. In the case of free sulphurous acid the average percentage decrease of Nos. 4 and 5 in red corpuscles is 3.6 and in white corpuscles 14.6.

Figure 3 sets forth graphically, both for the individuals and for the summaries, the extent of the diminution of the red and white blood cells. Unmistakably the data for the special study bear out those obtained in Series VII, and seem to establish the fact that the administration of sulphurous acid both in the free state and in the form of sulphites tends to diminish the number of the red and white corpuscles in the blood.

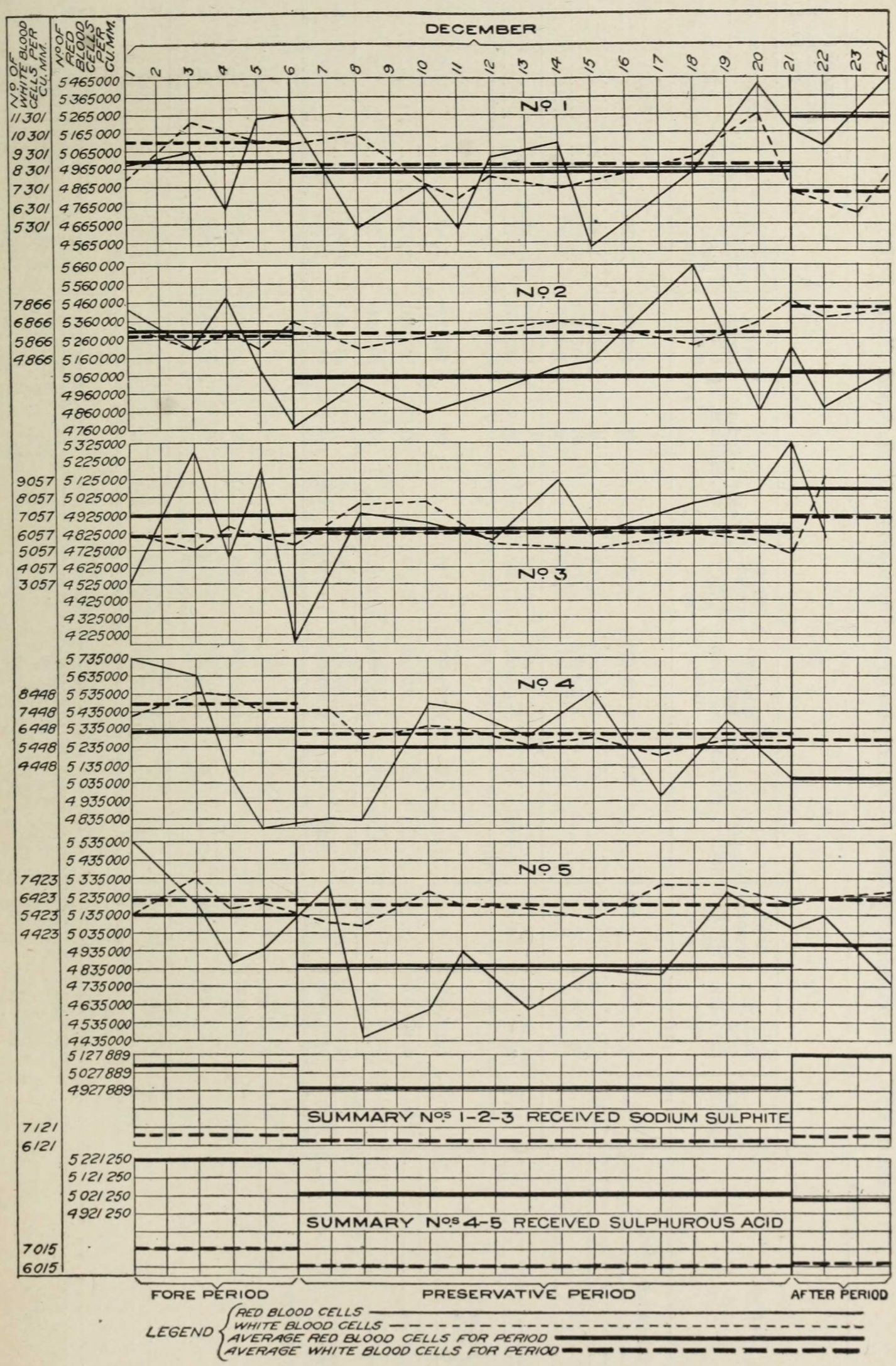

FIG. 3.—Individual and summarized data showing the effect of the preservative on the red and white blood corpuscles, Series XIII.

TABLE XIV.—*Supplementary study of the corpuscles and hemoglobin in the blood, Series XIII.*

Period.	No. 1.				No. 2.				No. 3.				Amount of preservative Nos. 1-3 received.	
													Sodium sulphite—	
	Hemoglobin.	Red corpuscles per cubic mm.	White corpuscles per cubic mm.	Color index.	Hemoglobin.	Red corpuscles per cubic mm.	White corpuscles per cubic mm.	Color index.	Hemoglobin.	Red corpuscles per cubic mm.	White corpuscles per cubic mm.	Color index.	As Na_2SO_3.	As SO_2.
													Gram.	*Mg.*
Fore period, December, 1906:														
1	96	4,985,000	7,700	.....	98	5,425,000	6,592	.....	95	4,505,000	6,094	.....	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	97	5,040.000	10,886	.....	97	5,200,000	5,290	.....	95	5,280,000	5,069	.....	.....	.....
4	97	4,740,000	10,359	.....	96	5,470,000	6,149	.....	97	4,685,000	6,426	.....	.....	.....
5	96	5,235,000	9,778	.....	97	5,085,000	5,290	.....	96	5,180,000	5,817	.....	.....	.....
Total	.....	20,000,000	38,723	.....	.....	21,180,000	23,321	.....	.....	19,650,000	23,406	.....	.....	.....
Average	96.5	5,000,000	9,681	0.965	97	5,295,000	5,830	0.916	95.8	4,912,500	5,852	0.975	.....	.....
Preservative period:														
First subperiod—														
6	97	5,265,000	9,639	.....	97	4,775,000	5,789	.....	96	4,185,000	5,401	.....	1.0	508
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.0	508
8	96	4,635,000	10,193	.....	96	5,010,000	5,318	.....	97	4,935,000	7,728	.....	1.0	508
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.0	508
10	98	4,860,000	7,423	.....	98	4,855,000	5,872	.....	97	4,890,000	7,756	.....	1.0	508
Total	.....	14,760,000	27,255	.....	.....	14,640,000	16,979	.....	.....	14,010,000	20,885	.....	5.0	2,540
Average	97	4,920,000	9,085	.986	97	4,880,000	5,660	.994	96.6	4,670,000	6,962	1.034	1.0	508
Second subperiod—														
11	98	4,640,000	6,620	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.5	762 *a* 200
12	97	5,030,000	7,811	.....	97	4,965,000	6,204	.....	97	4,780.000	5,484	.....	2.0	1,016
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0	1,016
14	98	5,110,000	7,257	.....	98	5,105,000	6,814	.....	98	5,110,000	5,207	.....	2.0	1,016
15	97	4,545,000	7,672	.....	98	5,115,000	6,620	.....	97	4,810,000	5,179	.....	2.0	1,016
Total	.....	19,325,000	29,360	.....	.....	15,185,000	19,638	.....	.....	14,700,000	15,870	.....	9.5	5,026
Average	97.5	4,831,250	7,340	1.009	97.6	5,062,000	6,546	.964	97.3	4,900,000	5,290	.993	1.9	1,005
Third subperiod—														
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.0	1,524
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.0	1,524

18	98	4,945,000	8,974	.....	98	5,660,000	5,484	.....	97	4,985,000	5,955	.....	3.0	1,524
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.0	1,524
20	97	5,435,000	11,301	.....	97	4,845,000	6,814	.....	97	5,070,000	5,595	.....	3.0	1,524
Total	.....	10,380,000	20,275	.....	.....	10,505,000	12,298	.....	.....	10,055,000	11,550	.....	15.0	7,620
Average	97.5	5,190,000	10,138	.939	97.5	5,253,000	6,149	.927	97	5,027,500	5,775	.964	3.0	1,524
Entire preservative period:														
Total	.....	44,465,000	76,890	.....	.....	40,330,000	48,915	.....	.....	38,765,000	48,305	.....	29.5	15,186
Average	97.3	4,940,555	8,544	.985	97.4	5,041,000	6,114	.966	97	4,845,625	6,038	1.001	1.3	1,012.4
After period:														
21	97	5,185,000	7,063	.....	98	5,200,000	7,866	.....	97	5,325,000	4,792	.....	.....	.....
22	97	5,090,000	5,955	.....	97	4,870,000	7,035	.....	97	4,795,000	9,057	.....	.....	.....
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	97	5,465,000	7,949	.....	98	5,070,000	7,368	.....	.....	.....	.....	.....	.....	.....
Total	.....	15,740,000	20,967	.....	.....	15,140,000	22,269	.....	.....	10,120,000	13,849	.....	.....	.....
Average	97	5,246,666	6,989	.924	97.6	5,047,000	7,423	.967	97	5,060,000	6,925	.958	.....	.....

[a] As sulphurous acid at breakfast of this date.

TABLE XIV.—*Supplementary study of the corpuscles and hemoglobin in the blood, Series XIII*—Continued.

Period.	No. 4.				No. 5.				No. 6.				Amount of preservative Nos. 4-6 received.	
													Sulphurous acid as SO_2—	
	Hemoglobin.	Red corpuscles per cubic mm.	White corpuscles per cubic mm.	Color index.	Hemoglobin.	Red corpuscles per cubic mm.	White corpuscles per cubic mm.	Color index.	Hemoglobin.	Red corpuscles per cubic mm.	White corpuscles per cubic mm.	Color index.	Nos. 4 and 5.	No. 6.
													Mg.	*Mg.*
Fore period, December, 1906:														
1	93	5,735,000	7,202	.....	97	5,535,000	5,429	.....	.....	.....	.....	.....	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	95	5,640,000	8,448	.....	98	5,195,000	7,423	.....	.....	.....	.....	.....	.....	.....
4	97	5,080,000	8,310	.....	96	4,860,000	5,789	.....	.....	.....	.....	.....	.....	.....
5	97	4,785,000	7,479	.....	97	4,940,000	6,038	.....	.....	.....	.....	.....	.....	.....
Total	.....	21,240,000	31,439	.....	.....	20,530,000	24,679	.....	.....	.....	.....	.....	.....	.....
Average	95.5	5,310,000	7,860	0.90	97	5,132,500	6,170	0.945	.....	.....	.....	.....	.....	.....
Preservative period:														
First subperiod—														
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300	.....
7	97	4,840,000	7,479	.....	96	5,300,000	4,930	.....	.....	.....	.....	.....	300	.....
8	97	4,830,000	5,844	.....	98	4,455,000	4,847	.....	.....	.....	.....	.....	300	.....
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300	.....
10	96	5,475,000	6,620	.....	97	4,615,000	6,675	.....	*a*102	*a*4,830,000	*a*7,811	*a*1.056	300	.....
Total	.....	15,145,000	19,943	.....	.....	14,370,000	16,452	.....	.....	.....	.....	.....	1,500	.....
Average	96.7	5,048,000	6,648	.958	97	4,790,000	5,484	1.012	.....	.....	.....	.....	300	.....
Second subperiod—														
11	97	5,440,000	6,426	.....	97	4,940,000	5,817	.....	100	4,730,000	7,645	.....	400	300
12	.....	.....	.....	.....	.....	.....	.....	.....	98	5,115,000	6,786	.....	400	300
13	98	5,285,000	5,512	.....	97	4,610,000	5,733	.....	98	5,435,000	10,609	.....	400	300
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400	300
15	98	5,535,000	6,010	.....	97	4,830,000	5,179	.....	100	5,515,000	6,094	.....	400	300
Total	.....	16,260,000	17,948	.....	.....	14,380,000	16,729	.....	.....	20,795,000	31,134	.....	2,000	1,500
Average	97.7	5,420,000	5,983	.90	97	4,793,000	5,576	1.012	99	5,198,750	7,783	.952	400	300
Third subperiod—														
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500	400
17	97	4,955,000	4,875	.....	97	4,800,000	7,063	.....	98	4,955,000	5,927	.....	500	400
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500	400

19	97	5,375,000	5,761	.....	97	5,240,000	7,091	.....	98	5,620,000	6,592	.....	500	400
20	.....	.....	.....	.....	.....	.....	.....	.....	100	5,700,000	7,479	.....	500	400
Total	.....	10,330,000	10,636	.....	.....	10,040,000	14,154	.....	.....	16,275,000	19,998	.....	2,500	2,000
Average	97	5,165,000	5,318	.94	97	5,020,000	7,077	.966	98.7	5,425,000	6,666	.909	500	400
Entire preservative period:														
Total	.....	41,735,000	48,527	.....	.....	38,790,000	47,335	.....	.....	37,070,000	51,132	.....	6,000	3,500
Average	97.1	5,216,875	6,066	.932	97	4,848,750	5,917	1.00	98.9	5,295,714	7,305	.934	400	350
After period:														
21	98	5,060,000	5,706	.....	97	5,040,000	5,983	.....	98	5,000,000	7,534	.....	.....	.....
22	.....	.....	.....	.....	97	5,095,000	6,315	.....	98	5,240,000	7,700	.....	.....	.....
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	.....	.....	.....	.....	97	4,745,000	6,564	.....	100	5,640,000	8,697	.....	.....	.....
Total	.....	.....	.....	.....	.....	14,880,000	18,862	.....	.....	15,880,000	23,931	.....	.....	.....
Average	98	5,060,000	5,706	.969	97	4,960,000	6,287	.977	98.7	5,293,000	7,977	.932	.....	.....

SUMMARIES.

Period.	Nos. 1-3—Received sodium sulphite.						Nos. 4 and 5—Received sulphurous acid.					
	Hemoglobin.	Red corpuscles per cubic mm.	White corpuscles per cubic mm.	Color index.	Per cent decrease reds from fore period.	Per cent decrease whites from fore period.	Hemoglobin.	Red corpuscles per cubic mm.	White corpuscles per cubic mm.	Color index.	Per cent decrease reds from fore period.	Per cent decrease whites from fore period.
Fore period	96.4	5,069,166	7,121	0.952	.....	.....	96.3	5,221,250	7,015	0.923	.....	.....
Preservative period	97.2	4,942,393	6,899	.984	2.5	3.1	97.1	5,032,813	5,992	.966	3.6	14.6
After period	97.2	5,117,889	7,112	.949	.....	.....	97.5	5,010,000	5,997	.973	.....	.....

[a] This day constituted the fore period for No. 6; no preservative taken.

METABOLIC PROCESSES.

The effect of the preservative upon the metabolic processes is shown in the balance sheets made for the principal food elements, namely, nitrogen, phosphoric acid, sulphur, fat, calories, and total solids. The data include the amounts of food ingested, by periods and subperiods; the absolute quantities and percentage amounts of the respective elements excreted in the feces and the urine, and the balance, together with a statement as to the amounts of preservative administered.

NITROGEN BALANCE.

INDIVIDUAL DATA.

The average daily quantity of nitrogen consumed by No. 1 is 17.58 grams in the fore period, 16.97 grams in the preservative period, and 16.95 grams in the after period. Of this quantity, there appear in the feces 1.26 grams, 1.14 grams, and 0.73 gram, respectively, for the three periods; and in the urine 16.06 grams, 14.89 grams, and 15.37 grams, respectively. The total quantity of nitrogen recovered in the feces and urine is 17.32 grams, 16.03 grams, and 16.10 grams, daily, respectively, for the three periods. Calculated to percentage, it is seen that of the total nitrogen in the food 7.19 per cent appears in the feces in the fore period, 6.74 per cent in the preservative period, and 4.34 per cent in the after period; and in the urine, 91.38 per cent in the fore period, 87.74 per cent in the preservative period, and in the after period, 90.64 per cent. The nitrogen balance for all three periods is positive and amounts to 0.26 gram in the fore period, 0.94 gram in the preservative period, and 0.85 gram in the after period. In this case it is noticed that there is a smaller quantity of nitrogen recovered in the excreta during the preservative period and therefore a greater nitrogen balance. By reason of the abnormally low amount of nitrogen recovered in the feces in the after period the balance for that period is only slightly less than for the preservative period.

In the case of No. 2 the data for the preservative period is not complete, including only the first, second, and third subperiods. There is little variation in the amount of nitrogen ingested in this case, it being slightly greater, however, in the preservative period. The quantity recovered in the feces is almost exactly the same in the fore and after periods and is slightly greater in the preservative period. The quantity recovered in the urine is practically the same in the preservative and after periods, being somewhat less than in the fore period. Of the total amount of nitrogen recovered in the feces and urine it is seen that a less quantity is recovered in the preservative period than in the fore period and a slightly less quantity in the after period than in the preservative period. The nitrogen balance is

negative in the fore period, but by an extremely small amount, namely, 0.02 gram. The balance in the preservative period is positive and quite large, namely, 1.16 grams. In the after period the balance is also positive and amounts to 1.03 grams. The data show a decreased excretion of nitrogen during the preservative period, which is due to the decrease in metabolized nitrogen, and this inhibition is continued, though not to the same extent, in the after period.

With No. 3 the average daily quantity of nitrogen ingested is somewhat greater in the preservative period and notably greater in the after period than in the fore period. This, however, is not sufficient to account for the increase in the excretion of the nitrogen, both in the feces and in the urine, during the preservative period. There is a large positive nitrogen balance in the fore period, which is diminished almost one-half in the preservative period and is doubled in the after period, where the balance appears to be abnormally high. These data indicate an increased excretion of nitrogen during the preservative period in a larger quantity than would be due to the increase in the amount of nitrogen ingested. This is especially true of the unmetabolized nitrogen.

The amount of nitrogen consumed by No. 4 is slightly larger in the preservative period and after periods than in the fore period. The quantity excreted in the feces is increased, both in the preservative and after periods, over the fore period. The quantity excreted in the urine is markedly diminished in the preservative period. The total quantity excreted in the feces and urine is very considerably diminished in the preservative period and is almost the same in the fore and after periods. The nitrogen balance in the fore and after periods is large and negative; in the preservative period it is small and negative. In this case there is a marked decrease in elimination of nitrogen during the preservative period, though the quantity of nonmetabolized nitrogen excreted is increased.

The data for No. 5 are incomplete, for reasons already stated. No comparison can be made between the fore period and the after period, and the figures for the balance have no signification for comparative purposes. The tendency shown in three of the preceding cases to increase the excretion of non-metabolized nitrogen is again shown.

The quantity of nitrogen consumed by No. 6 is slightly less in the preservative period than in the fore period and is slightly greater in the after period than in the preservative period. The quantity of nitrogen found in the feces is very materially increased in the preservative period, although the amount of nitrogen in the food is diminished. In the after period the quantity in the feces is almost the same as in the fore period. The quantity of nitrogen in the urine is also very considerably increased in the preservative period, being 1.67 grams per day greater than in the fore period. This increase is

even more marked in the after period. The total quantity of nitrogen excreted during the preservative period is very considerably increased over the fore period and is exactly the same as that excreted during the after period. The nitrogen balance in the fore period is abnormally large and positive. It is still large and positive in the preservative period, though only about one-half the magnitude of the fore period. In the after period it is somewhat larger than in the preservative period.

The data in the case of No. 7 for the nitrogen balance are incomplete, on account of the absence of any data for the after period, and for the further reason that only three subperiods of the preservative period are considered. These data therefore are of little or no value for comparative purposes.

The quantity of nitrogen in the food in the case of No. 8 is quite uniform in all the periods. The quantity excreted in the feces is almost the same for the fore and preservative periods and slightly less for the after period. The quantity of nitrogen excreted in the urine is slightly greater in the preservative period and is increased again in about a like proportion in the after period. The quantity in the feces and urine together is increased to a slight extent in the preservative period and also in the after period. The balance in the fore period is positive and amounts to 1.06 grams daily. It is also positive in the preservative period and amounts to 0.88 gram. In the after period the balance is again somewhat diminished and is 0.71 gram.

The quantity of nitrogen excreted in the feces of No. 9 in the fore period is very low and the positive balance, therefore, is exceptionally high. There is a notable increase in the nitrogen excreted during the preservative period, being over 1 gram per day more than in the fore period, and in the after period there is still an increase. The balance in the preservative period is positive and more nearly normal than in the fore period. There is a further diminution in the magnitude of the balance in the after period. The decrease in the positive balance in the preservative period appears to be due to a considerable increase in nitrogen katabolism, and in the after period the decrease in the balance is even more marked. This indication is further borne out by the percentage figures for the preservative period, while in the after period the greater elimination is in the feces.

The balances in the case of No. 10 are all unusually large, amounting to 2.55 grams daily in the fore period, 3.08 grams daily in the preservative period, and 2.17 grams daily in the after period. A larger quantity of nitrogen is excreted in the preservative period in the feces than in the fore period, but the opposite is true of the nitrogen in the urine, which is very largely decreased in the preservative period. The data in this case indicate a tendency on the part of the preservative

to inhibit the excretion of total nitrogen, but there is again an increase in the quantity of nonmetabolized nitrogen excreted.

The quantity of nitrogen consumed by No. 11 is exceptionally large, amounting to more than 20 grams per day. The quantity excreted in the feces is slightly greater in the preservative period than in the fore period, while in the after period it is less than in the fore period. There is a diminution, however, in the amount of nitrogen excreted in the urine, while its loss is partially restored in the after period. The total quantity of nitrogen excreted in the feces and urine is markedly less in the preservative period. The balances are large in all the periods and especially so in the preservative and after periods.

The quantity of nitrogen consumed by No. 12 is slightly greater in the preservative period and considerably less in the after period than in the fore period. The amount excreted in the feces is decidedly less in the after period than in either of the other periods. The quantity of nitrogen excreted in the urine is somewhat greater in the preservative period than in the fore period and a greater quantity is excreted in the feces and urine together than in the fore or after periods. The nitrogen balance is positive in all cases, slightly less in the preservative period and markedly less in the after period than in the fore period.

SUMMARIES.

The summaries for the nitrogen balances, as for all of the principal food elements, are submitted for Nos. 1 to 6, who received sodium sulphite and are complete with the exception of the fourth preservative subperiod. For Nos. 8 to 11, receiving sulphurous acid, the data are complete for the entire observation. These two summaries are discussed and compared, while the smaller summaries for Nos. 1 and 4, 5 and 6, and 7 and 12, and the partial summary for Nos. 7 to 12 are submitted without comment.

In the summary for Nos. 1 to 6 the average daily amount of nitrogen consumed is 17.77 grams in the fore period, 17.42 grams in the preservative period, and 16.71 grams in the after period. The average daily quantity of nitrogen excreted in the feces is 1.33 grams for the fore period, 1.49 grams for the preservative period, and 1.25 grams for the after period. The average daily quantity of nitrogen excreted in the urine is 15.12 grams in the fore period, 15.19 grams in the preservative period, and 14.74 grams in the after period. The total quantity of nitrogen excreted in the feces and urine is 16.45 grams in the fore period, 16.67 grams in the preservative period, and 15.99 grams in the after period. These data show a slight increase in the quantity of nitrogen excreted in the preservative period, although the amount in the food is slightly less. In the after period there is a decrease in the quantity of nitrogen in the food

and practically the same decrease in the amount excreted. The balance is positive in all cases and has a magnitude of 1.32 grams in the fore period, 0.75 gram in the preservative period, and 0.72 gram in the after period

Considering the percentage data it is seen that in the fore period 7.50 per cent of nitrogen appear in the feces and 85.10 per cent in the urine, while in the preservative period 8.54 per cent appear in the feces and 87.17 per cent in the urine, an increase of 1.04 per cent of nonmetabolized nitrogen excreted and 2.07 per cent of metabolized nitrogen. In other words, there is a total increased excretion of nitrogen of 3.11 per cent, notwithstanding a daily decrease of nitrogen ingested amounting to 0.35 gram. In the after period there is a marked decrease both in the absolute quantity and percentage amount of nonmetabolized nitrogen excreted and a decrease in the quantity of metabolized nitrogen, though the percentage amount is again increased, amounting to 88.17 per cent, the reason for this being that the average daily quantity of nitrogen consumed in the after period is 0.71 gram less than in the preservative period. The total quantity of nitrogen excreted is somewhat less in the after period, though the percentage excretion is practically the same as in the preservative period, reducing the balances in the preservative and after periods to 0.75 and 0.72 gram, respectively, or about one-half the balance of the fore period.

These data seem to show a marked change in nitrogen metabolism from the conditions of the fore period and indicate a tendency on the part of the preservative to diminish the assimilation of the proteid constituents of the food; the data for weight and water content of the feces also bear out this point, these figures increasing during the preservative period. After the withdrawal of the preservative more nitrogen is absorbed and metabolism is evidently more active.

Nos. 8 to 11 furnish summarized data for the entire period of observation. The quantity of nitrogen in the food consumed by these subjects is almost constant, being slightly less in the preservative period and in the after period than in the fore period. The quantity excreted in the feces is 1.42 grams for the fore period, 1.53 grams for the preservative period, and 1.62 grams for the after period, and in the urine 14.27 grams in the fore period, 13.81 grams in the preservative period, and 14.24 grams in the after period. The total quantity of nitrogen excreted in the feces and urine is 15.69 grams in the fore period, 15.35 grams in the preservative period, and 15.86 grams in the after period. The balance is positive and has a magnitude of 2.02 grams in the fore period, 2.11 grams in the preservative period, and 1.69 grams in the after period. There do not appear to be any notable effects produced upon the nitrogen balance in this case by the administration of the preservative, though

the balance is slightly increased in the preservative period, notwithstanding the increase in the percentage elimination of nonmetabolized nitrogen.

It is now possible to compare the summary for Nos. 1 to 6, inclusive, who received sodium sulphite, and that for Nos. 8, 9, 10, and 11, who took free sulphurous acid. In respect of the influence of the preservative upon the excretion of nitrogen in the feces, it is seen that there is an increase of 0.16 gram daily in the amount excreted in the preservative period in the case of Nos. 1 to 6. In the after period, on the contrary, the amount excreted is 0.08 gram less than in the fore period. This increase in the amount of nitrogen excreted in the feces is the more pronounced in the preservative period when it is noticed that the quantity of nitrogen in the food is greater by 0.35 gram during the fore period than during the preservative period. When we compare these data with the summary for Nos. 8, 9, 10, and 11, we see a similar increase in the preservative period of the nitrogen excreted in the feces, this increase amounting to 0.11 gram daily. Unlike the summary for Nos. 1 to 6, however, there is no diminution of this amount in the after period. On the contrary, the increase is greater, amounting to 0.20 gram per day. As is the case with the summary for Nos. 1 to 6, this increase in the amount of nitrogen excreted in the preservative period is attended with a decrease of nitrogen in the food of 0.25 gram per day. It is therefore even more significant than appears from its actual magnitude.

If the excretion of nitrogen in the urine be taken into consideration, it is noticed that there is a slight increase in the preservative period over the fore period for Nos. 1 to 6, amounting to 0.07 gram per day, while there is a marked decrease in the after period, amounting to 0.38 gram per day.

The same data in the summary for Nos. 8, 9, 10, and 11 show a decrease in the amount of nitrogen excreted in the urine, amounting to 0.46 gram per day in the preservative period, whereas in the after period the amount excreted is restored almost to the original figure. The agreement between the two summaries is found only in the case of the feces. The conclusion, therefore, to be drawn is this: That sulphurous acid, both in the form of sulphites and in the uncombined state, tends to increase the excretion of the nitrogen in the feces. The preservative in the form of sulphites has but little effect upon the excretion of the nitrogen in the urine, though the tendency here is also to increase the amount. On the contrary, when sulphurous acid is administered there is a decrease in the amount of nitrogen excreted in the urine, which is greater than could be accounted for by the decrease of nitrogen in the food.

The general results of the study of the nitrogen balance lead to the conclusion that there is a measurable disturbance of the process of

metabolism of nitrogen, especially that part appearing in the feces which is credited as nonmetabolized nitrogen. The preservative, both in the form of sulphites and in a free state, gives concordant results in this respect. There is little effect upon the metabolized nitrogen in the urine, though the sulphites appear to slightly increase the amount metabolized and the sulphurous acid to slightly diminish it.

TABLE XV.—*Nitrogen balances for Series VII.*

[Averages are per day.]

No. 1.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	89.57	8.27	80.75	89.02	9.23	90.15	99.39	+ 0.55	0.0
Average	17.91	1.65	16.15	17.80	.....	.....	.....	+ .11	.0
Second subperiod:									
Total	86.18	4.37	79.85	84.22	5.07	92.65	97.72	+ 1.96	.0
Average	17.24	.84	15.97	16.84	.....	.....	.....	+ .40	.0
Entire fore period:									
Total	175.75	12.64	160.60	173.24	7.19	91.38	98.57	+ 2.51	.0
Average	17.58	1.26	16.06	17.32	.....	.....	.....	+ .26	.0
Preservative period.									
First subperiod:									
Total	84.44	6.86	75.62	82.48	8.12	89.55	97.68	+ 1.96	1.115
Average	16.89	1.37	15.12	16.50	.....	.....	.....	+ .39	.223
Second subperiod:									
Total	83.47	7.68	69.40	77.08	9.20	83.14	92.34	+ 6.39	2.540
Average	16.69	1.54	13.88	15.42	.....	.....	.....	+ 1.27	.508
Third subperiod:									
Total	86.16	4.16	74.89	79.05	4.83	86.92	91.74	+ 7.11	3.810
Average	17.23	.83	14.98	15.81	.....	.....	.....	+ 1.42	.762
Fourth subperiod:									
Total	85.35	4.18	77.89	82.07	4.90	91.26	96.16	+ 3.28	3.810
Average	17.07	.84	15.58	16.42	.....	.....	.....	+ .65	.762
Entire preservative period:									
Total	339.42	22.88	297.80	320.68	6.74	87.74	94.48	+18.74	11.275
Average	16.97	1.14	14.89	16.03	.....	.....	.....	+ .94	.564
After period.									
First subperiod:									
Total	83.12	3.76	77.01	80.77	4.52	92.65	97.17	+ 2.35	.0
Average	16.62	.75	15.40	16.15	.....	.....	.....	+ .47	.0
Second subperiod:									
Total	86.41	3.60	76.66	80.26	4.17	88.72	92.88	+ 6.15	.0
Average	17.28	.72	15.33	16.05	.....	.....	.....	+ 1.23	.0
Entire after period:									
Total	169.53	7.36	153.67	161.03	4.34	90.64	94.99	+ 8.50	.0
Average	16.95	.73	15.37	16.10	.....	.....	.....	+ .85	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 2.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	96.76	6.65	90.25	96.90	6.87	93.27	100.14	− 0.14	0.0
Average	19.35	1.33	18.05	19.38	.....	.....	.....	− .03	.0
Second subperiod:									
Total	98.79	10.66	88.28	98.94	10.79	89.36	100.15	− .15	.0
Average	19.76	2.13	17.66	19.79	.....	.....	.....	− .03	.0
Entire fore period:									
Total	195.55	17.31	178.53	195.84	8.85	91.30	100.15	− .29	.0
Average	19.56	1.73	17.85	19.58	.....	.....	.....	− .02	.0
Preservative period.									
First subperiod:									
Total	104.93	8.44	80.36	88.80	8.04	76.58	84.62	+16.13	1.115
Average	20.99	1.69	16.07	17.76	.....	.....	.....	+ 3.23	.223
Second subperiod:									
Total	96.12	11.39	81.48	92.87	11.85	84.77	96.62	+ 3.25	2.540
Average	19.22	2.28	16.30	18.57	.....	.....	.....	+ .65	.508
Third subperiod:									
Total	97.86	8.53	91.36	99.89	8.72	93.36	102.07	− 2.03	3.810
Average	19.57	1.71	18.27	19.98	.....	.....	.....	− .41	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(3.810)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.762)
First, second, and third subperiods:									
Total	298.91	28.36	253.20	281.56	9.49	84.71	94.20	+17.35	.....
Average	19.93	1.89	16.88	18.77	.....	.....	.....	+ 1.16	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	11.275
Average	.....	.....	.....	.....	.....	.....	.....	.....	.564
After period.									
First subperiod:									
Total	98.52	8.89	85.31	94.20	9.02	86.59	95.62	+ 4.32	.0
Average	19.70	1.78	17.06	18.84	.....	.....	.....	+ .86	.0
Second subperiod:									
Total	98.26	8.51	83.80	92.31	8.66	85.28	93.94	+ 5.95	.0
Average	19.65	1.70	16.76	18.46	.....	.....	.....	+ 1.19	.0
Entire after period:									
Total	196.78	17.40	169.11	186.51	8.84	85.94	94.78	+10.27	.0
Average	19.68	1.74	16.91	18.65	.....	.....	.....	+ 1.03	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 3.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	85.84	3.74	76.22	79.96	4.36	88.79	93.15	+ 5.88	0.0
Average	17.17	.75	15.24	15.97	.....	.....	.....	+ 1.20	.0
Second subperiod:									
Total	93.82	5.62	83.50	89.12	5.99	89.00	94.99	+ 4.70	.0
Average	18.76	1.12	16.70	17.82	.....	.....	.....	+ .94	.0
Entire fore period:									
Total	179.66	9.36	159.72	169.08	5.21	88.90	94.11	+10.58	.....
Average	17.97	.94	15.97	16.91	.....	.....	.....	+ 1.06	.....
Preservative period.									
First subperiod:									
Total	90.44	6.97	80.62	87.59	7.71	89.14	96.85	+ 2.85	1.115
Average	18.09	1.39	16.12	17.52	.....	.....	.....	+ .57	.223
Second subperiod:									
Total	90.97	5.49	81.70	87.19	6.04	89.81	95.84	+ 3.78	2.549
Average	18.19	1.10	16.34	17.44	.....	.....	.....	+ .75	.508
Third subperiod:									
Total	92.89	7.83	81.70	89.53	8.43	87.95	96.38	+ 3.36	3.810
Average	18.58	1.57	16.34	17.91	.....	.....	.....	+ .67	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(.381)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.076)
First, second, and third subperiods:									
Total	274.30	20.29	244.02	264.31	7.40	88.96	96.36	+ 9.99	.....
Average	18.29	1.35	16.27	17.62	.....	.....	.....	+ .67	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	7.846
Average	.....	.....	.....	.....	.....	.....	.....	.....	[a].392
After period.									
First subperiod:									
Total	91.48	4.48	79.16	80.67	4.90	83.29	88.18	+10.81	.0
Average	18.30	.90	15.24	16.14	.....	.....	.....	+ 2.16	.0
Second subperiod:									
Total	95.16	4.74	80.71	85.45	4.98	84.82	89.80	+ 9.71	.0
Average	19.03	.95	16.14	17.09	.....	.....	.....	+ 1.94	.0
Entire after period:									
Total	186.64	9.22	156.90	166.12	4.94	84.07	89.01	+20.52	.0
Average	18.66	.92	15.69	16.61	.....	.....	.....	+ 2.05	.0

[a] Average for 20 days.

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	83.49	5.84	82.76	88.60	6.99	99.13	106.12	− 5.11	0.0
Average	16.70	1.17	16.55	17.72	.....	.....	.....	− 1.02	.0
Second subperiod:									
Total	86.01	7.43	86.94	94.37	8.64	101.08	109.72	− 8.36	.0
Average	17.20	1.49	17.39	18.87	.....	.....	.....	− 1.67	.0
Entire fore period:									
Total	169.50	13.27	169.70	182.97	7.83	100.12	107.95	−13.47	.0
Average	16.95	1.33	16.97	18.30	.....	.....	.....	− 1.35	.0
Preservative period.									
First subperiod:									
Total	89.60	6.51	83.52	90.03	7.27	93.21	100.48	− .43	1.115
Average	17.92	1.30	16.70	18.01	.....	.....	.....	− .09	.223
Second subperiod:									
Total	82.63	9.51	75.32	84.83	11.51	91.15	102.66	− 2.20	2.540
Average	16.53	1.90	15.06	16.97	.....	.....	.....	− .44	.508
Third subperiod:									
Total	85.71	6.27	78.63	84.90	7.32	91.74	99.05	+ .81	3.810
Average	17.14	1.25	15.73	16.98	.....	.....	.....	+ .16	.762
Fourth subperiod:									
Total	84.19	7.74	77.57	85.31	9.19	92.14	101.33	− 1.12	5.100
Average	16.84	1.55	15.51	17.06	.....	.....	.....	− .22	1.020
Entire preservative period:									
Total	342.13	30.03	315.04	345.07	8.78	92.08	100.86	− 2.94	12.565
Average	17.11	1.50	15.75	17.25	.....	.....	.....	− .14	.628
After period.									
First subperiod:									
Total	84.49	6.64	84.27	90.91	7.86	99.74	107.60	− 6.42	.0
Average	16.90	1.33	16.85	18.18	.....	.....	.....	− 1.28	.0
Second subperiod:									
Total	86.32	8.30	83.59	91.89	9.62	96.84	106.45	− 5.57	.0
Average	17.26	1.66	16.72	18.38	.....	.....	.....	− 1.12	.0
Entire after period:									
Total	170.81	14.94	167.86	182.80	8.75	98.27	107.02	−11.99	.0
Average	17.08	1.49	16.79	18.28	.....	.....	.....	− 1.20	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 5.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	84.34	5.34	64.63	69.97	6.33	76.63	82.96	+14.37	0.0
Average	16.87	1.07	12.93	13.99	.....	.....	.....	+ 2.88	.0
Preservative period.									
First subperiod:									
Total	81.02	6.15	75.68	81.83	7.59	93.41	101.00	− .81	1.115
Average	16.20	1.23	15.14	16.37	.....	.....	.....	− .17	.223
Second subperiod:									
Total	80.09	6.93	68.16	75.09	8.65	85.11	93.76	+ 5.00	2.540
Average	16.02	1.39	13.63	15.02	.....	.....	.....	+ 1.00	.508
Third subperiod:									
Total	67.06	5.33	62.27	67.60	7.95	92.86	100.81	− .54	2.540
Average	13.41	1.07	12.45	13.52	.....	.....	.....	− .11	.508
Fourth subperiod:									
Total	38.47	6.08	48.38	54.46	15.80	125.76	141.56	−15.99	.0
Average	7.69	1.22	9.68	10.89	.....	.....	.....	− 3.20	.0
Entire preservative period:									
Total	226.64	24.49	254.49	278.98	10.81	112.29	123.10	−52.34	6.195
Average	11.33	1.22	12.72	13.94	.....	.....	.....	− 2.61	.310
After period.									
First subperiod:									
Total	52.19	5.28	46.74	52.02	10.12	89.56	99.67	+ .17	.0
Average	10.44	1.06	9.35	10.40	.....	.....	.....	+ .04	.0
Second subperiod:									
Total	57.02	4.73	51.00	55.73	8.30	89.44	97.74	+ 1.29	.0
Average	11.40	.95	10.20	11.15	.....	.....	.....	+ .25	.0
Entire after period:									
Total	109.21	10.01	97.74	107.75	9.17	89 50	98.66	+ 1.46	.0
Average	10.92	1.00	9.77	10.77	.....	.....	.....	+ .15	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	83.43	6.77	57.87	64.64	8.11	69.36	77.48	+18.79	0.0
Average	16.69	1.35	11.57	12.92	.....	.....	.....	+ 3.77	.0
Second subperiod:									
Total	88.94	8.60	63.20	71.80	9.67	71.06	80.73	+17.14	.0
Average	17.79	1.72	12.64	14.36	.....	.....	.....	+ 3.43	.0
Entire fore period:									
Total	172.37	15.37	121.07	136.44	8.92	70.24	79.16	+35.93	.0
Average	17.24	1.54	12.11	13.64	.....	.....	.....	+ 3.60	.0
Preservative period.									
First subperiod:									
Total	88.40	7.67	66.07	73.74	8.68	74.74	83.42	+14.66	1.115
Average	17.68	1.53	13.21	14.74	.....	.....	.....	+ 2.94	.223
Second subperiod:									
Total	82.28	11.08	71.35	82.43	13.47	86.72	100.18	− .15	2.540
Average	16.46	2.22	14.27	16.49	.....	.....	.....	− .03	.508
Third subperiod:									
Total	83.73	7.08	68.59	75.67	8.46	81.92	90.37	+ 8.06	3.810
Average	16.75	1.42	13.72	15.14	.....	.....	.....	+ 1.61	.762
Fourth subperiod:									
Total	83.02	8.29	69.55	77.84	9.99	83.77	93.76	+ 5.18	.0
Average	16.60	1.66	13.91	15.57	.....	.....	.....	+ 1.03	.0
Entire preservative period:									
Total	337.43	34.12	275.56	309.68	10.11	81.66	91.78	+27.75	7.465
Average	16.87	1.71	13.78	15.49	.....	.....	.....	+ 1.38	.373
After period.									
First subperiod:									
Total	85.61	8.20	71.15	79.35	9.58	83.11	92.69	+ 6.26	.0
Average	17.12	1.64	14.23	15.87	.....	.....	.....	+ 1.25	.0
Second subperiod:									
Total	84.29	7.74	67.81	75.55	9.18	80.45	89.63	+ 8.74	.0
Average	16.86	1.55	13.56	15.11	.....	.....	.....	+ 1.75	.0
Entire after period:									
Total	169.90	15.94	138.96	154.90	9.38	81.79	91.17	+15.00	.0
Average	16.99	1.59	13.90	15.49	.....	.....	.....	+ 1.50	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 7.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	77.19	5.05	56.21	61.26	6.54	72.82	79.36	+15.93	0.0
Average	15.44	1.01	11.24	12.25	.....	.....	.....	+ 3.19	.0
Second subperiod:									
Total	74.47	6.79	56.64	63.43	9.12	76.06	85.18	+11.04	.0
Average	14.89	1.36	11.33	12.69	.....	.....	.....	+ 2.20	.0
Entire fore period:									
Total	151.66	11.84	112.85	124.69	7.81	74.41	82.22	+26.97	.0
Average	15.17	1.18	11.29	12.47	.....	.....	.....	+ 2.70	.0
Preservative period.									
First subperiod:									
Total	73.46	7.93	58.18	66.11	10.79	79.20	89.99	+ 7.35	.856
Average	14.69	1.59	11.64	13.22	.....	.....	.....	+ 1.47	.171
Second subperiod:									
Total	66.51	5.05	47.15	52.20	7.59	70.89	78.48	+14.31	1.600
Average	13.30	1.01	9.43	10.44	.....	.....	.....	+ 2.86	.320
Third subperiod:									
Total	65.29	3.29	57.96	61.25	5.04	88.77	93.81	+ 4.04	1.800
Average	13.06	.66	11.59	12.25	.....	.....	.....	+ .81	.360
First, second, and third subperiods:									
Total	206.26	16.27	163.29	179.55	7.89	79.17	87.05	+26.71	4.256
Average	13.68	1.08	10.89	11.97	.....	.....	.....	+ 1.71	[a].213

[a] Average for 20 days.

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 8.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	75.65	8.73	57.36	66.09	11.54	75.82	87.36	+ 9.56	0.0
Average	15.13	1.75	11.47	13.22	.....	.....	.....	+ 1.91	.0
Second subperiod:									
Total	76.66	10.51	65.14	75.65	13.71	84.97	98.68	+ 1.01	.0
Average	15.33	2.10	13.03	15.13	.....	.....	.....	+ .20	.0
Entire fore period:									
Total	152.31	19.24	122.50	141.74	12.63	80.43	93.06	+10.57	.0
Average	15.23	1.92	12.25	14.17	.....	.....	.....	+ 1.06	.0
Preservative period.									
First subperiod:									
Total	83.73	6.90	66.91	73.81	.824	79.91	88.15	+ 9.92	.856
Average	16.75	1.38	13.38	14.76	.....	.....	.....	+ 1.99	.171
Second subperiod:									
Total	73.67	7.28	61.42	68.70	9.88	83.37	93.25	+ 4.97	2.000
Average	14.73	1.46	12.28	13.74	.....	.....	.....	+ .99	.400
Third subperiod:									
Total	76.36	11.90	62.16	74.06	15.58	81.40	96.99	+ 2.30	2.000
Average	15.27	2.38	12.43	14.81	.....	.....	.....	+ .46	.400
Fourth subperiod:									
Total	74.13	13.12	60.48	73.60	17.70	81.59	99.29	+ .53	2.000
Average	14.83	2.62	12.10	14.72	.....	.....	.....	+ .11	.400
Entire preservative period:									
Total	307.89	39.20	250.97	290.17	12.73	81.51	94.24	+17.72	6.856
Average	15.39	1.96	12.55	14.51	.....	.....	.....	+ .88	.343
After period.									
First subperiod:									
Total	75.73	8.53	63.87	72.40	11.26	84.34	95.60	+ 3.33	.0
Average	15.15	1.71	12.77	14.48	.....	.....	.....	+ .67	.0
Second subperiod:									
Total	77.04	9.02	64.28	73.30	11.71	83.44	95.15	+ 3.74	.0
Average	15.41	1.80	12.86	14.66	.....	.....	.....	+ .75	.0
Entire after period:									
Total	152.77	17.55	128.15	145.70	11.49	83.88	95.37	+ 7.07	.0
Average	15.28	1.76	12.82	14.57	.....	.....	.....	+ .71	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 9.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance. (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	83.62	4.85	65.14	69.99	5.80	77.90	83.70	+13.63	0.0
Average	16.72	.97	13.03	14.00	.....	.....	.....	+ 2.72	.0
Second subperiod:									
Total	84.95	4.68	69.49	74.17	5.51	81.80	87.31	+10.78	.0
Average	16.99	.94	13.90	14.83	.....	.....	.....	+ 2.16	.0
Entire fore period:									
Total	168.57	9.53	134.63	144.16	5.65	79.87	85.52	+24.41	.0
Average	16.86	.95	13.46	14.42	.....	.....	.....	+ 2.44	.0
Preservative period.									
First subperiod:									
Total	82.65	5.62	75.81	81.43	6.80	91.72	98.52	+ 1.22	.856
Average	16.53	1.12	15.16	16.29	.....	.....	.....	+ .24	.171
Second subperiod:									
Total	80.88	5.50	69.30	74.80	6.80	85.68	92.48	+ 6.08	2.000
Average	16.18	1.10	13.86	14.96	.....	.....	.....	+ 1.22	.400
Third subperiod:									
Total	82.98	5.51	69.73	75.24	6.64	84.03	90.67	+ 7.74	2.000
Average	16.60	1.10	13.95	15.05	.....	.....	.....	+ 1.55	.400
Fourth subperiod:									
Total	82.28	3.57	75.57	79.14	4.38	91.84	96.18	+ 3.14	2.000
Average	16.46	.71	15.11	15.83	.....	.....	.....	+ .63	.400
Entire preservative period:									
Total	328.79	20.20	290.41	310.61	6.14	88.33	94.47	+18.18	6.856
Average	16.44	1.01	14.52	15.53	.....	.....	.....	+ .91	.343
After period.									
First subperiod:									
Total	82.25	8.95	71.86	80.81	10.88	87.37	98.25	+ 1.44	.0
Average	16.45	1.79	14.37	16.16	.....	.....	.....	+ .29	.0
Second subperiod:									
Total	83.32	6.74	72.05	78.79	8.09	86.47	94.56	+ 4.53	.0
Average	16.66	1.35	14.41	15.76	.....	.....	.....	+ .90	.0
Entire after period:									
Total	165.57	15.69	143.91	159.60	9.48	86.92	96.39	+ 5.97	.0
Average	16.56	1.57	14.39	15.96	.....	.....	.....	+ .60	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 10.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	90.96	6.34	71.45	77.79	6.97	78.55	85.52	+13.17	0.0
Average	18.19	1.27	14.29	15.56	.....	.....	.....	+ 2.63	.0
Second subperiod:									
Total	89.67	3.96	73.35	77.31	4.42	81.80	86.22	+12.36	.0
Average	17.93	.79	14.67	15.46	.....	.....	.....	+ 2.47	.0
Entire fore period:									
Total	180.63	10.30	144.80	155.10	5.70	80.16	85.87	+25.53	.0
Average	18.06	1.03	14.48	15.51	.....	.....	.....	+ 2.55	.0
Preservative period.									
First subperiod:									
Total	86.27	7.80	69.23	77.03	9.04	80.25	89.29	+ 9.24	.856
Average	17.25	1.56	13.85	15.41	.....	.....	.....	+ 1.84	.171
Second subperiod:									
Total	88.09	6.88	53.20	60.08	7.81	60.39	68.20	+28.01	2.000
Average	17.62	1.38	10.64	12.02	.....	.....	.....	+ 5.60	.400
Third subperiod:									
Total	88.10	3.76	71.41	75.17	4.27	81.06	85.32	+12.93	2.000
Average	17.62	.75	14.28	15.03	.....	.....	.....	+ 2.59	.400
Fourth subperiod:									
Total	87.45	8.19	68.00	76.19	9.37	77.76	87.12	+11.26	2.000
Average	17.49	1.64	13.60	15.24	.....	.....	.....	+ 2.25	.400
Entire preservative period:									
Total	349.91	26.63	261.84	288.47	7.61	74.83	82.44	+61.44	6.856
Average	17.50	1.33	13.09	14.42	.....	.....	.....	+ 3.08	.343
After period.									
First subperiod:									
Total	87.40	7.44	72.75	80.19	8.51	83.24	91.75	+ 7.21	.0
Average	17.48	1.49	14.55	16.04	.....	.....	.....	+ 1.44	.0
Second subperiod:									
Total	87.61	8.12	65.03	73.15	9.27	74.73	83.50	+14.46	.0
Average	17.52	1.62	13.01	14.63	.....	.....	.....	+ 2.89	.0
Entire after period:									
Total	175.01	15.56	137.78	153.34	8.89	78.73	87.62	+21.67	.0
Average	17.50	1.56	13.78	15.33	.....	.....	.....	+ 2.17	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	101.95	9.11	82.93	92.04	8.94	81.34	90.28	+ 9.91	0.0
Average	20.39	1.82	16.59	18.41	.....	.....	.....	+ 1.98	.0
Second subperiod:									
Total	105.12	8.76	85.92	94.68	8.33	81.73	90.07	+10.44	.0
Average	21.02	1.75	17.18	18.94	.....	.....	.....	+ 2.08	.0
Entire fore period:									
Total	207.07	17.87	168.85	186.72	8.63	81.54	90.17	+20.35	.0
Average	20.71	1.79	16.88	18.67	.....	.....	.....	+ 2.04	.0
Preservative period.									
First subperiod:									
Total	102.01	10.13	81.73	91.86	9.93	80.12	90.05	+10.15	.856
Average	20.40	2.03	16.35	18.37	.....	.....	.....	+ 2.03	.171
Second subperiod:									
Total	102.03	7.94	69.36	77.30	7.78	67.98	75.76	+24.73	2.000
Average	20.41	1.59	13.87	15.46	.....	.....	.....	+ 4.95	.400
Third subperiod:									
Total	103.79	9.47	74.98	84.45	9.13	72.24	81.37	+19.34	2.000
Average	20.76	1.89	15.00	16.89	.....	.....	.....	+ 3.87	.400
Fourth subperiod:									
Total	102.48	9.14	75.66	84.80	8.92	73.83	82.75	+17.68	2.000
Average	20.50	1.83	15.13	16.96	.....	.....	.....	+ 3.54	.400
Entire preservative period:									
Total	410.31	36.68	301.73	338.41	8.94	73.54	82.47	+71.90	6.856
Average	20.52	1.83	15.09	16.92	.....	.....	.....	+ 3.60	.343
After period.									
First subperiod:									
Total	104.33	8.70	77.07	85.77	8.34	73.87	82.21	+18.56	.0
Average	20.87	1.74	15.41	17.15	.....	.....	.....	+ 3.72	.0
Second subperiod:									
Total	104.24	7.47	82.53	90.00	7.17	79.17	86.34	+14.24	.0
Average	20.85	1.49	16.51	18.00	.....	.....	.....	+ 2.85	.0
Entire after period:									
Total	208.57	16.17	159.60	175.77	7.76	76.52	84.28	+32.80	.0
Average	20.86	1.62	15.96	17.58	.....	.....	.....	+ 3.28	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per day.]

No. 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	87.41	6.85	77.34	84.19	7.84	88.48	96.32	+ 3.22	0.0
Average	17.48	1.37	15.47	16.84	.....	.....	.....	+ .64	.0
Second subperiod:									
Total	89.42	5.00	76.77	81.77	5.59	85.85	91.44	+ 7.65	.0
Average	17.88	1.00	15.35	16.35	.....	.....	.....	+ 1.53	.0
Entire fore period:									
Total	176.83	11.85	154.11	165.96	6.70	87.15	93.85	+10.87	.0
Average	17.68	1.19	15.41	16.60	.....	.....	.....	+ 1.08	.0
Preservative period.									
First subperiod:									
Total	89.96	6.57	79.58	86.15	7.30	88.46	95.76	+ 3.81	.856
Average	17.99	1.31	15.92	17.23	.....	.....	.....	+ .76	.171
Second subperiod:									
Total	89.80	5.35	81.89	87.24	5.96	91.19	97.15	+ 2.56	2.000
Average	17.96	1.07	16.31	17.45	.....	.....	.....	+ .51	.400
Third subperiod:									
Total	90.61	7.10	81.94	89.04	7.84	90.43	98.37	+ 1.57	1.600
Average	18.12	1.42	16.39	17.81	.....	.....	.....	+ .31	.320
Fourth subperiod:									
Total	92.34	5.18	75.81	80.99	5.61	82.10	87.71	+11.35	.0
Average	18.47	1.04	15.16	16.20	.....	.....	.....	+ 2.27	.0
Entire preservative period:									
Total	362.71	24.20	319.22	343.42	6.67	88.01	94.68	+19.29	4.456
Average	18.14	1.20	15.96	17.17	.....	.....	.....	+ .97	.223
After period.									
First subperiod:									
Total	85.26	3.66	73.64	77.30	4.29	86.37	90.66	+ 7.96	.0
Average	17.05	.73	14.93	15.46	.....	.....	.....	+ 1.59	.0
Second subperiod:									
Total	78.07	5.48	74.47	79.95	7.02	95.39	102.41	+ 1.88	.0
Average	15.61	1.10	14.89	15.99	.....	.....	.....	+ .38	.0
Entire after period:									
Total	163.33	9.14	148.11	157.25	5.60	90.68	96.28	+ 6.08	.0
Average	16.33	.91	14.81	15.72	.....	.....	.....	+ .61	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Nos. 1 to 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	[a] 439.09	31.27	387.85	419.12	7.12	88.33	95.45	+19.97	0.0
Average	17.56	1.25	15.51	16.76	.....	.....	.....	+ .80	.0
Second subperiod:									
Total	538.08	42.02	443.75	485.77	7.81	82.47	90.28	+52.31	.0
Average	17.94	1.40	14.79	16.19	.....	.....	.....	+ 1.75	.0
Entire fore period:									
Total	977.17	73.29	831.60	904.89	7.50	85.10	92.60	+72.28	.0
Average	17.77	1.33	15.12	16.45	.....	.....	.....	+ 1.32	.0
Preservative period.									
First subperiod:									
Total	538.83	42.60	461.87	504.47	7.91	85.72	93.62	+34.36	6.690
Average	17.96	1.42	15.40	16.82	.....	.....	.....	+ 1.14	.223
Second subperiod:									
Total	515.56	52.08	447.41	499.49	10.10	86.78	96.88	+16.07	15.240
Average	17.19	1.74	14.91	16.65	.....	.....	.....	+ .54	.508
Third subperiod:									
Total	513.41	39.20	457.44	496.64	7.64	89.10	96.73	+16.77	21.590
Average	17.11	1.31	15.25	16.55	.....	.....	.....	+ .56	.720
First, second, and third subperiods:									
Total	1,567.80	133.88	1,366.72	1,500.60	8.54	87.17	95.71	+67.20	43.520
Average	17.42	1.49	15.19	16.67	.....	.....	.....	+ .75	.484
After period.									
First subperiod:									
Total	495.41	37.25	440.67	477.92	7.52	88.95	96.47	+17.49	.0
Average	16.51	1.24	14.69	15.93	.....	.....	.....	+ .58	.0
Second subperiod:									
Total	507.46	37.62	443.57	481.19	7.41	87.41	94.82	+26.27	.0
Average	16.92	1.25	14.79	16.04	.....	.....	.....	+ .88	.0
Entire after period:									
Total	1,002.87	74.87	884.24	959.11	7.47	88.17	95.64	+43.76	.....
Average	16.71	1.25	14.74	15.99	.....	.....	.....	+ .72	.....

[a] No. 5 absent.

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 8 to 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams*
Total	352.18	29.03	276.88	305.91	8.24	78.62	86.86	+46.27	0.0
Average	17.61	1.45	13.84	15.30	.....	.....	.....	+ 2.31	.0
Second subperiod:									
Total	356.40	27.91	293.90	321.81	7.83	82.46	90.29	+34.59	.0
Average	17.82	1.40	14.70	16.09	.....	.....	.....	+ 1.73	.0
Entire fore period:									
Total	708.58	56.94	570.78	627.72	8.04	80.55	88.59	+80.86	.....
Average	17.71	1.42	14.27	15.69	.....	.....	.....	+ 2.02	.....
Preservative period.									
First subperiod:									
Total	354.66	30.45	293.68	324.13	8.59	82.80	91.39	+30.53	3.424
Average	17.73	1.52	14.68	16.21	.....	.....	.....	+ 1.52	.171
Second subperiod:									
Total	344.67	27.60	253.28	280.88	8.01	73.48	81.49	+63.79	8.000
Average	17.23	1.38	12.66	14.04	.....	.....	.....	+ 3.19	.400
Third subperiod:									
Total	351.23	30.64	278.28	308.92	8.72	79.23	87.95	+42.31	8.000
Average	17.56	1.53	13.91	15.45	.....	.....	.....	+ 2.11	.400
Fourth subperiod:									
Total	346.34	34.02	279.71	313.73	9.82	80.76	90.58	+32.61	8.000
Average	17.32	1.70	13.99	15.69	.....	.....	.....	+ 1.63	.400
Entire preservative period:									
Total	1,396.90	122.71	1,104.95	1,227.66	8.78	79.10	87.88	+169.24	27.424
Average	17.46	1.53	13.81	15.35	.....	.....	.....	+ 2.11	.343
After period.									
First subperiod:									
Total	349.71	33.62	285.55	319.17	9.61	81.65	91.27	+30.54	.0
Average	17.48	1.68	14.28	15.96	.....	.....	.....	+ 1.52	.0
Second subperiod:									
Total	352.21	31.35	283.89	315.24	8.90	80.60	89.50	+36.97	.0
Average	17.61	1.57	14.19	15.76	.....	.....	.....	+ 1.85	.0
Entire after period:									
Total	701.92	64.97	569.44	634.41	9.26	81.13	90.38	+67.51	.0
Average	17.55	1.62	14.24	15.86	.....	.....	.....	+ 1.69	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 1 and 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	173.06	14.11	163.51	177.62	8.15	94.48	102.63	− 4.56	0.0
Average	17.31	1.41	16.35	17.76	.....	.....	.....	− .45	.0
Second subperiod:									
Total	172.19	11.80	144.14	155.94	6.85	83.71	90.56	+16.25	.0
Average	17.22	1.18	14.41	15.59	.....	.....	.....	+ 1.63	.0
Entire fore period:									
Total	345.25	25.91	307.65	333.56	7.50	89.11	96.61	+11.69	.0
Average	17.26	1.30	15.38	16.68	.....	.....	.....	+ .58	.0
Preservative period.									
First subperiod:									
Total	174.04	13.37	159.14	172.51	7.68	91.44	99.12	+ 1.53	2.230
Average	17.40	1.34	15.91	17.25	.....	.....	.....	+ .15	.223
Second subperiod:									
Total	166.10	17.19	144.72	161.91	10.35	87.13	97.48	+ 4.19	5.080
Average	16.61	1.72	14.47	16.19	.....	.....	.....	+ .42	.508
Third subperiod:									
Total	171.87	10.43	153.52	163.95	6.07	89.32	95.39	+ 7.92	7.620
Average	17.19	1.04	15.35	16.40	.....	.....	.....	+ .79	.762
Fourth subperiod:									
Total	169.54	11.92	155.46	167.38	7.03	91.70	98.73	+ 2.16	8.910
Average	16.95	1.19	15.55	16.74	.....	.....	.....	+ .21	.891
Entire preservative period:									
Total	681.55	52.91	612.84	665.75	7.76	89.92	97.68	+15.80	23.840
Average	17.04	1.32	15.32	16.64	.....	.....	.....	+ .40	.596
After period.									
First subperiod:									
Total	167.61	10.40	161.28	171.68	6.20	96.22	102.43	− 4.07	.0
Average	16.76	1.04	16.13	17.17	.....	.....	.....	− .41	.0
Second subperiod:									
Total	172.73	11.90	160.25	172.15	6.89	92.77	99.66	+ .58	.0
Average	17.27	1.19	16.03	17.22	.....	.....	.....	+ .05	.0
Entire after period:									
Total	340.34	22.30	321.53	343.83	6.55	94.47	101.03	− 3.49	.0
Average	17.02	1.12	16.08	17.19	.....	.....	.....	− .17	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 5 and 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces. (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	173.28	13.94	127.83	141.77	8.04	73.77	81.82	+31.51	0.0
Average	17.33	1.39	12.78	14.18	.....	.....	.....	+ 3.15	.0
Preservative period.									
First subperiod:									
Total	169.42	13.82	141.75	155.57	8.16	83.67	91.83	+13.85	2.230
Average	16.94	1.38	14.18	15.56	.....	.....	.....	+ 1.38	.223
Second subperiod:									
Total	162.37	18.01	139.51	157.52	11.09	85.92	97.01	+ 4.85	5.080
Average	16.24	1.80	13.95	15.75	.....	.....	.....	+ .49	.508
Third subperiod:									
Total	150.79	12.41	130.86	143.27	8.23	86.78	95.01	+ 7.52	6.350
Average	15.08	1.24	13.09	14.33	.....	.....	.....	+ .75	.635
Fourth subperiod:									
Total	121.49	14.37	117.93	132.30	11.83	97.07	108.90	−10.81	.0
Average	12.15	1.44	11.79	13.23	.....	.....	.....	− 1.08	.0
Entire preservative period:									
Total	604.07	58.61	530.05	588.66	9.70	87.75	97.45	+15.41	13.660
Average	15.10	1.47	13.25	14.72	.....	.....	.....	+ .38	.342
After period.									
First subperiod:									
Total	137.80	13.48	117.89	131.37	9.78	85.55	95.33	+ 6.43	.0
Average	13.78	1.35	11.79	13.14	.....	.....	.....	+ .64	.0
Second subperiod:									
Total	141.31	12.47	118.81	131.28	8.82	84.08	92.90	+10.03	.0
Average	14.13	1.25	11.88	13.13	.....	.....	.....	+ 1.00	.0
Entire after period:									
Total	279.11	25.95	236.70	262.65	9.30	84.81	94.10	+16.46	.0
Average	13.96	1.30	11.84	13.13	.....	.....	.....	+ .83	.0

TABLE XV.—*Nitrogen balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 7 and 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	164.60	11.90	133.55	145.45	7.23	81.14	88.37	+19.15	0.0
Average	16.46	1.19	13.36	14.54	.....	.....	.....	+ 1.92	.0
Second subperiod:									
Total	163.89	11.79	133.41	145.20	7.19	81.40	88.60	+18.69	.0
Average	16.39	1.18	13.34	14.52	.....	.....	.....	+ 1.87	.0
Entire fore period:									
Total	328.49	23.69	266.96	290.65	7.21	81.27	88.48	+37.84	.0
Average	16.42	1.18	13.35	14.53	.....	.....	.....	+ 1.89	.0
Preservative period.									
First subperiod:									
Total	163.42	14.50	137.76	152.26	8.87	84.30	93.17	+11.16	1.712
Average	16.34	1.45	13.78	15.23	.....	.....	.....	+ 1.11	.171
Second subperiod:									
Total	156.31	10.40	129.04	139.44	6.65	82.55	89.21	+16.87	3.600
Average	15.63	1.04	12.90	13.94	.....	.....	.....	+ 1.69	.360
Third subperiod:									
Total	155.90	10.39	139.90	150.29	6.66	89.74	96.40	+ 5.61	3.400
Average	15.59	1.04	13.99	15.03	.....	.....	.....	+ .56	.340
First, second, and third subperiods:									
Total	475.63	35.29	406.70	441.99	7.42	85.51	92.93	+33.64	8.712
Average	15.85	1.18	13.56	14.73	.....	.....	.....	+ 1.12	.290

Nos. 7 to 12.

Fore period.									
First subperiod:									
Total	516.78	40.93	410.43	451.36	7.92	79.42	87.32	+ 65.42	0.0
Average	17.22	1.36	13.68	15.05	.....	.....	.....	+ 2.18	.0
Second subperiod:									
Total	520.29	39.70	427.31	467.01	7.63	82.13	89.76	+ 53.28	.0
Average	17.34	1.32	14.24	15.57	.....	.....	.....	+ 1.77	.0
Entire fore period:									
Total	1,037.07	80.63	837.74	918.37	7.77	80.79	88.56	+118.70	.0
Average	17.28	1.34	13.96	15.31	.....	.....	.....	+ 1.97	.0
Preservative period.									
First subperiod:									
Total	518.08	44.95	431.44	476.39	8.68	83.28	91.96	+ 41.69	5.136
Average	17.27	1.50	14.38	15.88	.....	.....	.....	+ 1.39	.171
Second subperiod:									
Total	500.98	38.00	382.32	420.32	7.59	76.31	83.90	+ 80.66	11.600
Average	16.70	1.27	12.74	14.01	.....	.....	.....	+ 2.69	.387
Third subperiod:									
Total	507.13	41.03	418.18	459.21	8.09	82.46	90.55	+ 47.92	11.400
Average	16.90	1.37	13.94	15.31	.....	.....	.....	+ 1.59	.380
First, second, and third subperiods:									
Total	1,526.19	123.98	1,231.94	1,355.92	8.12	80.72	88.84	+170.27	28.136
Average	16.96	1.38	13.69	15.07	.....	.....	.....	+ 1.89	.313

PHOSPHORIC ACID BALANCE.

INDIVIDUAL DATA.

The quantity of phosphoric acid consumed by No. 1 is slightly less in the preservative period than in the fore period, and the quantity in the after period is also smaller than in the fore period but larger than in the preservative period. The quantity excreted in the feces is markedly less in the preservative period, but the decrease is no greater than could be accounted for by the decrease in the amount in the food. This deficit also persists in the after period and to even a greater extent. The quantity excreted in the urine is also diminished to a greater extent than it should have been considering the amounts in the food, but is increased slightly in the after period. Expressed in percentages, it is seen that while 32.84 per cent of the phosphoric acid in the food is excreted in the feces in the fore period, only 29.72 per cent is excreted in the preservative period and 24.67 per cent in the after period. A like decrease in percentages occurs in the amount excreted in the urine, but not to such an extent. Expressed as total excretion, it is seen that 97.22 per cent of the phosphoric acid in the food is excreted in the fore period, 91.00 per cent in the preservative period, and 83.98 per cent in the after period. The balances therefore increase in proportion as the percentage of the ingested phosphoric acid excreted diminishes. In the fore period the balance is positive, being 0.114 gram, rising to 0.341 gram in the preservative period and 0.637 gram in the after period. There is an apparent tendency indicated here to diminish the quantity of phosphoric acid excreted, both in a metabolized and nonmetabolized form. In this connection, however, it should not be forgotten that during the first subperiod there was an abnormal excretion of phosphoric acid, the elimination of which would not make the difference so great.

In the case of No. 2 the data for the preservative period are not complete, but indicate an increase in the total quantity of phosphoric acid excreted, due to an increase in the feces. In this case, however, there is another abnormal period, namely, the second preservative subperiod, in which a very large excess of phosphoric acid is excreted. In all cases the balances are positive, amounting to 0.140 gram in the fore period, 0.076 gram in the preservative period, and 0.457 gram in the after period.

The case of No. 3 shows an extreme condition of disturbance of the balance during the preservative period. There is a very low excretion of phosphoric acid both in the fore period and the after period, the balance in the fore period being 0.727 daily and in the after period 0.997 gram. During the preservative period there was a uniform abnormally high excretion of phosphoric acid in the feces, so that the balance became a negative quantity, amounting to −0.224 gram.

The data of the balance sheet show a marked effect on the metabolism of phosphorus during the progress of the experiment. In the after period there is a tendency to return to normal conditions, although the decrease in the phosphorus eliminated in the urine continues.

For No. 4 the quantities of phosphoric acid ingested during the different periods remain fairly constant, being almost identical in the fore and preservative periods and slightly increased during the after period. The quantities excreted in the feces are also almost the same, being slightly less in the after period, when the amount in the food is greater, which causes a considerable difference in the percentage of elimination. The quantities of phosphoric acid excreted in the urine are increased slightly, both in the preservative and after periods.

The total quantities excreted in the feces and urine gradually increase with the three periods, rising from 4.108 grams daily in the fore period to 4.356 grams daily in the after period. The percentages of elimination remain fairly constant. The balance for the fore period is 0.257 gram, for the preservative period 0.104 gram, and for the after period 0.171 gram. The tendency is shown here in the preservative period to increase the elimination of phosphoric acid, due to an increased excretion in the urine, and thus to diminish the magnitude of the positive balance.

The data for No. 5 are rendered incomplete by reason of the shortness of the fore period, which extends over only one subperiod, and there is also a considerable variation in the quantity of phosphoric acid exhibited in the food. These two facts somewhat decrease the value of the comparative study of the data of the balance sheet. In spite of the fact that the phosphoric acid ingested in the preservative period was very materially less than in the fore period, the nonmetabolized phosphoric acid excreted was markedly greater in the preservative period. This fact, taken into consideration with the slight change in the elimination in the urine, indicates a tendency on the part of the preservative to decrease the absorption of phosphorus.

In the case of No. 6 the amount of phosphoric acid in the food remains almost constant for the three periods. The excretion of phosphoric acid in the feces is considerably increased during the preservative period, rising from 1.180 grams daily to 1.400 grams daily. In the after period a tendency is shown to return to the conditions of the fore period in so far as the excretion of phosphoric acid in the feces is concerned. The quantity of phosphoric acid excreted in the urine is diminished during the preservative period, falling from 2.438 grams daily to 2.282 grams. The quantity rises again in the after period, being almost the same quantity as in the fore period. The sum of the quantities excreted in the feces and urine is almost the same for the three periods. The balance is positive and its magnitude in the fore period is 0.583, in the preservative period 0.495, and in the after period 0.689 gram.

The data for No. 6 show a somewhat increased elimination of phosphoric acid. This was due entirely to the increased amount in the feces, for the amount eliminated in the urine was considerably less in the preservative period than in the fore period. The influence of the preservative appears, therefore, to have been to decrease the absorption of phosphoric acid. In the after period there is a tendency shown to return to the conditions of the fore period.

The data for No. 7 are complete only for the fore and preservative periods. The quantity of phosphoric acid excreted in the fore period is considerably larger than in the preservative period. There appears to be a tendency in this case to diminish not only the quantity, but the percentage of phosphoric acid excreted and thus to increase the positive balance. It should be noted in this connection that a smaller amount was ingested in the preservative period.

The data for No. 8 are complete for the three periods. The quantity of phosphoric acid exhibited in the food is fairly constant. There is an increased excretion of phosphoric acid in the feces during the preservative period and a marked decrease in the after period. The quantity of phosphoric acid appearing in the urine for the three periods is almost identical.

Notwithstanding the fact that the total amount of phosphoric acid excreted was increased during the preservative period, the amount excreted in the urine was considerably decreased. The amount excreted in the feces was largely increased. These conditions point to a marked tendency on the part of the preservative to decrease the absorption of the phosphorus. In the after period there is a marked tendency to return to the conditions of the fore period. The balance in the fore period is 0.124, in the preservative period 0, and in the after period 0.432.

The quantity of phosphoric acid ingested in the food of No. 9 is almost the same in all three of the periods. There is a slight increase in the excretion of phosphoric acid in the feces during the preservative period, and this is still more marked in the after period. There is also a marked increase in the excretion of phosphoric acid in the urine in the preservative period, and this increase is maintained, though not quite to the same degree in the after period. There is a notable increase in the total amount of phosphoric acid excreted during the preservative period, and a further increase during the after period. The balance during the fore period is 0.683, during the preservative period 0.305 gram, and during the after period 0.055 gram. The effect of the preservative in this case appears very strongly marked in increasing the metabolism of phosphorus, and this increased activity is manifested in the highest degree during the fore part of the after period. In marked contrast to the greater part of the data

already discussed is the increase in the excretion of metabolized phosphorus in the preservative period.

The quantity of phosphoric acid ingested in the food of No. 10 is almost the same for all periods. The quantity of phosphoric acid excreted in the feces is notably increased in the preservative period and still more so in the after period. The quantity occurring in the urine is diminished in the preservative period and restored, but not quite to the original quantity, in the after period. The total quantity of phosphoric acid excreted is slightly diminished in the preservative period and considerably increased in the after period. The balance is positive and quite large, amounting to 0.817 gram in the fore period, 0.845 gram in the preservative period, and 0.548 gram in the after period. The influence of the preservative appears to have been to decrease decidedly the absorption of the phosphorus. The phosphoric acid eliminated in the urine was greatly decreased in the preservative period over the amount eliminated in the fore period, while the reverse is true of the phosphoric acid eliminated in the feces. In the after period there is a tendency to return to the conditions of the fore period with respect to the urine, but the amount excreted in the feces was still further increased.

The quantity of phosphoric acid exhibited in the food in the case of No. 11 is almost the same in the three periods. There is a notable increase in the amount excreted in the feces during the preservative period and a decrease in the after period to an amount less than in the fore period. In respect of the urine, there is a marked decrease in the quantity excreted during the preservative period and a slight gain over this quantity in the after period. In regard to the total phosphoric acid excreted, it is seen that it is slightly less in the preservative period than in the fore period, and is still further diminished in the after period. The balance is very large in all cases, amounting to 0.737 gram in the fore period, 0.887 gram in the preservative period, and 1.272 grams in the after period.

No. 12 received about the same quantity of phosphoric acid in all three periods. There is a slight increase in the amount excreted in the feces in the preservative period and a very marked decrease in the amount excreted in the after period. In the urine there is also an increase in quantity in phosphoric acid excreted, and the amount excreted in the after period is almost the same as that in the preservative period. The balance in this case is positive and amounts to 0.184 gram in the fore period, 0.116 gram in the preservative period, and 0.144 gram in the after period. These data show a slight tendency on the part of the preservative to increase the metabolism of phosphoric acid.

SUMMARIES.

The summary for Nos. 1 to 6 covers the entire experiment, with the exception of the fourth subperiod of the preservative period. This summary shows that the average quantity of phosphoric acid given is almost identical in each period, amounting to 4.478 grams in the fore period, 4.386 grams in the preservative period, and 4.394 grams in the after period. The quantity of phosphoric acid excreted in the feces is notably increased during the preservative period, rising from 1.340 grams in the fore period to 1.594 grams in the preservative period, and decreasing in the after period to an amount slightly less than that in the fore period, namely, 1.314 grams. In the urine there is a slight decrease in the amount of phosphoric acid excreted, falling from 2.688 grams daily in the fore period to 2.580 grams daily in the preservative period, and 2.531 grams daily in the after period. Taking the total excretion of phosphorus in the feces and the urine, we find that the daily average quantity in the fore period is 4.029 grams, in the preservative period 4.174 grams, and in the after period 3.845 grams. These data show a slight increase in phosphoric acid eliminated in the feces, a slight decrease in the urine, and a slight increase in the total elimination. The balance in the fore period is 0.449 gram, in the preservative period 0.212 gram, and in the after period 0.549 gram.

These figures show quite a distinct effect of the preservative to increase the excretion of phosphoric acid, while the data for the feces and urine indicate that this effect is produced by reason of the greater excretion of nonmetabolized phosphoric acid.

The summaries for Nos. 8, 9, 10, and 11 are complete for all the periods. The quantity of phosphoric acid in the food is almost constant during the three periods. The quantity of phosphoric acid excreted in the feces is notably greater, both in the preservative and in the after period, than in the fore period. The quantity excreted in the urine is slightly less both in the preservative period and in the after period. The total quantity excreted is notably greater both in the preservative and after periods. The balance for the fore period is 0.591 gram, for the preservative period 0.435 gram, and for the after period 0.549 gram. The general effect of the preservative, therefore, is to increase the excretion of total phosphoric acid, notwithstanding the decrease in metabolized phosphorus eliminated, and thus to diminish the positive balance.

In the summaries for Nos. 1 to 6 it is seen that the phosphoric acid in the feces is markedly increased during the preservative period, being 36.34 per cent of the amount ingested in the food as compared with 29.93 per cent, which is the percentage amount eliminated in the feces in the fore period.

The average percentage amount of phosphoric acid eliminated in the urine for these men in the preservative period is 58.82 per cent, which is only 1.21 per cent less than in the fore period.

This same general condition is seen in the cases of Nos. 8, 9, 10, and 11, but not to such a marked extent. There is an increase of 4.32 per cent of phosphoric acid in the feces in the preservative period over the fore period as compared with 6.41 per cent for Nos. 1 to 6. In the urine there is a decrease in the preservative period for Nos. 8, 9, 10, and 11 of only 0.81 per cent from the fore period.

In the after period the data do not agree quite so well, though the same tendency is manifested in each case. In the cases of Nos. 1 to 6 the percentage amount eliminated in the feces is the same as in the fore period, with a less amount eliminated in the urine than in the preservative or fore periods. For Nos. 8, 9, 10, and 11 the excretion of phosphoric acid in the feces in the after period is less by 0.47 per cent than in the preservative period, but exceeds the amount in the fore period by 3.85 per cent. In the urine in the after period there is less phosphoric acid excreted than in the fore period and preservative period by 2.65 per cent and 1.84 per cent, respectively.

Considering that the data in the fore period represent the normal excretion of phosphoric acid, it is seen in each case that under the influence of the preservative a large amount of phosphoric acid is not absorbed, but is excreted in the feces, and therefore does not take any part in the metabolic processes. This is much more marked in the case of the subjects (Nos. 1 to 6) who received the preservative in the form of sulphites than in those subjects (8 to 11) who received it in the form of sulphurous acid. This difference is no more than would be expected when the larger amount of SO_2, which was administered as sulphites, is compared with the amount of SO_2 administered as sulphurous acid; that it occurs in both cases, and to a less degree with the smaller amount administered, seems to be conclusive evidence as to the effect produced by the preservative.

There is only a slight diminution in the amount of phosphoric acid excreted in the urine, while the total amount excreted in the preservative period is larger than in the fore period, though the amount of phosphoric acid in the food is less in each case.

In the after period this condition appears to have gradually returned to normal in the cases of Nos. 1 to 6, showing at the same time a retention of phosphoric acid in the body. Nos. 8 to 11, on the other hand, show the same tendency, but appear not to have reached their normal condition at the conclusion of the experiment.

It is therefore evident, and the conclusion can safely be drawn, that the administration of the preservative, both in the form of sulphites and as sulphurous acid, inhibits the absorption of phosphoric

acid from the digestive tract; and under these conditions the katabolic action with respect to the phosphoric acid is seemingly but slightly retarded.

TABLE XVI.—*Phosphoric-acid balances for Series VII.*

[Averages are per day.]

No. 1.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	21.272	8.944	14.055	22.999	42.05	66.07	108.12	−1.727	0.0
Average	4.254	1.789	2.811	4.600	.....	.....	.....	− .346	.0
Second subperiod:									
Total	19.821	4.552	12.401	16.953	22.97	62.56	85.53	+2.868	.0
Average	3.964	.910	2.480	3.391	.....	.....	.....	+ .573	.0
Entire fore period:									
Total	41.093	13.496	26.456	39.952	32.84	64.38	97.22	+1.141	.0
Average	4.109	1.350	2.646	3.995	.....	.....	.....	+ .114	.0
Preservative period.									
First subperiod:									
Total	19.072	6.577	11.718	18.295	34.49	61.44	95.93	+ .777	1.115
Average	3.814	1.315	2.344	3.659	.....	.....	.....	+ .155	.223
Second subperiod:									
Total	18.364	6.692	11.235	17.927	36.44	61.18	97.62	+ .437	2.540
Average	3.673	1.338	2.247	3.585	.....	.....	.....	+ .088	.508
Third subperiod:									
Total	19.464	3.882	12.143	16.025	19.94	62.39	82.33	+3.439	3.810
Average	3.893	.776	2.429	3.205	.....	.....	.....	+ .688	.762
Fourth subperiod:									
Total	19.001	5.410	11.414	16.824	28.47	60.07	88.54	+2.177	3.810
Average	3.800	1.082	2.283	3.365	.....	.....	.....	+ .435	.762
Entire preservative period:									
Total	75.901	22.561	46.510	69.071	29.72	61.28	91.00	+6.830	11.275
Average	3.795	1.128	2.326	3.454	.....	.....	.....	+ .341	.564
After period.									
First subperiod:									
Total	19.617	4.797	12.449	17.246	24.45	63.46	87.91	+2.371	.0
Average	3.923	.959	2.490	3.449	.....	.....	.....	+ .474	.0
Second subperiod:									
Total	20.078	4.995	11.095	16.090	24.88	55.26	80.14	+3.988	.0
Average	4.016	.999	2.219	3.218	.....	.....	.....	+ .798	.0
Entire after period:									
Total	39.695	9.792	23.544	33.336	24.67	59.31	83.98	+6.359	.0
Average	3.970	.979	2.354	3.333	.....	.....	.....	+ .637	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 2.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	25.225	6.350	17.380	23.730	25.17	68.90	94.07	+1.495	0.0
Average	5.045	1.270	3.476	4.746	.....	.....	.....	+ .299	.0
Second subperiod:									
Total	25.717	9.080	16.734	25.814	35.31	65.07	100.38	— .097	.0
Average	5.143	1.816	3.347	5.163	.....	.....	.....	— .020	.0
Entire fore period:									
Total	50.942	15.430	34.114	49.544	30.29	66.97	97.26	+1.398	.0
Average	5.094	1.543	3.411	4.954	.....	.....	.....	+ .140	.0
Preservative period.									
First subperiod:									
Total	26.400	8.139	14.035	22.174	30.83	53.16	83.99	+4.226	1.115
Average	5.280	1.628	2.807	4.435	.....	.....	.....	+ .845	.223
Second subperiod:									
Total	24.843	11.290	17.011	28.301	45.45	68.47	113.92	—3.458	2.540
Average	4.969	2.258	3.402	5.660	.....	.....	.....	— .691	.508
Third subperiod:									
Total	25.551	8.603	16.587	25.190	33.67	64.92	98.59	+ .361	3.810
Average	5.110	1.721	3.317	5.038	.....	.....	.....	+ .072	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(3.810)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.762)
First, second, and third subperiods:									
Total	76.794	28.032	47.633	75.665	36.50	62.03	98.53	+1.129	.....
Average	5.120	1.869	3.176	5.044	.....	.....	.....	+ .076	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	11.275
Average	.....	.....	.....	.....	.....	.....	.....	.....	.564
After period.									
First subperiod:									
Total	25.815	8.053	16.738	24.791	31.20	64.84	96.03	+1.024	.0
Average	5.163	1.611	3.348	4.958	.....	.....	.....	+ .205	.0
Second subperiod:									
Total	26.010	7.412	15.054	22.466	28.50	57.88	86.37	+3.544	.0
Average	5.202	1.482	3.011	4.493	.....	.....	.....	+ .709	.0
Entire after period:									
Total	51.825	15.465	31.792	47.257	29.84	61.34	91.19	+4.568	.0
Average	5.183	1.546	3.179	4.726	.....	.....	.....	+ .457	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 3.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	22.050	5.305	11.298	16.603	24.06	51.23	75.29	+5.447	0.0
Average	4.410	1.061	2.260	3.321	.....	.....	.....	+1.089	.0
Second subperiod:									
Total	25.023	11.019	12.183	23.202	44.04	48.68	92.72	+1.821	.0
Average	5.005	2.204	2.437	4.640	.....	.....	.....	+ .365	.0
Entire fore period:									
Total	47.073	16.324	23.481	39.805	34.68	49.88	84.56	+7.268	.0
Average	4.707	1.632	2.348	3.980	.....	.....	.....	+ .727	.0
Preservative period.									
First subperiod:									
Total	24.242	14.738	10.049	24.787	60.80	41.45	102.25	− .545	1.115
Average	4.848	2.948	2.010	4.957	.....	.....	.....	− .109	.223
Second subperiod:									
Total	23.827	11.683	13.029	24.712	49.03	54.68	103.71	− .885	2.540
Average	4.765	2.337	2.606	4.942	.....	.....	.....	− .177	.508
Third subperiod:									
Total	24.601	15.028	11.504	26.532	61.09	46.76	107.85	−1.931	3.810
Average	4.920	3.006	2.301	5.306	.....	.....	.....	− .386	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(.381)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.076)
First, second, and third subperiods:									
Total	72.670	41.449	34.582	76.031	57.04	47.59	104.63	−3.361	.....
Average	4.845	2.763	2.305	5.069	.....	.....	.....	− .224	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	7.846
Average	.....	.....	.....	.....	.....	.....	.....	.....	[a].392
After period.									
First subperiod:									
Total	24.726	8.620	10.946	19.566	34.86	44.27	79.13	+5.160	.0
Average	4.945	1.724	2.189	3.913	.....	.....	.....	+1.032	.0
Second subperiod:									
Total	25.679	9.508	11.353	20.861	37.03	44.21	81.24	+4.818	.0
Average	5.136	1.902	2.271	4.172	.....	.....	.....	+ .964	.0
Entire after period:									
Total	50.405	18.128	22.299	40.427	35.96	44.24	80.20	+9.978	.0
Average	5.040	1.813	2.230	4.043	.....	.....	.....	+ .997	.0

[a] Average for one day in a period of twenty days.

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine. (2+3)	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	21.338	4.911	12.080	16.991	23.02	56.61	79.63	+4.347	0.0
Average	4.268	.982	2.416	3.398	.....	.....	.....	+ .870	.0
Second subperiod:									
Total	22.310	7.778	16.309	24.087	34.86	73.10	107.97	−1.777	.0
Average	4.462	1.556	3.262	4.817	.....	.....	.....	− .355	.0
Entire fore period:									
Total	43.648	12.689	28.389	41.078	29.07	65.04	94.11	+2.570	.0
Average	4.365	1.269	2.839	4.108	.....	.....	.....	+ .257	.0
Preservative period.									
First subperiod:									
Total	22.635	5.689	15.300	20.989	25.13	67.59	92.73	+1.646	1.115
Average	4.527	1.138	3.060	4.198	.....	.....	.....	+ .329	.223
Second subperiod:									
Total	21.564	8.422	15.489	23.911	39.06	71.83	110.88	−2.347	2.540
Average	4.313	1.684	3.098	4.782	.....	.....	.....	− .469	.508
Third subperiod:									
Total	22.194	4.799	15.329	20.128	21.62	69.07	90.69	+2.066	3.810
Average	4.439	.960	3.066	4.026	.....	.....	.....	+ .413	.762
Fourth subperiod:									
Total	21.454	6.405	14.328	20.733	29.85	66.78	96.64	+ .721	5.100
Average	4.291	1.281	2.866	4.147	.....	.....	.....	+ .144	1.020
Entire preservative period:									
Total	87.847	25.315	60.446	85.761	28.82	68.81	97.63	+2.086	12.565
Average	4.392	1.266	3.022	4.288	.....	.....	.....	+ .104	.628
After period.									
First subperiod:									
Total	22.419	5.134	17.079	22.213	22.90	76.18	99.08	+ .206	.0
Average	4.484	1.027	3.416	4.443	.....	.....	.....	+ .041	.0
Second subperiod:									
Total	22.854	6.993	14.350	21.343	30.60	62.79	93.39	+1.511	.0
Average	4.571	1.399	2.870	4.269	.....	.....	.....	+ .302	.0
Entire after period:									
Total	45.273	12.127	31.429	43.556	26.79	69.42	96.21	+1.717	.0
Average	4.527	1.213	3.143	4.356	.....	.....	.....	+ .171	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 5.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine. (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	21.550	3.978	11.034	15.012	18.46	51.20	69.66	+6.538	0.0
Average	4.310	.796	2.207	3.002	.....	.....	.....	+1.308	.0
Preservative period.									
First subperiod:									
Total	20.932	4.891	12.263	17.154	23.37	58.58	81.95	+3.778	1.115
Average	4.186	.978	2.453	3.431	.....	.....	.....	+ .755	.223
Second subperiod:									
Total	20.459	7.020	11.599	18.619	34.31	56.69	91.01	+1.840	2.540
Average	4.092	1.404	2.320	3.724	.....	.....	.....	+ .368	.508
Third subperiod:									
Total	17.861	4.974	9.970	14.944	27.85	55.82	83.67	+2.917	2.540
Average	3.572	.995	1.994	2.989	.....	.....	.....	+ .583	.508
Fourth subperiod:									
Total	12.588	6.199	8.837	15.036	49.25	70.20	119.45	−2.448	.0
Average	2.518	1.240	1.769	3.007	.....	.....	.....	− .489	.0
Entire preservative period:									
Total	71.840	23.084	42.669	65.753	32.13	59.39	91.53	+6.087	6.195
Average	3.592	1.154	2.133	3.288	.....	.....	.....	+ .304	.310
After period.									
First subperiod:									
Total	16.270	5.368	9.703	15.071	32.99	59.64	92.63	+1.199	.0
Average	3.254	1.074	1.941	3.014	.....	.....	.....	+ .240	.0
Second subperiod:									
Total	16.945	5.382	9.355	14.737	31.76	55.21	86.97	+2.208	.0
Average	3.389	1.076	1.871	2.947	.....	.....	.....	+ .442	.0
Entire after period:									
Total	33.215	10.750	19.058	29.808	32.36	57.38	89.74	+3.407	.0
Average	3.322	1.075	1.906	2.981	.....	.....	.....	+ .341	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4)	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	20.275	5.407	13.554	18.961	26.67	66.85	93.52	+1.314	0.0
Average	4.055	1.081	2.711	3.792	.....	.....	.....	+ .263	.0
Second subperiod:									
Total	21.736	6.391	10.829	17.220	29.40	49.82	79.22	+4.516	.0
Average	4.347	1.278	2.166	3.444	.....	.....	.....	+ .903	.0
Entire fore period:									
Total	42.011	11.798	24.383	36.181	28.08	58.04	86.12	+5.830	.0
Average	4.201	1.180	2.438	3.618	.....	.....	.....	+ .583	.0
Preservative period.									
First subperiod:									
Total	21.529	5.550	11.323	16.873	25.78	52.59	78.37	+4.656	1.115
Average	4.306	1.110	2.265	3.375	.....	.....	.....	+ .931	.223
Second subperiod:									
Total	20.300	9.229	12.329	21.558	45.46	60.73	106.20	−1.258	2.540
Average	4.060	1.846	8.466	4.312	.....	.....	.....	− .252	.508
Third subperiod:									
Total	20.906	6.241	11.274	17.515	29.85	53.93	83.78	+3.391	3.810
Average	4.181	1.248	2.255	3.503	.....	.....	.....	+ .678	.762
Fourth subperiod:									
Total	20.814	6.978	10.705	17.683	33.53	51.43	84.96	+3.131	.0
Average	4.163	1.396	2.141	3.537	.....	.....	.....	+ .626	.0
Entire preservative period:									
Total	83.549	27.998	45.641	73.639	33.51	54.63	88.14	+9.990	7.465
Average	4.117	1.400	2.282	3.682	.....	.....	.....	+ .495	.373
After period.									
First subperiod:									
Total	21.693	6.380	12.072	18.452	29.41	55.65	85.06	+3.241	.0
Average	4.339	1.276	2.414	3.690	.....	.....	.....	+ .649	.0
Second subperiod:									
Total	21.551	6.215	11.681	17.896	28.84	54.20	83.04	+3.655	.0
Average	4.310	1.243	2.336	3.579	.....	.....	.....	+ .731	.0
Entire after period:									
Total	43.244	12.595	23.753	36.348	29.13	54.93	84.05	+6.896	.0
Average	4.324	1.260	2.375	3.635	.....	.....	.....	+ .689	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 7.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	15.934	4.514	8.498	13.012	28.33	53.33	81.66	+2.922	0.0
Average	3.187	.903	1.700	2.602	.....	.....	.....	+ .585	.0
Second subperiod:									
Total	14.568	5.079	8.593	13.672	34.86	58.99	93.85	+ .896	.0
Average	2.914	1.016	1.719	2.734	.....	.....	.....	+ .180	.0
Entire fore period:									
Total	30.502	9.593	17.091	26.684	31.45	56.03	87.48	+3.818	.0
Average	3.050	.959	1.709	2.668	.....	.....	.....	+ .382	.0
Preservative period.									
First subperiod:									
Total	14.176	5.165	7.342	12.507	36.43	51.79	88.23	+1.669	.856
Average	2.835	1.033	1.468	2.501	.....	.....	.....	+ .334	.171
Second subperiod:									
Total	12.937	3.341	5.886	9.227	25.83	45.50	71.32	+3.710	1.600
Average	2.587	.668	1.177	1.845	.....	.....	.....	+ .742	.320
Third subperiod:									
Total	12.815	2.292	8.295	10.587	17.89	64.73	82.61	+2.228	1.800
Average	2.563	.458	1.659	2.117	.....	.....	.....	+ .446	.360
First, second, and third subperiods:									
Total	39.928	10.798	21.523	32.321	27.04	53.90	80.95	+7.607	4.256
Average	2.662	.720	1.435	2.155	.....	.....	.....	+ .507	[a] .213

No. 8.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:									
Total	16.355	5.908	9.489	15.397	36.12	58.02	94.14	+0.958	0.0
Average	3.271	1.182	1.898	3.080	.....	.....	.....	+ .191	.0
Second subperiod:									
Total	17.194	6.680	10.232	16.912	38.85	59.51	98.36	+ .282	.0
Average	3.439	1.336	2.046	3.382	.....	.....	.....	+ .057	.0
Entire fore period:									
Total	33.549	12.588	19.721	32.309	37.52	58.78	96.30	+1.240	.0
Average	3.355	1.259	1.972	3.231	.....	.....	.....	+ .124	.0
Preservative period.									
First subperiod:									
Total	17.644	4.616	9.801	14.417	26.16	55.55	81.71	+3.227	.856
Average	3.529	.923	1.960	2.883	.....	.....	.....	+ .646	.171
Second subperiod:									
Total	16.102	5.037	9.485	14.522	31.28	58.91	90.19	+1.580	2.000
Average	3.220	1.007	1.897	2.904	.....	.....	.....	+ .316	.400
Third subperiod:									
Total	16.956	7.942	9.653	17.595	46.84	56.93	103.77	− .639	2.000
Average	3.391	1.588	1.931	3.519	.....	.....	.....	− .128	.400
Fourth subperiod:									
Total	16.624	11.701	9.084	20.785	70.39	54.64	125.03	−4.161	2.000
Average	3.325	2.340	1.817	4.157	.....	.....	.....	− .832	.400
Entire preservative period:									
Total	67.326	29.296	38.023	67.319	43.51	56.48	99.99	+ .007	6.856
Average	3.366	1.465	1.901	3.366	.....	.....	.....	.0	.343
After period.									
First subperiod:									
Total	17.245	5.491	9.999	15.490	31.84	57.98	89.82	+1.755	.0
Average	3.449	1.098	2.000	3.098	.....	.....	.....	+ .351	.0
Second subperiod:									
Total	17.663	5.747	9.355	15.102	32.54	52.96	85.50	+2.561	.0
Average	3.533	1.149	1.871	3.020	.....	.....	.....	+ .513	.0
Entire after period:									
Total	34.908	11.238	19.354	30.592	32.19	55.44	87.64	+4.316	.0
Average	3.491	1.124	1.935	3.059	.....	.....	.....	+ .432	.0

[a] Average for 20 days.

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 9.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	20.610	7.699	9.535	17.234	37.36	46.26	83.62	+ 3.376	0.0
Average	4.122	1.540	1.907	3.447	.....	.....	.....	+ .675	.0
Second subperiod:									
Total	21.481	6.708	11.320	18.028	31.23	52.70	83.93	+ 3.453	.0
Average	4.296	1.342	2.264	3.606	.....	.....	.....	+ .690	.0
Entire fore period:									
Total	42.091	14.407	20.855	35.262	34.23	49.55	83.78	+ 6.829	.0
Average	4.209	1.441	2.086	3.526	.....	.....	.....	+ .683	.0
Preservative period.									
First subperiod:									
Total	20.875	8.917	12.170	21.087	42.72	58.30	101.02	− .212	.856
Average	4.175	1.783	2.434	4.217	.....	.....	.....	− .042	.171
Second subperiod:									
Total	20.464	8.075	11.554	19.629	39.46	56.46	95.92	+ .835	2.000
Average	4.093	1.615	2.311	3.926	.....	.....	.....	+ .167	.400
Third subperiod:									
Total	21.140	7.952	11.075	19.027	37.62	52.39	90.00	+ 2.113	2.000
Average	4.228	1.590	2.215	3.805	.....	.....	.....	+ .423	.400
Fourth subperiod:									
Total	20.778	5.473	11.934	17.407	26.34	57.44	83.78	+ 3.371	2.000
Average	4.156	1.095	2.387	3.481	.....	.....	.....	+ .675	.400
Entire preservative period:									
Total	83.257	30.417	46.733	77.150	36.53	56.13	92.66	+ 6.107	6.856
Average	4.163	1.521	2.337	3.858	.....	.....	.....	+ .305	.343
After period.									
First subperiod:									
Total	21.350	11.746	11.389	23.135	55.02	53.34	108.36	− 1.785	.0
Average	4.270	2.349	2.278	4.627	.....	.....	.....	− .357	.0
Second subperiod:									
Total	21.376	8.799	11.344	20.143	41.16	53.07	94.23	+ 1.233	.0
Average	4.275	1.760	2.269	4.029	.....	.....	.....	+ .246	.0
Entire after period:									
Total	42.726	20.545	22.733	43.278	48.09	53.21	101.29	− .552	.0
Average	4.273	2.055	2.273	4.328	.....	.....	.....	− .055	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 10.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	21.512	6.140	12.230	18.370	28.54	56.85	85.39	+ 3.142	0.0
Average	4.302	1.228	2.446	3.674	.....	.....	.....	+ .628	.0
Second subperiod:									
Total	21.797	4.427	12.347	16.774	20.31	56.65	76.96	+ 5.023	.0
Average	4.359	.885	2.469	3.355	.....	.....	.....	+ 1.004	.0
Entire fore period:									
Total	43.309	10.567	24.577	35.144	24.40	56.75	81.15	+ 8.165	.0
Average	4.331	1.057	2.458	3.514	.....	.....	.....	+ .817	.0
Preservative period.									
First subperiod:									
Total	21.568	6.500	11.941	18.441	30.14	55.36	85.50	+ 3.127	.856
Average	4.314	1.300	2.388	3.688	.....	.....	.....	+ .626	.171
Second subperiod:									
Total	21.122	6.426	8.932	15.358	30.42	42.29	72.71	+ 5.764	2.000
Average	4.224	1.285	1.786	3.072	.....	.....	.....	+ 1.152	.400
Third subperiod:									
Total	21.564	3.953	10.800	14.753	18.33	50.08	68.41	+ 6.811	2.000
Average	4.313	.791	2.160	2.951	.....	.....	.....	+ 1.362	.400
Fourth subperiod:									
Total	21.401	7.908	12.297	20.205	36.95	57.46	94.41	+ 1.196	2.000
Average	4.280	1.582	2.459	4.041	.....	.....	.....	+ .239	.400
Entire preservative period:									
Total	85.655	24.787	43.970	68.757	28.94	51.33	80.27	+16.898	6.856
Average	4.283	1.239	2.198	3.438	.....	.....	.....	+ .845	.343
After period.									
First subperiod:									
Total	21.845	7.033	13.085	20.118	32.20	59.90	92.09	+ 1.727	.0
Average	4.369	1.407	2.617	4.024	.....	.....	.....	+ .345	.0
Second subperiod:									
Total	21.892	7.802	10.340	18.142	35.64	47.23	82.87	+ 3.750	.0
Average	4.378	1.560	2.068	3.628	.....	.....	.....	+ .750	.0
Entire after period:									
Total	43.737	14.835	23.425	38.260	33.92	53.56	87.48	+ 5.477	.0
Average	4.374	1.484	2.342	3.826	.....	.....	.....	+ .548	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	27.024	10.565	14.181	24.746	39.09	52.48	91.57	+ 2.278	0.0
Average	5.405	2.113	2.836	4.949	.....	.....	.....	+ .456	.0
Second subperiod:									
Total	28.448	9.094	14.263	23.357	31.97	50.14	82.10	+ 5.091	.0
Average	5.690	1.819	2.853	4.671	.....	.....	.....	+ 1.019	.0
Entire fore period:									
Total	55.472	19.659	28.444	48.103	35.44	51.28	86.72	+ 7.369	.0
Average	5.547	1.966	2.844	4.810	.....	.....	.....	+ .737	.0
Preservative period.									
First subperiod:									
Total	27.941	13.103	12.885	25.988	46.90	46.12	93.01	+ 1.953	.856
Average	5.588	2.621	2.577	5.198	.....	.....	.....	+ .390	.171
Second subperiod:									
Total	27.395	10.468	10.399	20.867	38.21	37.96	76.17	+ 6.528	2.000
Average	5.479	2.094	2.080	4.173	.....	.....	.....	+ 1.306	.400
Third subperiod:									
Total	28.292	10.928	12.453	23.381	38.63	44.02	82.64	+ 4.911	2.000
Average	5.658	2.186	2.491	4.676	.....	.....	.....	+ .982	.400
Fourth subperiod:									
Total	27.663	10.049	13.277	23.326	36.33	48.00	84.32	+ 4.337	2.000
Average	5.533	2.010	2.655	4.665	.....	.....	.....	+ .868	.400
Entire preservative period:									
Total	111.291	44.548	49.014	93.562	40.03	44.04	84.07	+17.729	6.856
Average	5.565	2.227	2.451	4.678	.....	.....	.....	+ .887	.343
After period.									
First subperiod:									
Total	28.270	9.822	12.593	22.415	34.74	44.55	79.29	+ 5.855	.0
Average	5.654	1.964	2.519	4.483	.....	.....	.....	+ 1.171	.0
Second subperiod:									
Total	28.613	8.913	12.828	21.741	31.15	44.83	75.98	+ 6.872	.0
Average	5.723	1.783	2.566	4.348	.....	.....	.....	+ 1.375	.0
Entire after period:									
Total	56.883	18.735	25.421	44.156	32.94	44.69	77.63	+12.727	.0
Average	5.688	1.874	2.542	4.416	.....	.....	.....	+ 1.272	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per day.]

No. 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	21.493	10.799	12.637	23.436	50.24	58.80	109.04	+ 1.943	0.0
Average	4.299	2.160	2.527	4.687	.....	.....	.....	+ .388	.0
Second subperiod:									
Total	23.119	6.915	12.414	19.329	29.91	53.70	83.61	+ 3.790	.0
Average	4.624	1.383	2.483	3.866	.....	.....	.....	+ .758	.0
Entire fore period:									
Total	44.612	17.714	25.051	42.765	39.71	56.15	95.86	+ 1.847	.0
Average	4.461	1.771	2.505	4.277	.....	.....	.....	+ .184	.0
Preservative period.									
First subperiod:									
Total	23.353	10.415	13.527	23.942	44.60	57.92	102.52	− .589	.856
Average	4.671	2.083	2.705	4.788	.....	.....	.....	− .117	.171
Second subperiod:									
Total	22.868	7.772	13.985	21.757	33.99	61.16	95.15	+ 1.111	2.000
Average	4.574	1.554	2.797	4.351	.....	.....	.....	+ .223	.400
Third subperiod:									
Total	23.249	10.590	13.777	24.367	45.55	59.26	104.81	− 1.118	1.600
Average	4.650	2.118	2.755	4.873	.....	.....	.....	− .223	.320
Fourth subperiod:									
Total	23.861	7.869	13.078	20.947	32.98	54.81	87.79	+ 2.914	.0
Average	4.772	1.574	2.616	4.189	.....	.....	.....	+ .583	.0
Entire preservative period:									
Total	93.331	36.646	54.367	91.013	39.26	58.25	97.52	+ 2.318	4.456
Average	4.667	1.832	2.718	4.551	.....	.....	.....	+ .116	.223
After period.									
First subperiod:									
Total	22.653	5.602	13.777	19.379	24.73	60.82	85.55	+ 3.274	.0
Average	4.531	1.120	2.755	3.876	.....	.....	.....	+ .655	.0
Second subperiod:									
Total	21.896	9.733	14.001	23.734	44.45	63.94	108.39	− 1.838	.0
Average	4.379	1.947	2.800	4.747	.....	.....	.....	− .368	.0
Entire after period:									
Total	44.549	15.335	27.778	43.113	34.42	62.35	96.78	+ 1.436	.0
Average	4.455	1.534	2.778	4.311	.....	.....	.....	+ .144	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Nos. 1 to 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total[a]	110.160	30.917	68.367	99.284	28.07	62.06	90.13	+10.876	0.0
Average	4.406	1.237	2.735	3.971	.....	.....	.....	+ .435	.0
Second subperiod:									
Total	136.157	42.798	79.490	122.288	31.43	58.38	89.81	+13.869	.0
Average	4.539	1.427	2.650	4.076	.....	.....	.....	+ .463	.0
Entire fore period:									
Total	246.317	73.715	147.857	221.572	29.93	60.03	89.95	+24.745	.0
Average	4.478	1.340	2.688	4.029	.....	.....	.....	+ .449	.0
Preservative period.									
First subperiod:									
Total	134.810	45.584	74.688	120.272	33.81	55.40	89.20	+14.538	6.690
Average	4.494	1.519	2.490	4.009	.....	.....	.....	+ .485	.223
Second subperiod:									
Total	129.357	54.336	80.692	135.028	42.00	62.38	104.38	− 5.621	15.240
Average	4.312	1.811	2.690	4.501	.....	.....	.....	− .189	.508
Third subperiod:									
Total	130.577	43.527	76.807	120.334	33.33	58.82	92.16	+10.243	21.590
Average	4.353	1.451	2.560	4.011	.....	.....	.....	+ .342	.720
First, second, and third subperiods:									
Total	394.744	143.447	232.187	375.634	36.34	58.82	95.16	+19.110	43.520
Average	4.386	1.594	2.580	4.174	.....	.....	.....	+ .212	.484
After period.									
First subperiod:									
Total	130.540	38.352	78.987	117.339	29.38	60.51	89.89	+13.201	.0
Average	4.351	1.278	2.633	3.911	.....	.....	.....	+ .440	.0
Second subperiod:									
Total	133.117	40.505	72.888	113.393	30.43	54.75	85.18	+19.724	.0
Average	4.437	1.350	2.430	3.780	.....	.....	.....	+ .657	.0
Entire after period:									
Total	263.657	78.857	151.875	230.732	29.91	57.60	87.51	+32.925	.0
Average	4.394	1.314	2.531	3.845	.....	.....	.....	+ .549	.0

[a] No. 5 absent.

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 8 to 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	85.501	30.312	45.435	75.747	35.45	53.14	88.59	+ 9.754	0.0
Average	4.275	1.516	2.272	3.787	.....	.....	.....	+ .488	.0
Second subperiod:									
Total	88.920	26.909	48.162	75.071	30.26	54.16	84.42	+13.849	.0
Average	4.446	1.345	2.408	3.754	.....	.....	.....	+ .692	.0
Entire fore period:									
Total	174.421	57.221	93.597	150.818	32.81	53.66	86.47	+23.603	.0
Average	4.361	1.431	2.340	3.770	.....	.....	.....	+ .591	.0
Preservative period.									
First subperiod:									
Total	88.028	33.136	46.797	79.933	37.64	53.16	90.80	+ 8.095	3.424
Average	4.401	1.657	2.340	3.997	.....	.....	.....	+ .404	.171
Second subperiod:									
Total	85.083	30.006	40.370	70.376	35.27	47.45	82.71	+14.707	8.000
Average	4.254	1.500	2.018	3.519	.....	.....	.....	+ .735	.400
Third subperiod:									
Total	87.952	30.775	43.981	74.756	34.99	50.01	85.00	+13.196	8.000
Average	4.398	1.539	2.199	3.738	.....	.....	.....	+ .660	.400
Fourth subperiod:									
Total	86.466	35.131	52.532	87.663	40.63	60.75	101.38	− 1.197	8.000
Average	4.323	1.757	2.627	4.383	.....	.....	.....	− .060	.400
Entire preservative period:									
Total	347.529	129.048	183.680	312.728	37.13	52.85	89.99	+34.801	27.424
Average	4.344	1.613	2.296	3.909	.....	.....	.....	+ .435	.343
After period.									
First subperiod:									
Total	88.710	34.092	47.066	81.158	38.43	53.06	91.49	+ 7.552	.0
Average	4.436	1.705	2.353	4.058	.....	.....	.....	+ .378	.0
Second subperiod:									
Total	89.544	31.261	43.867	75.128	34.91	48.99	83.90	+14.416	.0
Average	4.477	1.563	2.193	3.756	.....	.....	.....	+ .721	.0
Entire after period:									
Total	178.254	65.353	90.933	156.286	36.66	51.01	87.68	+21.968	.0
Average	4.456	1.634	2.273	3.907	.....	.....	.....	+ .549	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 1 and 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	42.610	13.855	26.135	39.990	32.52	61.34	93.85	+ 2.620	0.0
Average	4.261	1.386	2.614	3.999	.....	.....	.....	+ .262	.0
Second subperiod:									
Total	42.131	12.330	28.710	41.040	29.27	68.14	97.41	+ 1.091	.0
Average	4.213	1.233	2.871	4.104	.....	.....	.....	+ .109	.0
Entire fore period:									
Total	84.741	26.185	54.845	81.030	30.90	64.72	95.62	+ 3.711	.0
Average	4.237	1.309	2.742	4.051	.....	.....	.....	+ .186	.0
Preservative period.									
First subperiod:									
Total	41.707	12.266	27.018	39.284	29.41	64.78	94.19	+ 2.423	2.230
Average	4.171	1.227	2.702	3.929	.....	.....	.....	+ .242	.223
Second subperiod:									
Total	39.928	15.114	26.724	41.838	37.85	66.93	104.78	− 1.910	5.080
Average	3.993	1.511	2.672	4.184	.....	.....	.....	− .191	.508
Third subperiod:									
Total	41.658	8.681	27.472	36.153	20.84	65.95	86.79	+ 5.505	7.620
Average	4.166	.868	2.747	3.615	.....	.....	.....	+ .551	.762
Fourth subperiod:									
Total	40.455	11.815	25.742	37.557	29.21	63.63	92.84	+ 2.898	8.910
Average	4.046	1.182	2.574	3.756	.....	.....	.....	+ .290	.891
Entire preservative period:									
Total	163.748	47.876	106.956	154.832	29.24	65.32	94.56	+ 8.916	23.840
Average	4.094	1.197	2.674	3.871	.....	.....	.....	+ .223	.596
After period.									
First subperiod:									
Total	42.036	9.931	29.528	39.459	23.62	70.24	93.87	+ 2.577	.0
Average	4.204	.993	2.953	3.946	.....	.....	.....	+ .258	.0
Second subperiod:									
Total	42.932	11.988	25.445	37.433	27.92	59.27	87.19	+ 5.499	.0
Average	4.293	1.199	2.545	3.743	.....	.....	.....	+ .550	.0
Entire after period:									
Total	84.968	21.919	54.973	76.892	25.80	64.70	90.50	+ 8.076	.0
Average	4.248	1.096	2.749	3.845	.....	.....	.....	+ .403	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 5 and 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	43.286	10.369	21.863	32.232	23.95	50.51	74.46	+11.054	0.0
Average	4.329	1.037	2.186	3.223	.....	.....	.....	+ 1.106	.0
Preservative period.									
First subperiod:									
Total	42.461	10.441	23.586	34.027	24.59	55.55	80.14	+ 8.434	2.230
Average	4.246	1.044	2.359	3.403	.....	.....	.....	+ .843	.223
Second subperiod:									
Total	40.759	16.249	23.928	40.177	39.86	58.71	98.57	+ .582	5.080
Average	4.076	1.625	2.393	4.018	.....	.....	.....	+ .058	.508
Third subperiod:									
Total	38.767	11.215	21.244	32.459	28.93	54.80	83.73	+ 6.308	6.350
Average	3.877	1.122	2.124	3.246	.....	.....	.....	+ .631	.635
Fourth subperiod:									
Total	33.402	13.177	19.542	32.719	39.45	58.51	97.96	+ .683	.0
Average	3.340	1.318	1.954	3.272	.....	.....	.....	+ .068	.0
Entire preservative period:									
Total	155.389	51.082	88.300	139.382	32.87	56.82	89.69	+16.007	13.660
Average	3.885	1.277	2.208	3.485	.....	.....	.....	+ .400	.342
After period.									
First subperiod:									
Total	37.963	11.748	21.775	33.523	30.94	57.36	88.30	+ 4.440	.0
Average	3.796	1.175	2.178	3.352	.....	.....	.....	+ .444	.0
Second subperiod:									
Total	38.496	11.597	21.036	32.633	30.13	54.65	84.77	+ 5.863	.0
Average	3.850	1.160	2.104	3.263	.....	.....	.....	+ .587	.0
Entire after period:									
Total	76.459	23.345	42.811	66.156	30.53	55.99	86.52	+10.303	.0
Average	3.823	1.167	2.141	3.308	.....	.....	.....	+ .515	.0

TABLE XVI.—*Phosphoric-acid balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 7 and 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	37.427	15.313	21.135	36.448	40.91	56.47	97.38	+ .979	0.0
Average	3.743	1.531	2.114	3.645	.....	.....	.....	+ .098	.0
Second subperiod:									
Total	37.687	11.994	21.007	33.001	31.83	55.74	87.57	+4.686	.0
Average	3.769	1.199	2.101	3.300	.....	.....	.....	+ .469	.0
Entire fore period:									
Total	75.114	27.307	42.142	69.449	36.35	56.10	92.46	+5.665	.0
Average	3.756	1.365	2.107	3.472	.....	.....	.....	+ .284	.0
Preservative period.									
First subperiod:									
Total	37.529	15.580	20.869	36.449	41.51	55.61	97.12	+1.080	1.712
Average	3.753	1.558	2.087	3.645	.....	.....	.....	+ .108	.171
Second subperiod:									
Total	35.805	11.113	19.871	30.984	31.04	55.50	86.54	+4.821	3.600
Average	3.580	1.111	1.987	3.098	.....	.....	.....	+ .482	.360
Third subperiod:									
Total	36.064	12.882	22.072	34.954	35.72	61.20	96.92	+1.110	3.400
Average	3.606	1.288	2.207	3.495	.....	.....	.....	+ .111	.340
First, second, and third subperiods:									
Total	109.398	39.575	62.812	102.387	36.18	57.42	93.59	+7.011	8.712
Average	3.647	1.319	2.094	3.413	.....	.....	.....	+ .234	.290

Nos. 7 to 12.

Fore period.									
First subperiod:									
Total	122.928	45.625	66.570	112.195	37.12	54.15	91.27	+10.733	0.0
Average	4.097	1.521	2.219	3.740	.....	.....	.....	+ .357	.0
Second subperiod:									
Total	126.607	38.903	69.169	108.072	30.73	54.63	85.36	+18.535	.0
Average	4.220	1.297	2.306	3.602	.....	.....	.....	+ .618	.0
Entire fore period:									
Total	249.535	84.528	135.739	220.267	33.87	54.40	88.27	+29.268	.0
Average	4.159	1.409	2.262	3.671	.....	.....	.....	+ .488	.0
Preservative period.									
First subperiod:									
Total	125.557	48.716	67.666	116.382	38.80	53.89	92.69	+ 9.175	5.136
Average	4.185	1.624	2.256	3.879	.....	.....	.....	+ .306	.171
Second subperiod:									
Total	120.888	41.119	60.241	101.360	34.01	49.83	83.85	+19.528	11.600
Average	4.030	1.371	2.008	3.379	.....	.....	.....	+ .651	.387
Third subperiod:									
Total	124.016	43.657	66.053	109.710	35.20	53.26	88.46	+14.306	11.400
Average	4.134	1.455	2.202	3.657	.....	.....	.....	+ .477	.380
First, second, and third subperiods:									
Total	370.461	133.492	193.960	327.452	36.03	52.36	88.39	+43.009	28.136
Average	4.116	1.483	2.155	3.638	.....	.....	.....	+ .478	.313

SULPHUR BALANCE.

A study of the metabolism of sulphur in this series is of special interest because it treats not only of the organic and inorganic sulphur ingested in the foods, but also of sulphur in the form of sulphurous acid and sulphites administered as the preservative. The changes through which the sulphurous acid passes, and the final form in which the added sulphur is excreted are of importance. Assuming that the sulphur added to the foods in the form of sulphurous acid and sulphites would all appear in the feces and urine, we expect to find a strongly negative balance during the preservative period.

The sulphur balances are calculated in two ways. A balance is made first, taking into consideration the sulphur in the food only, and the second balance considers in addition the sulphur administered in the form of sulphurous acid or sulphites. It is evident that the first balance would be largely negative, its increase over the normal balance, assuming the metabolic functions to continue normal, being the amount of sulphur ingested as the preservative. In the balance which takes into consideration the sulphur of the preservative, the presence of a minus balance indicates a tendency on the part of the preservative to increase the elimination of sulphur.

INDIVIDUAL DATA.

The quantity of sulphur in the food administered to No. 1 in the fore period is 1.303 grams daily, and it is almost exactly the same in the after period. During the preservative period the average amount is about 0.08 gram per day less. In the feces the quantity of sulphur excreted in the fore period is 0.135 gram, in the preservative period 0.115 gram, and in the after period 0.078 gram. It is evident from these data that none of the sulphur added to the food as sulphurous acid appears in the feces. On the contrary, there is a tendency to diminish the sulphur in the feces, and this tendency is very marked in the after period. The quantity of sulphur appearing in the urine in the fore period is 1.133 grams, in the preservative period 1.433 grams, and in the after period 1.169 grams. In this case it is evident that the large increase in the excretion of sulphur in the urine in the preservative period and the small increase during the after period are due solely to the sulphur added in the form of sulphites. The activity of the kidneys in excreting the products of the added sulphurous acid and sulphites is shown in a marked degree in the percentage of sulphur excreted in the urine, which is 86.90 in the fore period, 117.26 in the preservative period, and 89.41 in the after period. The balance in the fore period is positive and its magnitude is 0.035 gram. In the preservative period the first balance, considering the food sulphur only, is negative, and its magnitude is 0.326 gram; the second balance,

including the sulphur as preservative, is −0.044 gram, and in the after period the balance is again positive, with a magnitude of 0.061 gram.

No. 2 shows similar conditions. The sulphur in the food remains almost constant during the three periods. Likewise the amount excreted in the feces is practically constant in the three periods. The excretion in the urine is very largely increased in the preservative period and diminished very slightly from the fore period in the after period. Practically the whole of the added sulphur appears in the urine. The balance in the fore period is positive and its magnitude is 0.014 gram; in the preservative period the first balance is negative and its magnitude is 0.206 gram; the second balance is positive, amounting to 0.043. In the after period the balance is again positive and its magnitude is 0.09 gram. Unlike the case of No. 1, there appears to be a retention of sulphur in the preservative period.

In the case of No. 3 the quantity of sulphur administered in the food is quite constant, being slightly greater in the after period. The amount excreted in the feces is almost the same for the fore and after periods, but is considerably increased in the preservative period, showing in this instance an excretion in the feces of a part of the sulphur added as sulphites, or a less complete absorption of the sulphur of the foods. A great increase of the excretion of sulphur in the urine is found in the preservative period. The balance in the fore period is positive and its magnitude is 0.109 gram; in the preservative period the first balance is negative and its magnitude is 0.243 gram; the second balance is positive, amounting to 0.006. It is again positive in the after period and its magnitude is 0.166 gram. There appears to be no marked effect produced on the sulphur metabolism in this case.

In the case of No. 4 the amount of sulphur in the food is practically the same for the fore and preservative periods and slightly increased in the after period. The amount of sulphur eliminated in the feces is almost the same for the three periods. The elimination in the urine is largely increased in the preservative period. The balance in the fore period is an abnormal one—that is, it is negative, although its magnitude is very small, amounting to 0.079 gram. The first balance in the preservative period is strongly negative, its magnitude being 0.379 gram; the second balance is also negative, but amounts only to 0.064 gram, accounted for by the increased katabolism of sulphur. The balance is also negative in the after period, its magnitude being 0.06 gram.

Comparison of the data of No. 5 is unsatisfactory because of the irregularity in the fore period. The data show again an increase in the sulphur eliminated in the urine in the preservative period. There is a positive balance in the fore period of 0.181 gram daily, a nega-

tive balance in the preservative period of 0.228 gram considering the food sulphur only, a negative balance of 0.073 gram considering also the sulphur as preservative, and a positive balance in the after period of 0.009 gram.

With No. 6 the quantity of sulphur administered in the food during the preservative period is markedly less than during the fore and after periods. The quantity excreted in the feces, however, is very slightly increased in the preservative period. The chief increase in the excretion of sulphur is, as in the other cases, found in the urine, where the amount excreted in the preservative period is 0.340 gram greater than that of the fore period. It should be noted, however, that the excretion in the urine in the fore period is abnormally low, resulting in a large positive balance. The first balance in the preservative period is negative, having a magnitude of 0.135 gram; the second balance is positive, amounting to 0.052 gram. The balance is again positive in the after period, its magnitude being 0.079 gram.

In the case of No. 7 the incompleteness of the data render a comparison of the balances less valuable. The quantity of sulphur in the food is also much less in the preservative period than in the fore period. The balance in the fore period is +0.252, becoming negative in the preservative period, in the case of the first balance, and amounting to −0.014, while the second balance is +0.128. There is no after period.

With No. 8 the quantity of sulphur in the food is not constant, being largest in the after period and smallest in the preservative period. The quantities excreted in the feces do not vary greatly for the three periods; but inasmuch as the sulphur in the food is less in the preservative period, a part of the sulphur excreted in the feces in the preservative period may have come from the added preservative, or be the result of incomplete absorption. The balance in this case is positive in the fore period and amounts to 0.089 gram; it is negative in the preservative period in the case of the first balance and amounts to 0.127 gram, while the second balance is positive and amounts to 0.045. It is positive in the after period, although of a very small magnitude, namely, 0.003 gram. Here, again, the balance obtained by taking into consideration the sulphur of the preservative is materially smaller than is found in the fore period. This fact may be taken as an indication of the accelerating effect of the preservative on the elimination of sulphur, and, as has already been shown in the special sulphur and sulphate studies of the urine (p. 850), this takes place largely in the form of neutral sulphur and inorganic sulphur.

The quantity of sulphur administered in the food of No. 9 is almost exactly the same for the fore and after periods and slightly less in the preservative period. The amount excreted in the feces is

the same in the fore and preservative periods, and markedly greater in the after period. The quantity of sulphur excreted in the urine is markedly greater in the preservative period. The balance in the fore period is positive and its magnitude is 0.239 gram. The balance of the preservative period is negative when the sulphur of the food only is taken into consideration. When the sulphur preservative is considered, the balance is positive. At the same time, it is much less positive than in the fore period, and this fact indicates a tendency of the preservative to increase the excretion of sulphur. Since the amount of sulphur eliminated in the feces in the preservative period was the same as in the fore period, this increase is entirely due to the sulphur eliminated in the urine. The effect of the preservative in this respect bears out the data as obtained for No. 8 and shows a marked influence on the metabolism of sulphur. The balance is positive in the after period, its magnitude being 0.022 gram.

The quantity of sulphur administered to No. 10 is almost the same in the fore and after periods, but slightly less in the preservative period. The quantity excreted in the feces is slightly greater in the preservative and after periods, while the amount excreted in the urine is less than in any of the previous instances; in fact, the excess over the other periods is not very well marked. The balances are all positive and of the following magnitudes for the three periods respectively: 0.212 gram, 0.086 gram, and 0.135 gram.

The quantity of sulphur administered in the food in the case of No. 11 is practically the same in all the periods. The elimination of sulphur in the feces is almost the same in the fore and preservative periods and slightly less in the after period. There is a slight increase in the amount of sulphur eliminated in the urine in the preservative period, which, when only the sulphur in the food is taken into consideration, is not sufficient to produce a negative balance. This fact, as in the preceding case, is peculiar, inasmuch as in the case of all the other subjects negative balances were obtained, as would be expected. It is possible that a part of the sulphurous acid gas administered escaped before entering the digestive processes and becoming oxidized. The positive balances in this case amount to 0.219 gram in the fore period, 0.108 gram and 0.279 gram in the preservative period, and 0.248 gram for the after period.

The quantity of sulphur in the food of No. 12 is practically the same in the fore and preservative periods and slightly less in the after period. The elimination in the feces is less in the preservative period and markedly less in the after period than in the fore period. The increase of the sulphur in the urine in the preservative period is sufficient to produce a negative balance of 0.04 when only the food sulphur is considered. Balance II is positive and amounts to 0.072 gram. The balance is positive in the after period and of a magnitude of 0.083 gram.

SUMMARIES.

In the summary for Nos. 1 to 6, inclusive, the quantity of sulphur ingested in the food is seen to be slightly greater in the fore period than in the preservative and after periods. The amount of sulphur excreted in the feces is slightly greater (0.007 gram) in the preservative period than in the fore period and less (0.02 gram) in the after period than in the fore period. From this it would appear that a very small part of the preservative sulphur was excreted in the feces, or, there was a less complete absorption from the alimentary canal during the preservative period.[a] The data in the phosphoric acid and nitrogen balances, in which there was a similar increase in elimination of these elements in the feces during the preservative period, seem to justify the latter conclusion.

There is an average increase of 0.270 gram sulphur in the urine during the preservative period, the quantity in the after period being practically the same as in the fore period. This corresponds to a percentage increase of 24.11, considering the first balance, that is the sulphur in the food only, but even when the sulphur in the preservative is considered (balance II) there is seen to be an increase of 6.75 per cent over the amount excreted in the fore period. There is thus shown in this general summary an increased excretion of sulphur during the preservative period over that ingested as preservative. This is also shown in the balances, there being a positive balance in the fore period amounting to +0.080 gram, while balance II, taking the sulphur of the sodium sulphite into consideration, is positive, but amounts only to 0.008 gram. The first balance in the preservative period naturally is negative, amounting to 0.234 gram, which is only 0.008 gram less than the average quantity of preservative sulphur ingested. The balance in the after period is positive, amounting to 0.057 gram.

From these data, considered in connection with those for nitrogen and phosphoric acid, it can be safely concluded that under the influence of the preservative there is a decrease in the assimilation of these constituents and that the sulphur balance shows a decided increase in katabolic activities, two conditions diametrically opposed to normal metabolism. Considering, however, the special studies made of sulphur and sulphates in the urine (p. 839), it is seen that the increase in sulphur eliminated, over the amount ingested in the preservative period, is due to neutral sulphur, and there is some doubt whether sulphur in this form is due to katabolism.

In the summary for Nos. 8 to 11, inclusive, the men who received sulphurous acid gas, there is a fair agreement shown in the amount of sulphur ingested in the food during the three periods, though there is a slight deficiency in the preservative period. The quantity of

[a] See also discussion on p. 847, Table X.

sulphur excreted in the feces is slightly greater in the preservative period than in the fore period and there is still another slight increase in the after period. Expressed in percentage amounts, considering the first balance, this increase is 0.8 and 0.68 per cent, respectively, for the preservative and after periods.

The average amount of sulphur excreted in the urine during the preservative period is greater by 0.164 gram than during the fore period, and in the after period there is an increase over the fore period of 0.081 gram. There is a percentage increase during the preservative period, considering balance I, of 15.27 per cent and for balance II, including the preservative sulphur, of 4.43. For the after period there is 6.22 per cent more sulphur excreted than in the fore period. It should be borne in mind, too, that the sulphur in the food is slightly less in the preservative period and practically the same in the fore and after periods.

The balance in the fore period is positive and amounts to 0.190 gram. During the preservative period the first balance (food sulphur only) is only slightly negative, amounting to 0.015 gram, while the second balance is positive, amounting to 0.157 gram. In the after period the balance is +0.102.

The reduction in the positive balance for these subjects during the preservative period corresponds almost exactly to the reduction in the amount of sulphur ingested in the food. In the first balance, the sulphur eliminated in excess of that from the ingested food—that is, the sulphur in the preservative—is of sufficient amount to cause a negative balance of 0.015 gram, which if added to the first balance gives 0.172 gram, exactly the average daily amount ingested as preservative, the urine alone showing an actual increase of 0.164 gram. If we assume all of the sulphur here excreted to come from the administered preservative, a very rapid elimination of the sulphurous acid by the kidneys is shown, but in the after period there is again an increase over the fore period in the sulphur eliminated, both in the feces and urine, which of course represents some of the sulphur of the preservative that has been carried into the after period. Considered from this point of view there is still evidence of an increased excretion of sulphur over that administered as preservative, and there is also a slight decrease in the absorption of sulphur.

In comparing these two summaries it should be remembered that the fourth preservative subperiod for Nos. 1 to 6 is lacking and there is a lapse of five days before the after period began for three of these subjects. There is also a difference in the quantity of SO_2 administered as sulphites and as sulphurous acid gas, which must be taken into consideration. For Nos. 1 to 6 the average daily amount expressed as sulphur is 0.242 gram, while for Nos. 8 to 11 it is 0.172 gram. There is thus a constant difference of 70 milligrams of sulphur ingested per day.

During the preservative period for Nos. 1 to 6 the negative balance is 0.234 gram, while for Nos. 8 to 11 it is 0.015. There is, however, a much greater positive balance in the fore period in the case of Nos. 8 to 11 than for Nos. 1 to 6. Also, the difference in the quantity of preservative sulphur ingested as well as the diminished increase in the amount of sulphur eliminated during the preservative period, above that ingested in the preservative, has caused this difference in the magnitude of the negative balances.

Considering the percentage elimination of sulphur in the preservative period, the total increase—that is, in the feces and urine—over the fore period, is 25.03 per cent for Nos. 1 to 6, while Nos. 8 to 11 show 16.07 per cent. The increase in the after period is 1.61 per cent for Nos. 1 to 6, making a total increase of 26.64 per cent, while for Nos. 8 to 11 this increase in the after period is 6.90 per cent, giving a total increase for these subjects of 22.97 per cent. It will be remembered that Nos. 9 and 10 of this summary show a relatively small increase of sulphur eliminated during the preservative period, which probably accounts for part of this difference of 3.67 per cent increased elimination of Nos. 1 to 6 over Nos. 8 to 11. There is a possibility that some of the sulphurous acid gas may have escaped soon after its ingestion, but from the general similarity and agreement of the two summaries, bearing in mind the variations and conditions already noted, there is seen a marked influence on the metabolism of sulphur, namely, a decrease in its assimilation and an increased excretion over the quantity ingested in the preservative. This is more marked in the case of the men receiving sodium sulphite.

TABLE XVII.—*Sulphur balances for Series VII.*

[Averages are per day.]

No. 1.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).[a]
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.749	0.873	5.645	6.518	12.94	83.64	96.58	+0.231	0.0
Average	1.350	.175	1.129	1.304	.....	.....	.....	+ .046	.0
Second subperiod:									
Total	6.285	.479	5.681	6.160	7.62	90.39	98.01	+ .125	.0
Average	1.257	.096	1.136	1.232	.....	.....	.....	+ .025	.0
Entire fore period:									
Total	13.034	1.352	11.326	12.678	10.37	86.90	97.27	+ .356	.0
Average	1.303	.135	1.133	1.268	.....	.....	.....	+ .035	.0
Preservative period.									
First subperiod:									
Total	6.040	.722	6.054	6.776	11.95	100.23	112.19	− .736	1.115
Average	1.208	.144	1.211	1.355	.....	.....	.....	− .147	.223
Second subperiod:									
Total	6.246	.754	6.487	7.241	12.07	103.86	115.93	− .995	2.540
Average	1.249	.151	1.297	1.448	.....	.....	.....	− .199	.508
Third subperiod:									
Total	6.223	.386	7.909	8.295	6.20	127.09	133.30	−2.072	3.810
Average	1.245	.077	1.582	1.659	.....	.....	.....	− .414	762
Fourth subperiod:									
Total	5.938	.433	8.217	8.650	7.29	138.38	145.67	−2.712	3.810
Average	1.188	.087	1.643	1.730	.....	.....	.....	− .542	.762
Entire preservative period:									
Total food sulphur, I	24.447	2.295	28.667	30.962	9.39	117.26	126.65	−6.515	11.275
Average	1.222	.115	1.433	1.548	.....	.....	.....	− .326	.564
Sulphur as sodium sulphite:									
Total	5.643	.....	.....	.....	.....	.....	.....	.....	.....
Average	.282	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3, II	30.090	.....	.....	.....	7.63	95.27	102.90	− .872	.....
Average	1.504	.....	.....	.....	.....	.....	.....	− .044	.....
After period.									
First subperiod:									
Total	6.688	.412	6.113	6.525	6.16	91.40	97.56	+ .163	.0
Average	1.338	.082	1.223	1.305	.....	.....	.....	+ .033	.0
Second subperiod:									
Total	6.391	.370	5.581	5.951	5.79	87.33	93.12	+ .440	.0
Average	1.278	.074	1.116	1.190	.....	.....	.....	+ .088	.0
Entire after period:									
Total	13.079	.782	11.694	12.476	5.98	89.41	95.39	+ .603	.0
Average	1.308	.078	1.169	1.247	.....	.....	.....	+ .061	.0

[a] One-half the value of these figures represents the preservative administered as sulphur.

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 2.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.865	0.629	6.055	6.684	9.16	88.20	97.36	+0.181	0.0
Average	1.373	.126	1.211	1.337	.....	.....	.....	+ .036	.0
Second subperiod:									
Total	6.880	1.061	5.850	6.911	15.42	85.03	100.45	− .031	.0
Average	1.376	.212	1.170	1.382	.....	.....	.....	− .006	.0
Entire fore period:									
Total	13.745	1.690	11.905	13.595	12.30	86.61	98.91	+ .150	.0
Average	1.374	.169	1.191	1.360	.....	.....	.....	+ .014	.0
Preservative period.									
First subperiod:									
Total	7.070	.816	5.893	6.709	11.54	83.35	94.89	+ .361	1.115
Average	1.414	.163	1.179	1.342	.....	.....	.....	+ .072	.223
Second subperiod:									
Total	7.003	1.066	7.025	8.091	15.22	100.31	115.53	−1.088	2.540
Average	1.401	.213	1.405	1.618	.....	.....	.....	− .217	.508
Third subperiod:									
Total	6.923	.806	8.483	9.289	11.64	122.53	134.18	−2.366	3.810
Average	1.385	.161	1.697	1.858	.....	.....	.....	− .473	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(3.810)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.762)
First, second, and third subperiods:									
Total food sulphur, I	20,996	2.688	21.401	24.089	12.80	101.93	114.73	−3.093	.....
Average	1.400	.179	1.427	1.606	.....	.....	.....	− .206	.....
Sulphur as sodium sulphite:									
Total	3.736	.....	.....	.....	.....	.....	.....	.....	.....
Average	.249	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3, II	24.732	.....	.....	.....	10.87	86.53	97.40	+ .643	(11.275)
Average	1.649	.....	.....	.....	.....	.....	.....	+ .043	(.564)
After period.									
First subperiod:									
Total	7.260	.836	6.093	6.929	11.52	83.93	95.44	+ .331	.0
Average	1.452	.167	1.219	1.386	.....	.....	.....	+ .066	.0
Second subperiod:									
Total	6.989	.744	5.681	6.425	10.64	81.28	91.93	+ .564	.0
Average	1.400	.149	1.136	1.285	.....	.....	.....	+ .115	.0
Entire after period:									
Total	14.249	1.580	11.774	13.354	11.09	82.63	93.72	+ .895	.0
Average	1.425	.158	1.177	1.335	.....	.....	.....	+ .090	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 3.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.448	0.387	5.220	5.607	6.00	80.96	86.96	+0.841	0.0
Average	1.290	.77	1.044	1.121	.....	.....	.....	+ .169	.0
Second subperiod:									
Total	6.654	.691	5.716	6.407	10.38	85.90	96.29	+ .247	.0
Average	1.331	.138	1.143	1.281	.....	.....	.....	+ .050	.0
Entire fore period:									
Total	13.102	1.078	10.936	12.014	8.23	83.47	91.70	+1.088	.0
Average	1.310	.108	1.094	1.201	.....	.....	.....	+ .109	.0
Preservative period.									
First subperiod:									
Total	6.491	.815	6.129	6.944	12.56	94.42	106.98	— .453	1.115
Average	1.298	.163	1.226	1.389	.....	.....	.....	— .091	.223
Second subperiod:									
Total	6.666	.594	7.064	7.658	8.91	105.97	114.88	— .992	2.540
Average	1.333	.119	1.413	1.532	.....	.....	.....	— .199	.508
Third subperiod:									
Total	6.639	.852	7.995	8.847	12.83	120.42	133.26	—2.208	3.810
Average	1.328	.170	1.599	1.769	.....	.....	.....	— .441	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(.381)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.076)
First, second and third subperiods:									
Total food sulphur, I	19.796	2.261	21.188	23.449	11.42	107.03	118.45	—3.653	.....
Average	1.320	.151	1.413	1.563	.....	.....	.....	— .243	.....
Sulphur as sodium sulphite:									
Total	3.736	.....	.....	.....	.....	.....	.....	.....	.....
Average	.249	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3, II	23.532	.....	.....	.....	9.61	90.04	99.65	+ .083	(7.846)
Average	1.569	.....	.....	.....	.....	.....	.....	+ .006	[a](.392)
After period.									
First subperiod:									
Total	6.969	.489	5.679	6.168	7.02	81.49	88.51	+ .801	.0
Average	1.394	.098	1.136	1.234	.....	.....	.....	+ .160	.0
Second subperiod:									
Total	6.906	.496	5.556	6.052	7.18	80.45	87.63	+ .854	.0
Average	1.381	.099	1.111	1.210	.....	.....	.....	+ .171	.0
Entire after period:									
Total	13.875	.985	11.235	12.220	7.10	80.97	88.07	+1.655	.0
Average	1.388	.098	1.124	1.222	.....	.....	.....	+ .166	.0

[a] Average for 1 day in a period of 20 days.

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.115	0.572	5.619	6.191	9.35	91.89	101.24	−0.076	0.0
Average	1.223	.114	1.124	1.238	.....	.....	.....	− .015	.0
Second subperiod:									
Total	6.020	1.013	5.728	6.741	16.83	95.15	111.98	− .721	.0
Average	1.204	.203	1.146	1.348	.....	.....	.....	− .144	.0
Entire fore period:									
Total	12.135	1.585	11.347	12.932	13.06	93.51	106.57	− .797	.0
Average	1.214	.158	1.135	1.293	.....	.....	.....	− .079	.0
Preservative period.									
First subperiod:									
Total	6.114	.716	6.053	6.769	11.71	99.00	110.71	− .655	1.115
Average	1.223	.143	1.211	1.354	.....	.....	.....	− .131	.223
Second subperiod:									
Total	6.126	.971	6.684	7.655	15.85	109.11	124.96	−1.529	2.540
Average	1.225	.194	1.337	1.531	.....	.....	.....	− .306	.508
Third subperiod:									
Total	6.068	.665	7.709	8.374	10.96	127.04	138.00	−2.306	3.810
Average	1.214	.133	1.542	1.675	.....	.....	.....	− .461	.762
Fourth subperiod:									
Total	5.822	.834	8.074	8.908	14.32	138.68	153.01	−3.086	5.100
Average	1.164	.167	1.615	1.782	.....	.....	.....	− .618	1.020
Entire preservative period:									
Total food sulphur, I	24.130	3.186	28.520	31.706	13.20	118.19	131.40	−7.576	12.565
Average	1.206	.159	1.426	1.585	.....	.....	.....	− .379	.628
Sulphur as sodium sulphite:									
Total	6.289	.....	.....	.....	.....	.....	.....	.....	.....
Average	.315	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3, II	30.419	.....	.....	.....	10.47	93.76	104.23	−1.287	.....
Average	1.521	.....	.....	.....	.....	.....	.....	− .064	.....
After period.									
First subperiod:									
Total	6.363	.675	5.969	6.644	10.61	93.81	104.42	− .281	.0
Average	1.273	.135	1.194	1.329	.....	.....	.....	− .056	.0
Second subperiod:									
Total	6.195	.836	5.682	6.518	13.49	91.72	105.21	− .323	.0
Average	1.239	.167	1.136	1.304	.....	.....	.....	.065	.0
Entire after period:									
Total	12.558	1.511	11.651	13.162	12.03	92.78	104.81	− .604	.0
Average	1.256	.151	1.165	1.316	.....	.....	.....	− .060	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 5.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.									
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	5.893	0.523	4.467	4.990	8.87	75.80	84.68	+0.903	0.0
Average	1.179	.105	.893	.998	.....	.....	.....	+ .181	.0
Preservative period.									
First subperiod:									
Total	5.714	.644	5.690	6.334	11.27	99.58	110.85	— .620	1.115
Average	1.143	.129	1.138	1.267	.....	.....	.....	— .124	.223
Second subperiod:									
Total	5.825	.660	6.171	6.831	11.33	105.94	117.27	—1.006	2.540
Average	1.165	.132	1.234	1.366	.....	.....	.....	— .201	.508
Third subperiod:									
Total	4.756	.551	5.804	6.355	11.59	122.04	133.62	—1.599	2.540
Average	.951	.110	1.161	1.271	.....	.....	.....	— .320	.508
Fourth subperiod:									
Total	2.676	.531	3.488	4.019	19.84	130.34	150.19	—1.343	.0
Average	.535	.106	.698	.804	.....	.....	.....	— .269	.0
Entire preservative period:									
Total food sulphur, I	18.971	2.386	21.153	23.539	12.58	111.50	124.08	—4.568	6.195
Average	.949	.119	1.058	1.177	.....	.....	.....	— .228	.310
Sulphur as sodium sulphite:									
Total	3.101	.....	.....	.....	.....	.....	.....	.....	.....
Average	.155	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3, II	22.072	.....	.....	.....	10.81	95.84	106.65	—1.467	.....
Average	1.104	.....	.....	.....	.....	.....	.....	— .073	.....
After period.									
First subperiod:									
Total	3.803	.518	3.317	3.835	13.62	87.22	100.84	— .032	.0
Average	.761	.104	.663	.767	.....	.....	.....	— .006	.0
Second subperiod:									
Total	3.952	.453	3.384	3.837	11.46	85.63	97.09	+ .115	.0
Average	.790	.091	.677	.768	.....	.....	.....	+ .023	.0
Entire after period:									
Total	7.755	.971	6.701	7.672	12.52	86.41	98.93	+ .083	.0
Average	.776	.097	.670	.767	.....	.....	.....	+ .009	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.301	0.753	4.012	4.765	11.95	63.67	75.62	+1.536	0.0
Average	1.260	.151	.802	.953	.....	.....	.....	+ .307	.0
Second subperiod:									
Total	6.268	.916	4.190	5.106	14.61	66.85	81.46	+1.162	.0
Average	1.254	.183	.838	1.021	.....	.....	.....	+ .233	.0
Entire fore period:									
Total	12.569	1.669	8.202	9.871	13.28	65.26	78.53	+2.698	.0
Average	1.257	.167	.820	.987	.....	.....	.....	+ .270	.0
Preservative period.									
First subperiod:									
Total	6.061	.767	5.040	5.807	12.65	83.15	95.81	+ .254	1.115
Average	1.212	.153	1.008	1.161	.....	.....	.....	+ .051	.223
Second subperiod:									
Total	6.105	1.088	6.276	7.364	17.82	102.80	120.62	−1.259	2.540
Average	1.021	.218	1.255	1.473	.....	.....	.....	− .452	.508
Third subperiod:									
Total	5.976	.722	7.044	7.766	12.08	117.87	129.95	−1.790	3.810
Average	1.195	.144	1.409	1.553	.....	.....	.....	− .368	.762
Fourth subperiod:									
Total	5.756	.815	4.843	5.658	14.16	84.14	98.29	+ .098	.0
Average	1.151	.163	.969	1.132	.....	.....	.....	+ .019	.0
Entire preservative period:									
Total food sulphur, I	23.898	3.392	23.203	26.595	14.19	97.09	111.28	−2.697	7.465
Average	1.195	.170	1.160	1.330	.....	.....	.....	− .135	.373
Sulphur as sodium sulphite:									
Total	3.736	.....	.....	.....	.....	.....	.....	.....	.....
Average	.187	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3. II	27.634	.....	.....	.....	12.27	83.97	96.24	+1.039	.....
Average	1.382	.....	.....	.....	.....	.....	.....	+ .052	.....
After period.									
First subperiod:									
Total	6.447	.817	5.098	5.915	12.67	79.08	91.75	+ .532	.0
Average	1.289	.163	1.020	1.183	.....	.....	.....	+ .106	.0
Second subperiod:									
Total	6.137	.802	5.071	5.873	13.07	82.63	95.70	+ .264	.0
Average	1.225	.160	1.014	1.175	.....	.....	.....	+ .050	.0
Entire after period:									
Total	12.584	1.619	10.169	11.788	12.86	80.81	93.67	+ .796	.0
Average	1.258	.162	1.017	1.179	.....	.....	.....	+ .079	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 7.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.014	0.513	3.663	4.176	8.53	60.91	69.44	+1.838	0.0
Average	1.203	.103	.733	.835	.....	.....	.....	+ .368	.0
Second subperiod:									
Total	5.242	.684	3.884	4.568	13.05	74.09	87.14	+ .674	.0
Average	1.048	.137	.777	.914	.....	.....	.....	+ .134	.0
Entire fore period:									
Total	11.256	1.197	7.547	8.744	10.60	67.05	77.68	+2.512	.0
Average	1.126	.120	.755	.874	.....	.....	.....	+ .252	.0
Preservative period.									
First subperiod:									
Total	5.223	.836	4.454	5.290	16.01	85.28	101.28	− .067	.856
Average	1.045	.167	.891	1.058	.....	.....	.....	− .013	.171
Second subperiod:									
Total	4.880	.479	3.984	4.463	9.82	81.64	91.45	+ .417	1.600
Average	.976	.096	.797	.893	.....	.....	.....	+ .083	.320
Third subperiod:									
Total	4.612	.304	4.869	5.173	6.59	105.57	112.16	− .561	1.800
Average	.922	.061	.974	1.035	.....	.....	.....	− .113	.360
First, second, and third subperiods:									
Total food sulphur, I	14.715	1.619	13.307	14.926	11.00	90.43	101.43	− .211	.....
Average	.981	.108	.887	.995	.....	.....	.....	− .014	.....
Sulphur as sulphurous acid:									
Total	2.130	.....	.....	.....	.....	.....	.....	.....	.....
Average	.142	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2, II	16.845	.....	.....	.....	9.61	79.00	88.61	+1.919	4.256
Average	1.123	.....	.....	.....	.....	.....	.....	+ .128	.213

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 8.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	5.778	0.762	4.208	4.970	13.19	72.83	86.02	+0.808	0.0
Average	1.156	.152	.842	.994	.....	.....	.....	+ .162	.0
Second subperiod:									
Total	5.509	.945	4.483	5.428	17.15	81.38	98.53	+ .081	.0
Average	1.102	.189	.897	1.086	.....	.....	.....	+ .016	.0
Entire fore period:									
Total	11.287	1.707	8.691	10.398	15.12	77.00	92.12	+ .889	.0
Average	1.129	.171	.869	1.040	.....	.....	.....	+ .089	.0
Preservative period.									
First subperiod:									
Total	5.635	.647	5.006	5.653	11.48	88.84	100.32	− .018	.856
Average	1.127	.129	1.001	1.131	.....	.....	.....	− .004	.171
Second subperiod:									
Total	5.623	.643	5.513	6.156	11.44	98.04	109.48	− .533	2.000
Average	1.125	.129	1.103	1.232	.....	.....	.....	− .107	.400
Third subperiod:									
Total	5.539	1.133	5.314	6.447	20.45	95.94	116.39	− .908	2.000
Average	1.108	.227	1.063	1.289	.....	.....	.....	− .181	.400
Fourth subperiod:									
Total	5.321	1.100	5.298	6.398	20.67	99.57	120.24	−1.077	2.000
Average	1.064	.220	1.060	1.280	.....	.....	.....	− .216	.400
Entire preservative period:									
Total food sulphur, I	22.118	3.523	21.131	24.654	15.93	95.54	111.47	−2.536	6.856
Average	1.106	.176	1.057	1.233	.....	.....	.....	− .127	.343
Sulphur as sulphurous acid:									
Total	3.431	.....	.....	.....	.....	.....	.....	.....	.....
Average	.172	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2, II	25.549	.....	.....	.....	13.79	82.71	96.50	+ .895	.....
Average	1.278	.....	.....	.....	.....	.....	.....	+ .045	.....
After period.									
First subperiod:									
Total	5.918	.830	4.851	5.681	14.03	81.97	96.00	+ .237	.0
Average	1.184	.167	.970	1.136	.....	.....	.....	+ .048	.0
Second subperiod:									
Total	5.656	.792	5.070	5.862	14.00	89.64	103.64	− .206	.0
Average	1.131	.158	1.014	1.172	.....	.....	.....	− .041	.0
Entire after period:									
Total	11.574	1.622	9.921	11.543	14.01	85.72	99.73	+ .031	.0
Average	1.157	.162	.992	1.154	.....	.....	.....	+ .003	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 9.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.181	0.508	4.071	4.579	8.22	65.86	74.08	+1.602	0.0
Average	1.236	.102	.814	.916	.....	.....	.....	+ .320	.0
Second period:									
Total	5.917	.588	4.542	5.130	9.94	76.76	86.70	+ .787	.0
Average	1.183	.118	.908	1.026	.....	.....	.....	+ .157	.0
Entire fore period:									
Total	12.098	1.096	8.613	9.709	9.06	71.19	80.25	+2.389	.0
Average	1.210	.110	.861	.971	.....	.....	.....	+ .239	.0
Preservative period.									
First subperiod:									
Total	5.753	.668	5.437	6.105	11.61	94.51	106.12	— .352	.856
Average	1.151	.134	1.087	1.221	.....	.....	.....	— .070	.171
Second subperiod:									
Total	5.844	.586	6.085	6.671	10.03	104.12	114.15	— .827	2.000
Average	1.169	.117	1.217	1.334	.....	.....	.....	— .165	.400
Third subperiod:									
Total	5.836	.550	5.523	6.073	9.42	94.64	104.06	— .237	2.000
Average	1.167	.110	1.105	1.215	.....	.....	.....	— .048	.400
Fourth subperiod:									
Total	5.784	.405	6.496	6.901	7.00	112.31	119.31	—1.117	2.000
Average	1.157	.081	1.299	1.380	.....	.....	.....	— .223	.400
Entire preservative period:									
Total food sulphur, I	23.217	2.209	23.541	25.750	9.51	101.40	110.91	—2.533	6.856
Average	1.161	.110	1.177	1.288	.....	.....	.....	— .127	.343
Sulphur as sulphurous acid:									
Total	3.431	.....	.....	.....	.....	.....	.....	.....	.....
Average	.172	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2, II	26.648	.....	.....	.....	8.29	88.34	96.63	+ .898	.....
Average	1.332	.....	.....	.....	.....	.....	.....	+ .045	.....
After period.									
First subperiod:									
Total	6.130	.858	5.034	5.892	14.00	82.12	96.12	+ .238	.0
Average	1.226	.172	1.007	1.178	.....	.....	.....	+ .048	.0
Second subperiod:									
Total	5.946	.698	5.265	5.963	11.74	88.55	100.29	— .017	.0
Average	1.189	.140	1.053	1.193	.....	.....	.....	— .004	.0
Entire after period:									
Total	12.076	1.556	10.299	11.855	12.89	85.28	98.17	+ .221	.0
Average	1.208	.156	1.030	1.186	.....	.....	.....	+ .022	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 10.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.512	0.601	4.545	5.146	9.23	69.79	79.02	+1.366	0.0
Average	1.302	.120	.909	1.029	.....	.....	.....	+ .273	.0
Second subperiod:									
Total	6.197	.480	4.962	5.442	7.75	80.07	87.82	+ .755	.0
Average	1.239	.096	.992	1.088	.....	.....	.....	+ .151	.0
Entire fore period:									
Total	12.709	1.081	9.507	10.588	8.51	74.81	83.31	+2.121	.0
Average	1.271	.108	.951	1.059	.....	.....	.....	+ .212	.0
Preservative period.									
First subperiod:									
Total	6.063	.772	5.076	5.848	12.73	83.72	96.45	+ .215	.856
Average	1.213	.154	1.015	1.170	.....	.....	.....	+ .043	.171
Second subperiod:									
Total	6.246	.689	4.342	5.031	11.03	69.52	80.55	+1.215	2.000
Average	1.249	.138	.868	1.006	.....	.....	.....	+ .243	.400
Third subperiod:									
Total	6.228	.392	5.364	5.756	6.29	86.13	92.42	+ .472	2.000
Average	1.246	.078	1.073	1.151	.....	.....	.....	+ .094	.400
Fourth subperiod:									
Total	6.038	.706	5.528	6.234	11.69	91.55	103.25	— .196	2.000
Average	1.208	.141	1.106	1.247	.....	.....	.....	— .039	.400
Entire preservative period:									
Total, I	24.575	2.559	20.310	22.869	10.41	82.64	93.06	+1.706	6.856
Average	1.229	.128	1.016	1.143	.....	.....	.....	+ .086	.343
Sulphur as sulphurous acid:									
Total	3.431	.....	.....	.....	.....	.....	.....	.....	.....
Average	.172	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2, II	28.006	.....	.....	.....	9.14	72.52	81.66	+5.137	.....
Average	1.400	.....	.....	.....	.....	.....	.....	+ .257	.....
After period.									
First subperiod:									
Total	6.571	.751	5.167	5.918	11.43	78.63	90.06	+ .653	.0
Average	1.314	.150	1.033	1.184	.....	.....	.....	+ .130	.0
Second subperiod:									
Total	5.946	.632	4.621	5.253	10.63	77.72	88.35	+ .693	.0
Average	1.189	.126	.924	1.051	.....	.....	.....	+ .138	.0
Entire after period:									
Total	12.517	1.383	9.788	11.171	11.05	78.20	89.25	+1.346	.0
Average	1.252	.138	.979	1.117	.....	.....	.....	+ .135	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	7.548	0.874	5.618	6.492	11.58	74.43	86.01	+1.056	0.0
Average	1.510	.175	1.124	1.298	.....	.....	.....	+ .212	.0
Second subperiod:									
Total	7.464	.887	5.436	6.323	11.88	72.83	84.71	+1.141	.0
Average	1.493	.177	1.087	1.265	.....	.....	.....	+ .228	.0
Entire fore period:									
Total	15.012	1.761	11.054	12.815	11.73	73.63	85.37	+2.197	.0
Average	1.501	.176	1.105	1.282	.....	.....	.....	+ .219	.0
Preservative period.									
First subperiod:									
Total	7.304	.969	6.067	7.036	13.27	83.06	96.33	+ .268	.856
Average	1.461	.194	1.213	1.407	.....	.....	.....	+ .054	.171
Second subperiod:									
Total	7.580	.732	5.525	6.257	9.66	72.89	82.55	+1.323	2.000
Average	1.516	.146	1.105	1.251	.....	.....	.....	+ .265	.400
Third subperiod:									
Total	7.463	.888	5.998	6.886	11.90	80.37	92.27	+ .577	2.000
Average	1.493	.178	1.200	1.377	.....	.....	.....	+ .116	.400
Fourth subperiod:									
Total	7.215	.911	6.316	7.227	12.63	87.54	100.17	− .012	2.000
Average	1.443	.182	1.263	1.445	.....	.....	.....	− .002	.400
Entire preservative period:									
Total food sulphur, I	29.562	3.500	23.906	27.406	11.84	80.87	92.71	+2.156	6.856
Average	1.478	.175	1.195	1.370	.....	.....	.....	+ .108	.343
Sulphur as sulphurous acid:									
Total	3.431	.....	.....	.....	.....	.....	.....	.....	.....
Average	.172	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2, II	32.993	.....	.....	.....	10.61	72.46	83.07	+5.587	.....
Average	1.650	.....	.....	.....	.....	.....	.....	+ .279	.....
After period.									
First subperiod:									
Total	7.647	.771	5.468	6.239	10.08	71.51	81.59	+1.408	.0
Average	1.529	.154	1.094	1.248	.....	.....	.....	+ .281	.0
Second subperiod:									
Total	7.388	.674	5.644	6.318	9.12	76.39	85.52	+1.070	.0
Average	1.478	.135	1.129	1.264	.....	.....	.....	+ .214	.0
Entire after period:									
Total	15.035	1.445	11.112	12.557	9.61	73.91	83.52	+2.478	.0
Average	1.504	.144	1.111	1.256	.....	.....	.....	+ .248	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per day.]

No. 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6.545	0.759	5.194	5.953	11.60	79.36	90.95	+0.592	0.0
Average	1.309	.152	1.039	1.191	.....	.....	.....	+ .118	.0
Second subperiod:									
Total	6.432	.602	5.211	5.813	9.36	81.02	90.38	+ .619	.0
Average	1.286	.120	1.042	1.163	.....	.....	.....	+ .123	.0
Entire fore period:									
Total	12.977	1.361	10.405	11.766	10.49	80.18	90.67	+1.211	.0
Average	1.298	.136	1.041	1.177	.....	.....	.....	+ .121	.0
Preservative period.									
First subperiod:									
Total	6.449	.740	5.781	6.521	11.47	89.64	101.12	— .072	.856
Average	1.290	.148	1.156	1.304	.....	.....	.....	— .014	.171
Second subperiod:									
Total	6.599	.552	6.644	7.196	8.36	100.68	109.05	— .597	2.000
Average	1.320	.110	1.329	1.439	.....	.....	.....	— .119	.400
Third subperiod:									
Total	6.529	.701	6.450	7.151	10.74	98.79	109.53	— .622	1.600
Average	1.306	.140	1.290	1.430	.....	.....	.....	— .124	.320
Fourth subperiod:									
Total	6.445	.525	5.423	5.948	8.15	84.14	92.29	+ .497	.0
Average	1.289	.105	1.085	1.190	.....	.....	.....	+ .099	.0
Entire preservative period:									
Total food sulphur, I	26.022	2.518	24.298	26.816	9.68	93.37	103.05	— .794	4.456
Average	1.301	.121	1.215	1.341	.....	.....	.....	— .040	.223
Sulphur as sulphurous acid:									
Total	2.230	.....	.....	.....	.....	.....	.....	.....	.....
Average	.112	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2, II	28.252	.....	.....	.....	8.91	86.00	94.92	+1.436	.....
Average	1.413	.....	.....	.....	.....	.....	.....	+ .072	.....
After period.									
First subperiod:									
Total	6.444	.361	5.205	5.566	5.60	80.77	86.37	+ .878	.0
Average	1.289	.072	1.041	1.113	.....	.....	.....	+ .176	.0
Second subperiod:									
Total	5.644	.493	5.202	5.695	8.73	92.17	100.90	— .051	.0
Average	1.129	.099	1.040	1.139	.....	.....	.....	— .010	.0
Entire after period:									
Total	12.088	.854	10.407	11.261	7.06	86.09	93.16	+ .827	.0
Average	1.209	.085	1.047	1.126	.....	.....	.....	+ .083	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Nos. 1 to 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	[a]32.478	3.214	26.551	29.765	9.90	81.75	91.65	+ 2.713	0.0
Average	1.299	.129	1.062	1.191	.....	.....	.....	+ .108	.0
Second subperiod:									
Total	38.000	4.683	31.632	36.315	12.32	83.24	95.57	+ 1.685	.0
Average	1.267	.156	1.054	1.210	.....	.....	.....	+ .057	.0
Entire fore period:									
Total	70.478	7.897	58.183	66.080	11.20	82.55	93.76	+ 4.398	.0
Average	1.281	.144	1.058	1.201	.....	.....	.....	+ .080	.0
Preservative period.									
First subperiod:									
Total	37.490	4.480	34.859	39.339	11.95	92.98	104.93	− 1.849	6.690
Average	1.250	.149	1.162	1.311	.....	.....	.....	− .061	.223
Second subperiod:									
Total	37.971	5.133	39.707	44.840	13.52	104.57	118.09	− 6.869	15.240
Average	1.266	.171	1.324	1.495	.....	.....	.....	− .229	.508
Third subperiod:									
Total	36.585	3.982	44.944	48.926	10.88	122.85	133.73	−12.341	21.590
Average	1.220	.133	1.498	1.631	.....	.....	.....	− .411	.720
First, second, and third subperiods:									
Total food sulphur, I	112.046	13.595	119.510	133.105	12.13	106.66	118.79	−21.059	43.520
Average	1.245	.151	1.328	1.479	.....	.....	.....	− .234	.484
Sulphur as sodium sulphite:									
Total	21.782	.....	.....	.....	.....	.....	.....	.....	.....
Average	.242	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3, II	133.826	.....	.....	.....	10.16	89.30	99.46	+ .721	.....
Average	1.487	.....	.....	.....	.....	.....	.....	+ .008	.....
After period.									
First subperiod:									
Total	37.530	3.747	32.269	36.016	9.98	85.98	95.97	+ 1.514	.0
Average	1.251	.125	1.076	1.201	.....	.....	.....	+ .050	.0
Second subperiod:									
Total	36.570	3.701	30.955	34.656	10.12	84.65	94.77	+ 1.914	.0
Average	1.219	.123	1.032	1.155	.....	.....	.....	+ .064	.0
Entire after period:									
Total	74.100	7.448	63.224	70.672	10.05	85.32	95.37	+ 3.428	.0
Average	1.235	.124	1.054	1.178	.....	.....	.....	+ .057	.0

[a] No. 5 absent.

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 8 to 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	26.019	2.745	18.442	21.187	10.55	70.88	81.43	+ 4.832	0.0
Average	1.301	.137	.922	1.059	.....	.....	.....	+ .242	.0
Second subperiod:									
Total	25.087	2.900	19.423	22.323	11.56	77.42	88.98	+ 2.764	.0
Average	1.254	.145	.971	1.116	.....	.....	.....	+ .138	.0
Entire fore period:									
Total	51.106	5.645	37.865	43.510	11.05	74.09	85.14	+ 7.596	.0
Average	1.278	.141	.947	1.088	.....	.....	.....	+ .190	.0
Preservative period.									
First subperiod:									
Total	24.755	3.056	21.586	24.642	12.34	87.20	99.54	+ .113	3.424
Average	1.238	.153	1.079	1.232	.....	.....	.....	+ .006	.171
Second subperiod:									
Total	25.293	2.650	21.465	24.115	10.48	84.87	95.34	+ 1.178	8.000
Average	1.265	.132	1.073	1.206	.....	.....	.....	+ .059	.400
Third subperiod:									
Total	25.066	2.963	22.199	25.162	11.82	88.56	100.38	− .096	8.000
Average	1.254	.148	1.110	1.258	.....	.....	.....	− .004	.400
Fourth subperiod:									
Total	24.358	3.122	23.638	26.760	12.82	97.04	109.86	− 2.402	8.000
Average	1.218	.156	1.182	1.338	.....	.....	.....	− .120	.400
Entire preservative period:									
Total food sulphur, I	99.472	11.791	88.888	100.679	11.85	89.36	101.21	− 1.207	27.424
Average	1.243	.147	1.111	1.258	.....	.....	.....	− .015	.343
Sulphur as sulphurous acid:									
Total	13.726	.....	.....	.....	.....	.....	.....	.....	.....
Average	.172	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2 II	113.198	.....	.....	.....	10.42	78.52	88.94	+12.519	.....
Average	1.415	.....	.....	.....	.....	.....	.....	+ .157	.....
After period.									
First subperiod:									
Total	26.266	3.210	20.520	23.730	12.22	78.12	90.34	+ 2.536	.0
Average	1.313	.160	1.026	1.186	.....	.....	.....	+ .127	.0
Second subperiod:									
Total	24.936	2.796	20.600	23.396	11.21	82.61	93.82	+ 1.540	.0
Average	1.247	.140	1.030	1.170	.....	.....	.....	+ .077	.0
Entire after period:									
Total	51.202	6.006	41.120	47.126	11.73	80.31	92.04	+ 4.076	.0
Average	1.280	.150	1.028	1.178	.....	.....	.....	+ .102	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 1 and 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	12.864	1.445	11.264	12.709	11.23	87.56	98.79	+ 0.155	0.0
Average	1.286	.145	1.126	1.271	.....	.....	.....	+ .015	.0
Second subperiod:									
Total	12.305	1.492	11.409	12.901	12.12	92.72	104.84	− .596	.0
Average	1.230	.149	1.141	1.290	.....	.....	.....	− .060	.0
Entire fore period:									
Total	25.169	2.937	22.673	25.610	11.67	90.08	101.75	− .441	.0
Average	1.258	.147	1.134	1.280	.....	.....	.....	− .022	.0
Preservative period.									
First subperiod:									
Total	12.154	1.438	12.107	13.545	11.83	99.61	111.44	− 1.391	2.230
Average	1.215	.144	1.211	1.354	.....	.....	.....	− .139	.223
Second subperiod:									
Total	12.372	1.725	13.171	14.896	13.94	106.46	120.40	− 2.524	5.080
Average	1.237	.173	1.317	1.489	.....	.....	.....	− .252	.508
Third subperiod:									
Total	12.291	1.051	15.618	16.669	8.55	127.07	135.62	− 4.378	7.620
Average	1.229	.105	1.562	1.667	.....	.....	.....	− .438	.762
Fourth subperiod:									
Total	11.760	1.267	16.291	17.558	10.77	138.53	149.30	− 5.798	8.910
Average	1.176	.127	1.629	1.756	.....	.....	.....	− .580	.891
Entire preservative period:									
Total food sulphur, I	48.577	5.481	57.187	62.668	11.28	117.72	129.00	−14.091	23.840
Average	1.214	.137	1.430	1.567	.....	.....	.....	− .353	.596
Sulphur as sodium sulphite:									
Total	11.932	.....	.....	.....	.....	.....	.....	.....	.....
Average	.298	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3, II	60.509	.....	.....	.....	9.06	94.51	103.57	− 2.159	.....
Average	1.513	.....	.....	.....	.....	.....	.....	− .054	.....
After period.									
First subperiod:									
Total	13.051	1.087	12.082	13.169	8.33	92.58	100.90	− .118	.0
Average	1.305	109	1.208	1.317	.....	.....	.....	− .012	.0
Second subperiod:									
Total	12.586	1.206	11.263	12.469	9.58	89.49	99.07	− .117	.0
Average	1.259	.121	1.126	1.247	.....	.....	.....	− .012	.0
Entire after period:									
Total	25.637	2.293	23.345	25.638	8.94	91.06	100.00	− .001	.0
Average	1.282	.115	1.167	1.282	.....	.....	.....	− .000	.0

TABLE XVII—*Sulphur balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 5 and 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	12.161	1.439	8.657	10.096	11.83	71.19	83.02	+2.065	0.0
Average	1.216	.144	.866	1.010	.....	.....	.....	+ .206	.0
Preservative period.									
First period:									
Total	11.775	1.411	10.730	12.141	11.98	91.13	103.11	− .366	2.230
Average	1.178	.141	1.073	1.214	.....	.....	.....	− .036	.223
Second subperiod:									
Total	11.930	1.748	12.447	14.195	14.65	104.33	118.99	−2.265	5.080
Average	1.193	.175	1.245	1.420	.....	.....	.....	− .227	.508
Third subperiod:									
Total	10.732	1.073	12.848	14.121	11.86	119.72	131.58	−3.389	6.350
Average	1.073	.127	1.285	1.412	.....	.....	.....	− .339	.635
Fourth subperiod:									
Total	8.432	1.346	8.331	9.677	15.96	98.80	114.77	−1.245	.0
Average	.843	.135	.833	.968	.....	.....	.....	− .125	.0
Entire preservative period:									
Total food sulphur, I	42.869	5.778	44.356	50.134	13.48	103.47	116.95	−7.265	13.660
Average	1.072	.144	1.109	1.253	.....	.....	.....	− .181	.342
Sulphur as sodium sulphite:									
Total	6.837	.....	.....	.....	.....	.....	.....	.....	.....
Average	.171	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as Na_2SO_3, II	49.706	.....	.....	.....	11.62	89.24	100.86	− .428	.....
Average	1.243	.....	.....	.....	.....	.....	.....	− .010	.....
After period.									
First subperiod:									
Total	10.250	1.335	8.415	9.750	13.02	82.10	95.12	+ .500	.0
Average	1.025	.134	.842	.975	.....	.....	.....	+ .050	.0
Second subperiod:									
Total	10.089	1.255	8.455	9.710	12.44	83.80	96.24	+ .379	.0
Average	1.009	.126	.846	.971	.....	.....	.....	+ .038	.0
Entire after period:									
Total	20.339	2.590	16.870	19.460	12.73	82.94	95.68	+ .879	.0
Average	1.017	.130	.844	.973	.....	.....	.....	+ .044	.0

TABLE XVII.—*Sulphur balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 7 and 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	12.559	1.272	8.857	10.129	10.13	70.52	80.65	+2.430	0.0
Average	1.256	.127	.886	1.013	.....	.....	.....	+ .243	.0
Second subperiod:									
Total	11.674	1.286	9.095	10.381	11.02	77.91	88.92	+1.293	.0
Average	1.167	.129	.910	1.038	.....	.....	.....	+ .129	.0
Entire fore period:									
Total	24.233	2.558	17.952	20.510	10.56	74.08	84.64	+3.723	.0
Average	1.212	.128	.898	1.026	.....	.....	.....	+ .186	.0
Preservative period.									
First subperiod:									
Total	11.672	1.576	10.235	11.811	13.50	87.69	101.19	− .139	1.712
Average	1.167	.158	1.024	1.181	.....	.....	.....	− .014	.171
Second subperiod:									
Total	11.479	1.031	10.628	11.659	8.98	92.59	101.57	− .180	3.600
Average	1.148	.103	1.063	1.166	.....	.....	.....	− .018	.360
Third subperiod:									
Total	11.141	1.005	11.319	12.324	9.02	101.60	110.62	−1.183	3.400
Average	1.114	.100	1.132	1.232	.....	.....	.....	− .118	.340
First, second, and third subperiods:									
Total food sulphur, I	34.292	3.612	32.182	35.794	10.53	93.85	104.38	−1.502	8.712
Average	1.143	.120	1.073	1.193	.....	.....	.....	− .050	.290
Sulphur as sulphurous acid:									
Total	4.360	.....	.....	.....	.....	.....	.....	.....	.....
Average	.145	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2, II	38.652	.....	.....	.....	9.34	83.26	92.61	+2.858	.....
Average	1.288	.....	.....	.....	.....	.....	.....	+ .095	.....

Nos. 7 to 12.

Fore period.									
First subperiod:									
Total	38.578	4.017	27.299	31.316	10.41	70.76	81.18	+ 7.262	0.0
Average	1.286	.134	.910	1.044	.....	.....	.....	+ .242	.0
Second subperiod:									
Total	36.671	4.186	28.518	32.704	11.39	77.58	88.96	+ 4.057	.0
Average	1.225	.140	.951	1.090	.....	.....	.....	+ .135	.0
Entire fore period:									
Total	75.339	8.203	55.817	64.020	10.89	74.09	84.98	+11.319	.0
Average	1.256	.137	.930	1.067	.....	.....	.....	+ .189	.0
Preservative period.									
First subperiod:									
Total	36.427	4.632	31.821	36.453	12.72	87.36	100.07	− .026	5.136
Average	1.214	.154	1.061	1.215	.....	.....	.....	− .001	.171
Second subperiod:									
Total	36.772	3.681	32.093	35.774	10.01	87.28	97.29	+ .998	11.600
Average	1.226	.123	1.070	1.192	.....	.....	.....	+ .034	.387
Third subperiod:									
Total	36.207	3.968	33.518	37.486	10.96	92.57	103.53	− 1.279	11.400
Average	1.207	.132	1.117	1.250	.....	.....	.....	− .043	.380
First, second, and third subperiods:									
Total food sulphur, I	109.406	12.281	97.432	109.713	11.22	89.05	100.28	− .307	28.136
Average	1.216	.136	1.083	1.219	.....	.....	.....	− .003	.313
Sulphur as sulphurous acid:									
Total	13.654	.....	.....	.....	.....	.....	.....	.....	.....
Average	.152	.....	.....	.....	.....	.....	.....	.....	.....
Total, including S as SO_2, II	123.060	.....	.....	.....	9.98	79.17	89.15	+13.347	.....
Average	1.367	.....	.....	.....	.....	.....	.....	+ .148	.....

FAT BALANCE.

INDIVIDUAL DATA.

The quantity of the fat ingested in the food which is converted into heat and energy is determined by ascertaining the fat balances. The amount of fat in the food of No. 1 varies but little in the three periods, but is slightly less in both the preservative and after periods than in the fore period. This accounts in part for the diminution of the fat in the feces, which is seen to fall almost in the same quantity as the loss of fat in the food. It appears, however, that a larger percentage of the fat in the food appears in the feces in the fore period than in either the preservative or the after period, and therefore the data indicate a slightly increased absorption of fat. The balance is almost the same in the fore period and preservative period, but is slightly less in the after period.

The data for No. 2 show a slightly larger amount of fat in the food in the preservative period than in either the fore or after periods. There is an increase in the amount of fat in the feces in the preservative period, but as shown by the increased balance this is not as great as the increase in the amount in the food. There is a considerable increase in the amount of fat in the feces in the after period.

The data for No. 3 show a slightly decreased digestion of the fat, as judged by the larger amount occurring in the feces. The balance in the preservative period, however, is largely increased, owing to the unusual increase in the amount ingested.

In the case of No. 4 the fat appears to be more thoroughly utilized in the preservative period and the after period than in the fore period, showing an increased consumption for heat and energy in those two periods.

The data for No. 5 are not complete and by reason of the large variation in the quantity of fat consumed in the food in the three periods are not comparable.

The data for No. 6 are complete and show almost no variation in the quantity of fat consumed in the food in the three periods. There appears to be a slight retardation of the digestive process indicated by the very slightly increased quantity of fat in the feces during the preservative and after periods. The balances remain almost constant, showing only the variations in harmony with the preceding statement.

On account of the incompleteness of the data for No. 7 the same are of limited value. There appears to be very little change in respect of the digestion of the fat in the fore and preservative periods. There is a slightly larger amount of fat in the food of the fore period and a corresponding increase in the quantity of fat in the feces as compared with the same data in the preservative period.

In the case of No. 8 no tendency in the preservative period to modify the metabolism of the fat is shown, the variation in the amount ingested and the variation in the balance being practically compensatory. The amount in the feces is only very slightly greater in the fore period than in the preservative period, but in the after period there is a notable increase in the quantity of the fat in the feces, while the quantity of fat ingested has decreased. The tendency in this case seems to be to produce practically no effect during the administration of the preservative, but to inhibit the absorption of the fat during the after period.

No. 9 is notable by reason of the large quantity of fat consumed. In this case there is an increase in the quantity of fat in the feces during the preservative period, and this increase is continued and augmented in the after period. It is evident that there is a tendency on the part of the preservative to inhibit the absorption and combustion of the fat. This is shown also by the percentage data.

The same conditions which have just been described in the case of No. 9 occur again in No. 10. In the after period the amount of fat in the feces increases. These data, taken in conjunction with those of the percentage elimination, show a slight tendency on the part of the preservative to inhibit the combustion of fat and also show that this tendency is continued in a very marked degree in the after period.

The data in the case of No. 11 also show a slight increase in the percentage of fat in the feces during the preservative period, with a recovery in the after period. These data, taken in connection with the considerable increase in the amount of fat in the food and the slight increase in the balance, show a tendency to inhibit the absorption of fat.

Very little change is noticed in the metabolism of the fat in the case of No. 12. There is a slight increase in the amount of fat in the feces in the after period, and this is shown also in the magnitude of the percentage eliminated and by the balances.

SUMMARIES.

A comparison of the summaries of Nos. 1 to 6 and Nos. 8 to 11, inclusive, shows the general effect upon the fat metabolism of the administration of sulphur. The total amount of fat in the food of Nos. 1 to 6 daily is 102.27 grams in the fore period, 103.67 grams in the preservative period, and 97.09 grams in the after period. There remain in the feces in the fore period 3.83 grams, in the preservative period 3.92 grams, and in the after period 3.52 grams. Apparently there is a slight tendency on the part of the preservative to inhibit the absorption of the fat from the alimentary canal, but this is too slight to warrant any conclusion. There does not seem, therefore, to be any notable effect produced upon the metabolism of the fat by the administration of sulphites.

In the case of Nos. 8 to 11, inclusive, there is an increase in the amount of fat ingested during the preservative period and also an increase in the amount in the feces. When the quantity of fat falls, as it does in the after period, to the same magnitude as that in the fore period, we find there is still an increase of fat in the feces, indicating an inhibitory effect. This is an indication, though not of a very marked character, that free sulphurous acid, even though administered in smaller doses, tends more strongly than sulphurous acid in the form of sulphites to interfere with the digestion of fat. This interference, however, is too slight to warrant serious consideration, especially in connection with the variations in condition between the two groups which have already been noted.

TABLE XVIII.—*Fat balances for Series VII.*

[Averages are per day.]

No. 1.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	483.35	30.58	6.33	+ 452.77	0.0
Average	96.67	6.12	.....	+ 90.55	.0
Second subperiod:					
Total	435.38	11.89	2.73	+ 423.49	.0
Average	87.08	2.38	.....	+ 84.70	.0
Entire fore period:					
Total	918.73	42.47	4.62	+ 876.26	.0
Average	91.87	4.25	.....	+ 87.62	.0
Preservative period.					
First subperiod:					
Total	439.83	18.79	4.27	+ 421.04	1.115
Average	87.97	3.76	.....	+ 84.21	.223
Second subperiod:					
Total	463.94	18.02	3.88	+ 445.92	2.540
Average	92.79	3.60	.....	+ 89.19	.508
Third subperiod:					
Total	468.17	11.20	2.39	+ 456.97	3.810
Average	93.63	2.24	.....	+ 91.39	.762
Fourth subperiod:					
Total	438.38	13.62	3.11	+ 424.76	3.810
Average	87.68	2.72	.....	+ 84.96	.762
Entire preservative period:					
Total	1,810.32	61.63	3.40	+1,748.69	11.275
Average	90.52	3.08	.....	+ 87.44	.564
After period.					
First subperiod:					
Total	459.19	12.72	2.77	+ 446.47	.0
Average	91.84	2.54	.....	+ 89.30	.0
Second subperiod:					
Total	423.67	12.16	2.87	+ 411.51	.0
Average	84.73	2.43	.....	+ 82.30	.0
Entire after period:					
Total	882.86	24.88	2.82	+ 857.98	.0
Average	88.29	2.49	.....	+ 85.80	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 2.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	543.99	19.11	3.51	+ 524.88	0.0
Average	108.80	3.82	.....	+ 104.98	.0
Second subperiod:					
Total	555.96	26.28	4.73	+ 529.68	.0
Average	111.19	5.26	.....	+ 105.93	.0
Entire fore period:					
Total	1,099.95	45.39	4.13	+1,054.56	.0
Average	110.00	4.54	.....	+ 105.46	.0
Preservative period.					
First subperiod:					
Total	559.12	20.73	3.71	+ 538.39	1.115
Average	111.82	4.15	.....	+ 107.67	.223
Second subperiod:					
Total	584.18	33.81	5.79	+ 550.37	2.540
Average	116.84	6.76	.....	+ 110.08	.508
Third subperiod:					
Total	594.24	24.28	4.09	+ 569.96	3.810
Average	118.85	4.86	.....	+ 113.99	.762
Fourth subperiod:					
Total	.....	.....	.....	.....	(3.810)
Average	.....	.....	.....	.....	(.762)
First, second, and third subperiods:					
Total	1,737.54	78.82	4.54	+1,658.72	.....
Average	115.84	5.25	.....	+ 110.59	.....
Entire preservative period:					
Total	.....	.....	.....	.....	11.275
Average	.....	.....	.....	.....	.564
After period.					
First subperiod:					
Total	580.61	30.93	5.33	+ 549.68	.0
Average	116.12	6.19	.....	+ 109.93	.0
Second subperiod:					
Total	526.35	24.06	4.57	+ 502.29	.0
Average	105.27	4.81	.....	+ 100.46	.0
Entire after period:					
Total	1,106.96	54.99	4.97	+1,051.97	.0
Average	110.70	5.50	.....	+ 105.20	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 3.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	559.73	16.45	2.94	+ 543.28	0.0
Average	111.95	3.29	.....	+ 108.66	.0
Second subperiod:					
Total	603.32	19.45	3.22	+ 583.87	.0
Average	120.66	3.89	.....	+ 116.77	.0
Entire fore period:					
Total	1,163.05	35.90	3.09	+1,127.15	.0
Average	116.30	3.59	.....	+ 112.71	.0
Preservative period.					
First subperiod:					
Total	588.45	29.09	4.94	+ 559.36	1.115
Average	117.69	5.82	.....	+ 111.87	.223
Second subperiod:					
Total	624.39	19.91	3.19	+ 604.48	2.540
Average	124.88	3.98	.....	+ 120.90	.508
Third subperiod:					
Total	623.92	21 80	3.44	+ 602.12	3.810
Average	124.78	4.36	.....	+ 120.42	.762
Fourth subperiod:					
Total	.....	.....	.....	.....	(.381)
Average	.....	.....	.....	.....	(.076)
First, second, and third subperiods:					
Total	1,836 76	70.80	3.85	+1,765.96	.....
Average	122 45	4.72	.....	+ 117.73	.....
Entire preservative period:					
Total	.....	.....	.....	.....	7.846
Average	.....	.....	.....	.....	[a] .392
After period.					
First subperiod:					
Total	620.50	16.40	2.64	+ 604.10	.0
Average	124 10	3.28	.....	+ 120.82	.0
Second subperiod:					
Total	585.37	21.33	3.64	+ 564.04	.0
Average	117.07	4.27	.....	+ 112.80	.0
Entire after period:					
Total	1,205.87	37.73	3.13	+1,168.14	.0
Average	120.59	3.77	.....	+ 116.82	.0

[a] Average for 1 day in a period of 20 days.

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 4.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	513.63	18.62	3.63	+ 495.01	0.0
Average	102.73	3.72	.....	+ 99.01	.0
Second subperiod:					
Total	504.44	24.53	4.86	+ 479.91	.0
Average	100.89	4.91	.....	+ 95.98	.0
Entire fore period:					
Total	1,018.07	43.15	4.24	+ 974.92	.0
Average	101.81	4.32	.....	+ 97.49	.0
Preservative period.					
First subperiod:					
Total	507.61	14.70	2.90	+ 492.91	1.115
Average	101.52	2.94	.....	+ 98.58	.223
Second subperiod:					
Total	535.10	25.75	4.81	+ 509.35	2.540
Average	107.02	5.15	.....	+ 101.87	.508
Third subperiod:					
Total	545.73	15.15	2.78	+ 530.58	3.810
Average	109.15	3.03	.....	+ 106.12	.762
Fourth subperiod:					
Total	499.89	19.69	3.94	+ 480.20	5.100
Average	99.98	3.94	.....	+ 96.04	1.020
Entire preservative period:					
Total	2,088.33	75.29	3.61	+2,013.04	12.565
Average	104.42	3.76	.....	+ 100.66	.628
After period.					
First subperiod:					
Total	541.35	16.75	3.09	+ 524.60	.0
Average	108.27	3.35	.....	+ 104.92	.0
Second subperiod:					
Total	489.14	18.96	3.88	+ 470.18	.0
Average	97.83	3.79	.....	+ 94.04	.0
Entire after period:					
Total	1,030.49	35.71	3.47	+ 994.78	.0
Average	103.05	3.57	.....	+ 99.48	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 5.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
Second subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	442.76	12.73	2.88	+ 430.03	0.0
Average	88.55	2.55	.....	+ 86.00	.0
Preservative period.					
First subperiod:					
Total	443.56	11.72	2.64	+ 431.84	1.115
Average	88.71	2.34	.....	+ 86.37	.223
Second subperiod:					
Total	468.14	16.82	3.59	+ 451.32	2.540
Average	93.63	3.36	.....	+ 90.27	.508
Third subperiod:					
Total	395.96	13.93	3.52	+ 382.03	2.540
Average	79.19	2.79	.....	+ 76.40	.508
Fourth subperiod:					
Total	248.68	12.11	4.87	+ 236.57	.0
Average	49.74	2.42	.....	+ 47.32	.0
Entire preservative period:					
Total	1,556.34	54.58	3.51	+1,501.76	6.195
Average	77.82	2.73	.....	+ 75.09	.310
After period.					
First subperiod:					
Total	341.25	12.98	3.80	+ 128.27	.0
Average	68.25	2.60	.....	+ 65.65	.0
Second subperiod:					
Total	285.92	10.65	3.72	+ 275.27	.0
Average	57.18	2.13	.....	+ 55.05	.0
Entire after period:					
Total	627.17	23.63	3.77	+ 603.54	.0
Average	62.72	2.36	.....	+ 60.36	.0

TABLE XVIII—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 6.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	493.06	14.11	2.86	+ 478.95	0.0
Average	98.61	2.82	.....	+ 95.79	.0
Second subperiod:					
Total	489.29	16.81	3.44	+ 472.48	.0
Average	97.86	3.36	.....	+ 94.50	.0
Entire fore period:					
Total	982.35	30.92	3.15	+ 951.43	.0
Average	98.24	3.09	.....	+ 95.15	.0
Preservative period.					
First subperiod:					
Total	473.86	13.96	2.95	+ 459.90	1.115
Average	94.77	2.79	.....	+ 91.98	.223
Second subperiod:					
Total	507.47	23.08	4.55	+ 484.39	2.540
Average	101.49	4.62	.....	+ 96.87	.508
Third subperiod:					
Total	506.62	19.94	3.94	+ 486.68	3.810
Average	101.32	3.99	.....	+ 97.33	.762
Fourth subperiod:					
Total	488.70	22.78	4.66	+ 465.92	.0
Average	97.74	4.56	.....	+ 93.18	.0
Entire preservative period:					
Total	1,976.65	79.76	4.04	+1,896.89	7.465
Average	98.83	3.99	.....	+ 94.84	.373
After period.					
First subperiod:					
Total	509.27	16.25	3.19	+ 493.02	.0
Average	101.85	3.25	.....	+ 98.60	.0
Second subperiod:					
Total	463.05	17.94	3.87	+ 445.11	.0
Average	92.61	3.59	.....	+ 89.02	.0
Entire after period:					
Total	972.32	34.19	3.52	+ 938.13	.0
Average	97.23	3.42	.....	+ 93.81	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 7.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sulphurous acid administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	515.14	17.54	3.40	+ 497.60	0.0
Average	103.03	3.51	.....	+ 99.52	.0
Second subperiod:					
Total	502.94	15.40	3.06	+ 487.54	.0
Average	100.59	3.08	.....	+ 97.51	.0
Entire fore period:					
Total	1,018.08	32.94	3.24	+ 985.14	.0
Average	101.81	3.29	.....	+ 98.52	.0
Preservative period.					
First subperiod:					
Total	512.41	18.08	3.53	+ 499.33	.856
Average	102.48	3.62	.....	+ 98.87	.171
Second subperiod:					
Total	488.25	13.63	2.79	+ 474.62	1.600
Average	97.65	2.73	.....	+ 94.92	.320
Third subperiod:					
Total	464.90	9.81	2.11	+ 455.09	1.800
Average	92.98	1.96	.....	+ 91.02	.360
First, second, and third subperiods:					
Total	1,465.56	41.52	2.83	+1,424.04	.....
Average	97.70	2.77	.....	+ 94.93	.....
Entire preservative period:					
Total	.....	.....	.....	.....	4.256
Average	.....	.....	.....	.....	.213

No. 8.

Fore period.					
First subperiod:					
Total	456.18	11.50	2.52	+ 444.68	0.0
Average	91.24	2.30	.....	+ 88.94	.0
Second subperiod:					
Total	412.12	14.56	3.53	+ 397.56	.0
Average	82.42	2.91	.....	+ 79.51	.0
Entire fore period:					
Total	868.30	26.06	3.00	+ 842.24	.0
Average	86.83	2.61	.....	+ 84.22	.0
Preservative period.					
First subperiod:					
Total	408.65	8.10	1.98	+ 400.55	.856
Average	81.73	1.62	.....	+ 80.16	.171
Second subperiod:					
Total	426.52	9.30	2.18	+ 417.22	2.000
Average	85.30	1.86	.....	+ 83.44	.400
Third subperiod:					
Total	437.41	15.88	3.63	+ 421.53	2.000
Average	87.48	3.18	.....	+ 84.30	.400
Fourth subperiod:					
Total	397.83	14.77	3.71	+ 383.06	2.000
Average	79.57	2.95	.....	+ 76.62	.400
Entire preservative period:					
Total	1,670.41	48.05	2.88	+1,622.36	6.856
Average	83.52	2.40	.....	+ 81.12	.343
After period.					
First subperiod:					
Total	428.71	16.29	3.80	+ 412.42	.0
Average	85.74	3.26	.....	+ 82.48	.0
Second subperiod:					
Total	386.80	17.66	4.57	+ 369.14	.0
Average	77.36	3.53	.....	+ 73.83	.0
Entire after period:					
Total	815.51	33.95	4.16	+ 781.56	.0
Average	81.55	3.40	.....	+ 78.15	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 9.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1—2).	5 Sulphurous acid administered (SO_2)
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	608.55	16.74	2.75	+ 591.81	0.0
Average	121.71	3.35	.....	+ 118.36	.0
Second subperiod:					
Total	633.17	14.33	2.26	+ 618.84	.0
Average	126.63	2.87	.....	+ 123.76	.0
Entire fore period:					
Total	1,241.72	31.07	2.50	+1,210.65	.0
Average	124.17	3.11	.....	+ 121.06	.0
Preservative period.					
First subperiod:					
Total	633.38	22.90	3.62	+ 610.48	.856
Average	126.68	4.58	.....	+ 122.10	.171
Second subperiod:					
Total	658.40	29.05	4.41	+ 629.35	2.000
Average	131.68	5.81	.....	+ 125.87	.400
Third subperiod:					
Total	660.05	21.35	3.21	+ 644.70	2.000
Average	133.21	4.27	.....	+ 128.94	.400
Fourth subperiod:					
Total	631.90	12.65	2.00	+ 619.25	2.000
Average	126.38	2.53	.....	+ 123.85	.400
Entire preservative period:					
Total	2,589.73	85.95	3.32	+2,503.78	6.856
Average	129.49	4.30	.....	+ 125.19	.343
After period.					
First subperiod:					
Total	661.36	43.07	6.51	+ 618.29	.0
Average	132.27	8.61	.....	+ 123.66	.0
Second subperiod:					
Total	601.23	24.44	4.07	+ 576.79	.0
Average	120.25	4.89	.....	+ 115.36	.0
Entire after period:					
Total	1,262.59	67.51	5.35	1,195.08	.0
Average	126.26	6 75	.....	119.51	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 10.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1—2).	5 Sulphurous acid administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	496.66	21.10	4.25	+ 475.56	0.0
Average	99.33	4.22	.....	+ 95.11	.0
Second subperiod:					
Total	503.09	14.99	2.98	+ 488.10	.0
Average	101.62	3.00	.....	+ 97.62	.0
Entire fore period:					
Total	999.75	36.09	3.61	+ 963.66	.0
Average	99.98	3.61	.....	+ 96.37	.0
Preservative period.					
First subperiod:					
Total	514.58	26.29	5.11	+ 488.29	.856
Average	102.92	5.20	.....	+ 97.66	.171
Second subperiod:					
Total	533.73	25.70	4.82	+ 508.03	2.000
Average	106.75	5.14	.....	+ 101.61	.400
Third subperiod:					
Total	540.51	13.96	2.58	+ 526.55	2.000
Average	108.10	2.79	.....	+ 105.31	.400
Fourth subperiod:					
Total	507.60	30.94	6.10	+ 476.66	2.000
Average	101.52	6.19	.....	+ 95.33	.400
Entire preservative period:					
Total	2,096.42	96.89	4.62	+1,999.53	6.856
Average	104.82	4.84	.....	+ 99.98	.343
After period.					
First subperiod:					
Total	535.18	28.41	5.31	+ 506.77	.0
Average	107.04	5.68	.....	+ 101.35	.0
Second subperiod:					
Total	482.50	28.27	5.86	+ 454.23	.0
Average	96.50	5.65	.....	+ 90.85	.0
Entire after period:					
Total	1,017.68	56.68	5.57	+ 961.00	.0
Average	101.77	5.67	.....	+ 96.10	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 11.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sulphurous acid administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	653.91	19.16	2.93	+ 634.75	0.0
Average	130.78	3.83	.....	+ 126.95	.0
Second subperiod:					
Total	653.05	15.39	2.36	+ 637.66	.0
Average	130.61	3.08	.....	+ 127.53	.0
Entire fore period:					
Total	1,306.96	34.55	2.64	+1,272.41	.0
Average	130.70	3.46	.....	+ 127.24	.0
Preservative period.					
First subperiod:					
Total	651.00	26.52	4.07	+ 624.48	.856
Average	130.20	5.30	.....	+ 124.90	.171
Second subperiod:					
Total	682.15	31.57	4.63	+ 650.58	2.000
Average	136.43	6.31	.....	+ 130.12	.400
Third subperiod:					
Total	691.66	22.95	3.32	+ 668.71	2.000
Average	138.33	4.59	.....	+ 133.74	.400
Fourth subperiod:					
Total	648.02	17.90	2.76	+ 630.12	2.000
Average	129.60	3.58	.....	+ 126.02	.400
Entire preservative period:					
Total	2,672.83	98.94	3.70	+2,573.89	6.856
Average	133.64	4.95	.....	+ 128.69	.343
After period.					
First subperiod:					
Total	686.52	17.56	2.56	+ 660.96	.0
Average	137.30	3.51	.....	+ 133.79	.0
Second subperiod:					
Total	632.06	13.32	2.11	+ 618.74	.0
Average	126.41	2.66	.....	+ 123.75	.0
Entire after period:					
Total	1,318.58	30.88	2.34	+1,287.70	.0
Average	131.86	3.09	.....	+ 128.77	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per day.]

No. 12.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1—2).	5 Sulphurous acid administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	570.09	17.45	3.06	+ 552.64	0.0
Average	111.02	3.49	.....	+ 107.53	.0
Second subperiod:					
Total	568.32	10.65	1.87	+ 557.67	.0
Average	113.66	2.13	.....	+ 111.53	.0
Entire foreperiod:					
Total	1,138.41	28.10	2.47	+1,110.31	.0
Average	113.84	2.81	.....	+ 111.03	.0
Preservative period.					
First subperiod:					
Total	580.25	14.42	2.49	+ 565.83	.856
Average	116.05	2.88	.....	+ 113.17	.171
Second subperiod:					
Total	612.88	15.17	2.48	+ 597.71	2.000
Average	122.58	3.03	.....	+ 119.55	.400
Third subperiod:					
Total	611.50	14.40	2.35	+ 597.10	1.600
Average	122.30	2.88	.....	+ 119.42	.320
Fourth subperiod:					
Total	592.25	11.55	1.95	+ 580.70	.0
Average	118.45	2.31	.....	+ 116.14	.0
Entire preservative period:					
Total	2,396.88	55.54	2.31	+2,341.34	4.456
Average	119.84	2.78	.....	+ 117.06	.223
After period.					
First subperiod:					
Total	578.36	14.02	2.42	+ 564.34	.0
Average	115.67	2.80	.....	+ 112.87	.0
Second subperiod:					
Total	521.98	22.40	4.29	+ 499.58	.0
Average	104.40	4.48	.....	+ 99.92	.0
Entire after period:					
Total	1,100.34	36.42	3.31	+1,063.92	.0
Average	110.03	3.64	.....	+ 106.39	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Nos. 1 to 6.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	[a] 2,593.76	98.87	3.81	+2,494.89	0.0
Average	103.75	3.95	.....	+ 99.80	.0
Second subperiod:					
Total	3,031.15	111.69	3.68	+2,919.46	.0
Average	101.03	3.72	.....	+ 97.31	.0
Entire fore period:					
Total	5,624.91	210.56	3.74	+5,414.35	.0
Average	102.27	3.83	.....	+ 98.44	.0
Preservative period.					
First subperiod:					
Total	3,012.43	108.99	3.62	+2,903.44	6.690
Average	100.41	3.63	.....	+ 96.78	.223
Second subperiod:					
Total	3,183.22	137.39	4.32	+3,045.83	15.240
Average	106.11	4.58	.....	+ 101.53	.508
Third subperiod:					
Total	3,134.64	106.30	3.39	+3,028.34	21.590
Average	104.49	3.54	.....	+ 100.95	.720
First, second, and third subperiods:					
Total	9,330.29	352.68	3.78	+8,977.61	43.520
Average	103.67	3.92	.....	+ 99.75	.484
After period.					
First subperiod:					
Total	3,052.17	106.03	3.47	+2,946.14	.0
Average	101.74	3.53	.....	+ 98.21	.0
Second subperiod:					
Total	2,773.50	105.10	3.79	+2,668.40	.0
Average	92.45	3.50	.....	+ 88.95	.0
Entire after period:					
Total	5,825.67	211.13	3.62	+5,614.54	.0
Average	97.09	3.52	.....	+ 93.57	.0

[a] No. 5 absent.

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 8, 9, 10, and 11.

Period.	1 In food.	2 In feces.	3 In feces. (2÷1).	4 Balance (1−2).	5 Sulphurous acid administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	2,215.30	68.50	3.09	+2,146.80	0.0
Average	110.76	3.42	.....	+ 107.34	.0
Second subperiod:					
Total	2,201.43	59.27	2.69	+2,142.16	.0
Average	110.07	2.96	.....	+ 107.11	.0
Entire fore period:					
Total	4,416.73	127.77	2.89	+4,288.96	.0
Average	110.42	3.19	.....	+ 107.23	.0
Preservative period.					
First subperiod:					
Total	2,207.61	83.81	3.80	+2,123.80	3.424
Average	110.38	4.19	.....	+ 106.19	.171
Second subperiod:					
Total	2,300.80	95.62	4.16	+2,205.18	8.000
Average	115.04	4.78	.....	+ 110.26	.400
Third subperiod:					
Total	2,335.63	74.14	3.18	+2,261.49	8.000
Average	116.78	3.71	.....	+ 113.07	.400
Fourth subperiod:					
Total	2,185.35	76.26	3.49	+2,109.09	8.000
Average	109.27	3.81	.....	+ 105.46	.400
Entire preservative period:					
Total	9,029.39	329.83	3.65	+8,699.56	27.424
Average	112.87	4.12	.....	+ 108.75	.343
After period.					
First subperiod:					
Total	2,311.77	105.33	4.56	+2,206.44	.0
Average	115.59	5.27	.....	+ 110.32	.0
Second subperiod:					
Total	2,102.59	83.69	3.98	+2,018.90	.0
Average	105.13	4.18	.....	+ 100.95	.0
Entire after period:					
Total	4,414.36	189.02	4.28	+4,225.34	.0
Average	110.36	4.72	.....	+ 105.64	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 1 and 4.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	996.98	49.20	4.93	+ 947.78	0.0
Average	99.70	4.92	.....	+ 94.78	.0
Second subperiod:					
Total	939.82	36.42	3.88	+ 903.40	.0
Average	93.98	3.64	.....	+ 90.34	.0
Entire fore period:					
Total	1,936.80	85.62	4.42	+1,851.18	.0
Average	96.84	4.28	.....	+ 92.56	.0
Preservative period.					
First subperiod:					
Total	947.44	33.49	3.53	+ 913.95	2.230
Average	94.74	3.35	.....	+ 91.39	.223
Second subperiod:					
Total	999.04	43.77	4.38	+ 955.27	5.080
Average	99.90	4.38	.....	+ 95.52	.508
Third subperiod:					
Total	1,013.90	26.35	2.60	+ 987.55	7.620
Average	101.39	2.64	.....	+ 98.75	.762
Fourth subperiod:					
Total	938.27	33.31	3.55	+ 904.96	8.910
Average	93.83	3.33	.....	+ 90.50	.891
Entire preservative period:					
Total	3,898.65	136.92	3.51	+3,761.73	23.840
Average	97.47	3.43	.....	+ 94.04	.596
After period.					
First subperiod:					
Total	1,000.54	29.47	2.95	+ 971.07	.0
Average	100.05	2.95	.....	+ 97.10	.0
Second subperiod:					
Total	912.81	31.12	3.41	+ 881.69	.0
Average	91.28	3.11	.....	+ 88.17	.0
Entire after period:					
Total	1,913.35	60.59	3.17	+1,852.76	.0
Average	95.67	3.03	.....	+ 92.64	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 5 and 6.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sodium sulphite administered (SO_2).
Fore period.					
Second subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	932.05	29.54	3.17	+ 902.51	0 .0
Average	93.20	2.95	.....	+ 90.25	.0
Preservative period.					
First subperiod:					
Total	917.42	25.68	2.80	+ 891.74	2.230
Average	91.74	2.57	.....	+ 89.17	.223
Second subperiod:					
Total	975.61	39.90	4.09	+ 935.71	5.080
Average	97.56	3.99	.....	+ 93.57	.508
Third subperiod:					
Total	902.58	33.87	3.75	+ 868.71	6.350
Average	90.26	3.39	.....	+ 86.87	.635
Fourth subperiod:					
Total	737.38	34.89	4.73	+ 702.49	.0
Average	73.74	3.49	.....	+ 70.25	.0
Entire preservative period:					
Total	3,532.99	134.34	3.80	+3,398.65	13.660
Average	88.32	3.36	.....	+ 84.96	.342
After period.					
First subperiod:					
Total	850.52	29.23	3.44	+ 821.29	.0
Average	85.05	2.92	.....	+ 82.13	.0
Second subperiod:					
Total	748.97	28.59	3.82	+ 720.38	.0
Average	74.90	2.86	.....	+ 72.04	.0
Entire after period:					
Total	1,599.49	57.82	3.61	+1,541.67	.0
Average	79.97	2.89	.....	+ 77.08	.0

TABLE XVIII.—*Fat balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 7 and 12.

Period.	1 In food.	2 In feces.	3 In feces (2÷1).	4 Balance (1−2).	5 Sulphurous acid administered (SO_2).
Fore period.					
First subperiod:	*Grams.*	*Grams.*	*Per cent.*	*Grams.*	*Grams.*
Total	1,085.23	34.99	3.22	+1,050.24	0.0
Average	108.52	3.50	.....	+ 105.02	.0
Second subperiod:					
Total	1,071.26	26.05	2.43	+1,045.21	.0
Average	107.13	2.60	.....	+ 104.53	.0
Entire fore period:					
Total	2,156.49	61.04	2.83	+2,095.45	.0
Average	107.82	3.05	.....	+ 104.77	.0
Preservative period.					
First subperiod:					
Total	1,092.66	32.50	2.97	+1,060.16	1.712
Average	109.27	3.25	.....	+ 106.02	.171
Second subperiod:					
Total	1,101.13	28.80	2.62	+1,072.33	3.600
Average	110.11	2.88	.....	+ 107.23	.360
Third subperiod:					
Total	1,096.40	24.21	2.25	1,052.19	3.400
Average	107.64	2.42	.....	105.22	.340
First, second, and third subperiods:					
Total	3,270.19	85.51	2.61	+3,184.68	8.712
Average	109.01	2.85	.....	+ 106.16	.290

Nos. 7 to 12.

Fore period.					
Total	3,300.53	103.49	3.14	+3,917.04	0.0
Average	110.02	3.45	.....	+ 106.57	.0
Second subperiod:					
Total	3,272.69	85.32	2.61	+3,187.37	.0
Average	109.09	2.84	.....	+ 106.25	.0
Entire fore period:					
Total	6,573.22	188.81	2.87	+6,384.41	.0
Average	109.55	3.15	.....	+ 106.40	.0
Preservative period.					
First subperiod:					
Total	3,300.27	116.31	3.52	+3,183.96	5.136
Average	110.01	3.88	.....	+ 106.13	.171
Second subperiod:					
Total	3,401.93	124.42	3.66	+3,277.51	11.600
Average	113.40	4.15	.....	+ 109.25	.387
Third subperiod:					
Total	3,412.03	98.35	2.88	+3,313.68	11.400
Average	113.73	3.28	.....	+ 110.45	.380
First, second, and third subperiods:					
Total	10,114.23	339.08	3.35	+9,775.15	28.136
Average	112.38	3.77	.....	+ 108.61	.313

CALORIES BALANCE.

INDIVIDUAL DATA.

The extent of the combustion of the other elements of the food is also of interest, and these data include not only the fat constituents, but also all others in the foods capable of yielding heat on combustion. These figures are also important from a dietetic point of view, as they show the number of calories required by normal young men when choosing a ration designed to keep them in a state of equilibrium. The number of calories in the food of No. 1 does not vary to any extent in the three periods. There seems to be a tendency to more complete combustion in the after period, when the calories in the feces fall to 63, while at the same time they increase by a slight amount in the urine. In both the feces and urine there are fewer calories in the after period than in either of the other periods.

The calories ingested in the food in the case of No. 2 do not greatly differ in the three periods. There appears to be little effect in this case produced by the added preservative upon the utilization of calories.

The number of calories in the food of No. 3 is not very constant, being least in the fore period and greatest in the after period. There is very little difference in the amount or percentage of calories utilized and the balances remain practically the same.

No. 4 received about the same number of calories a day in the preservative and after periods and slightly less in the fore period. There is little difference in the utilization of the calories between the three periods and therefore no very great difference in the balances. There is but little disturbance produced in this case in the utilization of the food heat by the administration of the preservative.

No. 5 will not be discussed, as the data are incomplete.

In the case of No. 6 it is seen that the number of calories in the food is slightly increased in both the preservative period and in the after period. The amounts appearing in the feces and urine are considerably increased in the preservative period. There is, however, very little corresponding effect noticed upon the balances, which remain practically constant. This disturbance in the amount of the calories in the feces and urine with scarcely any variation of the balances is explained by the different quantities of calories consumed in the food.

In the case of No. 7 the data are again incomplete and show no notable changes such as could be ascribed to the use of the preservative.

For No. 8 the number of calories in the food remains almost constant during the three periods. There is also practically no variation

in the total quantity of calories remaining in the feces and urine. These data show practically no effect upon the utilization of calories produced by the administration of the preservative.

The data for No. 9 show a slight increase in the calories in the feces and urine in the preservative period, and this is still more marked in the after period. In this case it is probable that the administration of the preservative tends to increase the calories in the feces, and thus to diminish the heat and energy which the heat units of the food should have furnished.

The quantity of calories in the food of No. 10 are quite constant throughout the whole period of observation. The total quantity appearing in the feces and urine is increased during the preservative period and still further increased in the after period. These data indicate a slight disposition on the part of the added preservative to decrease the utilization of the heat-forming elements of the food.

The food of No. 11 contained a large number of calories, which is quite constant for the three periods. There is only a slight variation in the number of calories excreted in the feces and urine. Apparently in this case there is no influence produced by the administration of the preservative in so far as the utilization of the calories is concerned.

In the case of No. 12 there is a notable decrease in the calories administered during the after period. This doubtless accounts in a satisfactory way for the decrease in the number of calories in the feces and urine. It is fair to conclude, therefore, from these data that there is no marked influence upon the utilization of the heat-producing elements of the food due to the administration of the preservative.

SUMMARIES.

Comparing the summaries of Nos. 1 to 6 and Nos. 8 to 11, inclusive, we find that the average number of calories in the food of Nos. 1 to 6 is 3,224 in the fore period, 3,195 in the preservative period, and 3,171 in the after period. The total number of calories appearing in the feces and urine is 195 for the fore period, 203 for the preservative period, and 185 for the after period. This, in connection with the small decrease in the number of calories in the food in the preservative period, indicates a slight tendency on the part of the preservative in these six cases to diminish the absorption of the food, which is in harmony with the conclusions drawn from the other balances.

In the summary for Nos. 8 to 11, inclusive, the number of calories in the fore period is 3,245, in the preservative period 3,259, and in the after period 3,254, numbers which are, for all practical purposes, identical. The number of calories appearing in the feces and urine in the fore period is 184, in the preservative period 194, and in the after period 208. In this case there appears to be a very slight tendency

on the part of the preservative to interfere with the absorption of the heat-producing substances, resulting in an increased excretion of calories, and this tendency is somewhat increased in the after period. No notable difference can be seen between the two summaries except the diminution of the calories in the feces of Nos. 1 to 6 in the after period, and their increase in the urine in the preservative period. In general it may be said that no marked influence is exerted upon the utilization of heat and energy of the food by reason of the administration of the preservative. The tendency indicated, however, points to a decreased absorption of food elements, as already stated.

TABLE XIX.—*Calories balances for Series VII.*

[Averages are per day.]

No. 1.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
	Calories.	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	17,123	694	455	1,149	4.05	2.66	6.71	+15,974	0.0
Average	3,425	139	91	230	.....	.....	.....	+ 3,195	.0
Second subperiod:									
Total	15,897	335	323	658	2.11	2.03	4.14	+15,239	.0
Average	3,179	67	65	132	.....	.....	.....	+ 3,195	.0
Entire fore period:									
Total	33,020	1,029	778	1,807	3.12	2.36	5.47	+31,213	.0
Average	3,302	103	78	181	.....	.....	.....	+ 3,121	.0
Preservative period.									
First subperiod:									
Total	15,518	527	427	954	3.40	2.75	6.15	+14,564	1.115
Average	3,104	105	85	191	.....	.....	.....	+ 2,913	.223
Second subperiod:									
Total	16,129	553	391	944	3.43	2.42	5.85	+15,185	2.540
Average	3,226	111	78	189	.....	.....	.....	+ 3,037	.508
Third subperiod:									
Total	16,228	298	422	720	1.84	2.60	4.44	+15,508	3.810
Average	3,246	60	84	144	.....	.....	.....	+ 3,102	.762
Fourth subperiod:									
Total	16,555	357	439	796	2.16	2.65	4.80	+15,759	3.810
Average	3,311	71	88	159	.....	.....	.....	+ 3,152	.762
Entire preservative period:									
Total	64,430	1,735	1,679	3,414	2.69	2.61	5.30	+61,016	11.275
Average	3,222	87	84	171	.....	.....	.....	+ 3,051	.564
After period.									
First subperiod:									
Total	16,678	321	434	755	1.92	2.60	4.53	+15,923	.0
Average	3,336	64	87	151	.....	.....	.....	+ 3,185	.0
Second subperiod:									
Total	16,559	310	432	742	1.87	2.61	4.48	+15,817	.0
Average	3,312	62	86	148	.....	.....	.....	+ 3,164	.0
Entire after period:									
Total	33,237	631	866	1,497	1.90	2.61	4.50	+31,740	.0
Average	3,324	63	87	150	.....	.....	.....	+ 3,174	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 2.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.									
	Calories.	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	16,915	534	510	1,044	3.16	3.02	6.18	+15,871	0.0
Average	3,383	107	102	209	.....	.....	.....	+ 3,174	.0
Second subperiod:									
Total	16,756	809	498	1,307	4.83	2.97	7.80	+15,499	.0
Average	3,351	162	100	261	.....	.....	.....	+ 3,090	.0
Entire fore period:									
Total	33,671	1,343	1,008	2,351	3.99	2.99	6.98	+31,320	.0
Average	3,367	134	101	235	.....	.....	.....	+ 3,132	.0
Preservative period.									
First subperiod:									
Total	16,724	627	453	1,080	3.75	2.71	6.45	+15,644	1.115
Average	3,345	125	91	216	.....	.....	.....	+ 3,129	.223
Second subperiod:									
Total	17,024	856	460	1,316	5.03	2.70	7.73	+15,708	2.540
Average	3,405	171	92	263	.....	.....	.....	+ 3,129	.508
Third subperiod:									
Total	17,119	687	515	1,202	4.01	3.01	7.02	+15,917	3.810
Average	3,424	137	103	240	.....	.....	.....	+ 3,184	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(3.810)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.762)
First, second, and third subperiods:									
Total	50,867	2,170	1,428	3,598	4.27	2.81	7.07	+47,269	.....
Average	3,391	145	95	240	.....	.....	.....	+ 3,151	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	11.275
Average	.....	.....	.....	.....	.....	.....	.....	.....	.564
After period.									
First subperiod:									
Total	17,114	732	481	1,213	4.28	2.81	7.09	+15,901	.0
Average	3,423	146	96	242	.....	.....	.....	+ 3,181	.0
Second subperiod:									
Total	16,705	648	473	1,121	3.88	2.83	6.71	+15,584	.0
Average	3,341	130	95	224	.....	.....	.....	+ 3,117	.0
Entire after period:									
Total	33,819	1,380	954	2,334	4.08	2.82	6.90	+31,485	.0
Average	3,382	138	95	233	.....	.....	.....	+ 3,149	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 3.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4)	9 Sodium sulphite administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	16,486	371	430	801	2.25	2.61	4.86	+15,685	0.0
Average	3,297	74	86	160	.....	.....	.....	+ 3,137	.0
Second subperiod:									
Total	17,372	535	471	1,006	3.08	2.71	5.79	+16,366	.0
Average	3,474	107	94	201	.....	.....	.....	+ 3,273	.0
Entire fore period:									
Total	33,858	906	901	1,807	2.68	2.66	5.34	+32,051	.0
Average	3,386	91	90	181	.....	.....	.....	+ 3,205	.0
Preservative period.									
First subperiod:									
Total	16,855	656	455	1,111	3.89	2.69	6.59	+15,144	1.115
Average	3,371	131	91	222	.....	.....	.....	+ 3,149	.223
Second subperiod:									
Total	17,584	511	461	972	2.91	2.62	5.53	+16,612	2.540
Average	3,517	102	92	194	.....	.....	.....	+ 3,333	.508
Third subperiod:									
Total	17,478	693	461	1,154	3.96	2.64	6.60	+16,324	3.810
Average	3,496	139	92	231	.....	.....	.....	+ 3,265	7.62
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(.381)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.076)
First, second, and third subperiods:									
Total	51,917	1,860	1,377	3,237	3.58	2.65	6.23	+48,680	.....
Average	3,461	124	92	216	.....	.....	.....	+ 3,245	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	7.846
Average	.....	.....	.....	.....	.....	.....	.....	.....	[a] .392
After period.									
First subperiod:									
Total	17,508	413	430	843	2.36	2.46	4.81	+16,665	.0
Average	3,502	83	86	169	.....	.....	.....	+ 3,333	.0
Second subperiod:									
Total	17,534	468	455	923	2.67	2.59	5.26	+16,611	.0
Average	3,507	94	91	185	.....	.....	.....	+ 3,322	.0
Entire after period:									
Total	35,042	881	885	1,766	2.51	2.53	5.04	+33,276	.0
Average	3,504	88	88	177	.....	.....	.....	+ 3,327	.0

[a] Average for 1 day in a period of 20 days.

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	15,593	505	467	972	3.24	2.99	6.23	+14,621	0.0
Average	3,119	101	93	194	.....	.....	.....	+ 2,925	.0
Second subperiod:									
Total	15,310	709	490	1,199	4.63	3.20	7.83	+14,111	.0
Average	3,062	142	98	240	.....	.....	.....	+ 2,822	.0
Entire fore period:									
Total	30,903	1,214	957	2,171	3.93	3.10	7.03	+28,732	.0
Average	3,090	121	96	217	.....	.....	.....	+ 2,873	.0
Preservative period.									
First subperiod:									
Total	15,458	513	471	984	3.32	3.05	6.37	+14,474	1.115
Average	3,092	103	94	197	.....	.....	.....	+ 2,895	.223
Second subperiod:									
Total	15,985	758	425	1,183	4.74	2.66	7.40	+14,802	2.540
Average	3,197	152	85	237	.....	.....	.....	+ 2,960	.508
Third subperiod:									
Total	15,971	508	440	951	3.18	2.77	5.95	+15,020	3.810
Average	3,194	102	89	190	.....	.....	.....	+ 3,004	.762
Fourth subperiod:									
Total	15,756	633	437	1,070	4.02	2.77	6.79	+14,686	5.100
Average	3,154	127	87	214	.....	.....	.....	+ 2,937	1.020
Entire preservative period:									
Total	63,170	2,412	1,776	4,188	3.82	2.81	6.63	+58,982	12.565
Average	3,158	121	89	209	.....	.....	.....	+ 2,949	.628
After period.									
First subperiod:									
Total	16,132	530	475	1,005	3.29	2.94	6.23	+15,127	.0
Average	3,226	106	95	201	.....	.....	.....	+ 3,025	.0
Second subperiod:									
Total	15,781	643	471	1,114	4.07	2.98	7.06	+14,667	.0
Average	3,156	129	94	223	.....	.....	.....	+ 2,933	.0
Entire after period:									
Total	31,913	1,173	946	2,119	3.68	2.96	6.64	+29,794	.0
Average	3,191	117	95	212	.....	.....	.....	+ 2,979	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 5.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
Second subperiod:									
Total	15,511	393	365	758	2.53	2.35	4.89	+14,753	0.0
Average	3,102	79	73	152	.....	.....	.....	+ 2,950	.0
Preservative period.									
First subperiod:									
Total	15,045	447	427	874	2.97	2.84	5.81	+14,171	1.115
Average	3,009	89	85	175	.....	.....	.....	+ 2,834	.223
Second subperiod:									
Total	15,371	526	384	910	3.42	2.50	5.92	+14,461	2.540
Average	3,074	105	77	182	.....	.....	.....	+ 2,892	.508
Third subperiod:									
Total	12,662	415	351	766	3.28	2.77	6.05	+11,896	2.540
Average	2,532	83	70	153	.....	.....	.....	+ 2,379	.508
Fourth subperiod:									
Total	10,043	459	273	732	4.57	2.72	7.29	+ 9,311	.0
Average	2,009	92	55	146	.....	.....	.....	+ 1,863	.0
Entire preservative period:									
Total	53,121	1,847	1,435	3,282	3.48	2.70	6.18	+49,839	6.195
Average	2,656	92	72	164	.....	.....	.....	+ 2,492	.310
After period.									
First subperiod:									
Total	11,899	410	264	674	3.45	2.22	5.66	+11,225	.0
Average	2,380	82	53	135	.....	.....	.....	+ 2,245	.0
Second subperiod:									
Total	12,273	372	288	660	3.03	2.35	5.38	+11,613	.0
Average	2,455	74	58	132	.....	.....	.....	+ 2,323	.0
Entire after period:									
Total	24,172	782	552	1,334	3.24	2.28	5.52	+22,838	.0
Average	2,417	78	55	133	.....	.....	.....	+ 2,284	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	15,248	530	326	856	3.48	2.14	5.61	+14,392	0.0
Average	3,050	106	65	171	.....	.....	.....	+ 2,879	.0
Second subperiod:									
Total	15,112	620	356	976	4.10	2.36	6.46	+14,136	.0
Average	3,022	124	71	195	.....	.....	.....	+ 2,827	.0
Entire fore period:									
Total	30,360	1,150	682	1,832	3.79	2.25	6.03	+28,528	.0
Average	3,036	115	68	183	.....	.....	.....	+ 2,853	.0
Preservative period.									
First subperiod:									
Total	15,654	555	373	928	3.55	2.38	5.93	+14,726	1.115
Average	3,131	111	75	186	.....	.....	.....	+ 2,945	.223
Second subperiod:									
Total	15,408	826	402	1,228	5.36	2.61	7.97	+14,180	2.540
Average	3,082	165	80	246	.....	.....	.....	+ 2,836	.508
Third subperiod:									
Total	15,352	570	387	957	3.71	2.52	6.23	+14,395	3.810
Average	3,070	114	77	191	.....	.....	.....	+ 2,879	.762
Fourth subperiod:									
Total	15,635	628	392	1,020	4.02	2.51	6.52	+14,615	.0
Average	3,127	126	78	204	.....	.....	.....	+ 2,923	.0
Entire preservative period:									
Total	62,049	2,579	1,554	4,133	4.16	2.50	6.66	+57,936	7.465
Average	3,102	129	78	207	.....	.....	.....	+ 2,875	.373
After period.									
First subperiod:									
Total	16,566	629	401	1,030	3.80	2.42	6.22	+15,536	.0
Average	3,313	126	80	206	.....	.....	.....	+ 3,107	.0
Second subperiod:									
Total	15,485	597	382	979	3.86	2.46	6.32	+14,506	.0
Average	3,097	119	76	195	.....	.....	.....	+ 3,004	.0
Entire after period:									
Total	32,051	1,226	783	2,009	3.83	2.44	6.27	+30,042	.0
Average	3,205	123	781	201	.....	.....	.....	+ 3,004	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 7.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1)	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
Total	15,223	414	318	732	2.72	2.09	4.81	+14,491	0.0
Average	3,045	83	64	146	.....	.....	.....	+ 2,899	.0
Second subperiod:									
Total	13,760	482	319	801	3.50	2.32	5.82	+12,959	.0
Average	2,752	96	64	160	.....	.....	.....	+ 2,492	.0
Entire fore period:									
Total	28,983	896	637	1,533	3.09	2.20	5.29	+27,450	.0
Average	2,898	90	64	153	.....	.....	.....	+ 2,745	.0
Preservative period.									
First subperiod:									
Total	14,274	576	328	904	4.04	2.30	6.33	+13,370	.856
Average	2,855	115	66	181	.....	.....	.....	+ 2,674	.171
Second subperiod:									
Total	13,834	376	266	642	2.72	1.92	4.64	+13,192	1.600
Average	2,767	75	53	128	.....	.....	.....	+ 2,639	.320
Third subperiod:									
Total	13,321	253	328	581	1.90	2.46	4.36	+12,740	1.800
Average	2,664	51	66	116	.....	.....	.....	+ 2,548	.360
First, second, and third subperiods:									
Total	41,429	1,205	922	2,127	2.91	2.23	5.13	+39,302	4.256
Average	2,762	80	61	142	.....	.....	.....	+ 2,620	[a] .213

[a] Average for 20 days.

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 8.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period.									
	Calories.	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	16,040	548	324	872	3.42	2.02	5.44	+15,168	0.0
Average	3,208	110	65	174	.....	.....	.....	+ 3,034	.0
Second subperiod:									
Total	15,517	648	367	1,015	4.18	2.37	6.54	+14,502	.0
Average	3,103	130	73	203	.....	.....	.....	+ 2,900	.0
Entire fore period:									
Total	31,557	1,196	691	1,887	3.79	2.19	5.98	+29,670	.0
Average	3,156	120	69	189	.....	.....	.....	+ 2,967	.0
Preservative period.									
First subperiod:									
Total	15,493	405	377	782	2.61	2.43	5.05	+14,711	.856
Average	3,099	81	75	156	.....	.....	.....	+ 2,943	.171
Second subperiod:									
Total	15,500	452	346	798	2.92	2.23	5.15	+14,702	2.000
Average	3,100	90	69	160	.....	.....	.....	+ 2,940	.400
Third subperiod:									
Total	15,928	751	351	1,102	4.71	2.20	6.92	+14,826	2.000
Average	3,186	150	70	220	.....	.....	.....	+ 2,996	.400
Fourth subperiod:									
Total	15,492	802	341	1,143	5.18	2.20	7.38	+14,349	2.000
Average	3,098	160	68	229	.....	.....	.....	+ 2,869	.400
Entire preservative period:									
Total	62,413	2,410	1,415	3,825	3.86	2.27	6.13	+58,588	6.856
Average	3,121	120	71	191	.....	.....	.....	+ 2,930	.343
After period.									
First subperiod:									
Total	16,155	564	360	924	3.49	2.23	5.72	+15,231	.0
Average	3,231	113	72	185	.....	.....	.....	+ 3,046	.0
Second subperiod:									
Total	15,726	641	363	1,004	4.08	2.31	6.39	+14,722	.0
Average	3,145	128	73	241	.....	.....	.....	+ 2,904	.0
Entire after period:									
Total	31,881	1,205	723	1,928	3.78	2.27	6.05	+29,953	.0
Average	3,188	120	72	193	.....	.....	.....	+ 2,995	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 9.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
	Calories.	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	14,870	420	367	787	2.82	2.47	5.29	+14,083	0.0
Average	2,974	84	73	157	.....	.....	.....	+ 2,817	.0
Second subperiod:									
Total	14,905	402	392	794	2.70	2.63	5.33	+14,111	.0
Average	2,981	80	78	159	.....	.....	.....	+ 2,822	.0
Entire fore period:									
Total	29,775	822	759	1,581	2.76	2.55	5.31	+28,194	.0
Average	2,978	82	76	158	.....	.....	.....	+ 2,820	.0
Preservative period.									
First subperiod:									
Total	14,805	521	428	949	3.52	2.89	6.41	+13,856	.856
Average	2,961	104	86	190	.....	.....	.....	+ 2,771	.171
Second subperiod:									
Total	15,129	551	391	942	3.64	2.58	6.23	+14,187	2.000
Average	3,026	110	78	188	.....	.....	.....	+ 2,838	.400
Third subperiod:									
Total	15,152	495	393	888	3.27	2.59	5.86	+14,264	2.000
Average	3,030	99	79	178	.....	.....	.....	+ 2,852	.400
Fourth subperiod:									
Total	14,859	320	426	746	2.15	2.87	5.02	+14,113	2,000
Average	2,972	64	85	149	.....	.....	.....	+ 2,823	.400
Entire preservative period:									
Total	59,945	1,887	1,638	3,525	3.15	2.73	5.88	+56,420	6.856
Average	2,997	94	82	176	.....	.....	.....	+ 2,821	.343
After period.									
First subperiod:									
Total	15,203	840	405	1,245	5.53	2.66	8.19	+13,958	.0
Average	3,041	168	81	249	.....	.....	.....	+ 2,792	.0
Second subperiod:									
Total	14,669	599	406	1,005	4.08	2.77	6.85	+13,664	.0
Average	2,934	120	81	201	.....	.....	.....	+ 2,733	.0
Entire after period:									
Total	29,872	1,439	811	2,250	4.82	2.71	7.53	+27,622	.0
Average	2,987	144	81	225	.....	.....	.....	+ 2,762	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 10.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	15,471	531	403	934	3.43	2.61	6.04	+14,537	0.0
Average	3,094	106	81	187	.....	.....	.....	+ 2,907	.0
Second subperiod:									
Total	14,942	346	414	760	2.32	2.77	5.09	+14,182	.0
Average	2,988	69	83	152	.....	.....	.....	+ 2,836	.0
Entire fore period:									
Total	30,413	877	817	1,694	2.88	2.69	5.57	+28,719	.0
Average	3,041	88	82	169	.....	.....	.....	+ 2,872	.0
Preservative period.									
First subperiod:									
Total	15,085	662	390	1,052	4.39	2.58	6.97	+14,033	.856
Average	3,017	132	78	210	.....	.....	.....	+ 2,807	.171
Second subperiod:									
Total	15,047	579	300	879	3.85	1.99	5.84	+14,168	2.000
Average	3,009	116	60	176	.....	.....	.....	+ 2,833	.400
Third subperiod:									
Total	15,516	312	403	715	2.01	2.60	4.61	+14,801	2.000
Average	3,103	62	81	143	.....	.....	.....	+ 2,960	.400
Fourth subperiod:									
Total	15,274	718	384	1,102	4.70	2.51	7.21	+14,172	2.000
Average	3,055	144	77	220	.....	.....	.....	+ 2,835	.400
Entire preservative period:									
Total	60,922	2,271	1,477	3,748	3.73	2.42	6.15	+57,174	6.856
Average	3,046	114	74	187	.....	.....	.....	+ 2,859	.343
After period.									
First subperiod:									
Total	15,369	655	410	1,065	4.26	2.67	6.93	+14,304	.0
Average	3,074	131	82	213	.....	.....	.....	+ 2,861	.0
Second subperiod:									
Total	14,940	680	367	1,047	4.55	2.46	7.01	+13,893	.0
Average	2,988	136	73	209	.....	.....	.....	+ 2,779	.0
Entire after period:									
Total	30,309	1,335	777	2,112	4.41	2.56	6.97	+28,197	.0
Average	3,031	130	78	211	.....	.....	.....	+ 2,820	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	19,030	655	468	1,123	3.44	2.46	5.90	+17,907	0.0
Average	3,806	131	94	225	.....	.....	.....	+ 3,581	.0
Second subperiod:									
Total	19,012	599	485	1,084	3.15	2.55	5.70	+17,928	.0
Average	3,802	120	97	217	.....	.....	.....	+ 3,585	.0
Entire fore period:									
Total	38,042	1,254	953	2,207	3.30	2.51	5.80	+35,835	.0
Average	3,804	125	95	221	.....	.....	.....	+ 3,583	.0
Preservative period.									
First subperiod:									
Total	19,096	745	461	1,206	3.90	2.41	6.32	+17,890	.856
Average	3,819	149	92	241	.....	.....	.....	+ 3,578	.171
Second subperiod:									
Total	19,630	670	391	1,061	3.41	1.99	5.40	+18,569	2.000
Average	3,926	134	78	212	.....	.....	.....	+ 3,714	.400
Third subperiod:									
Total	19,536	702	423	1,125	3.59	2.17	5.76	+18,411	2.000
Average	3,907	140	85	225	.....	.....	.....	+ 3,682	.400
Fourth subperiod:									
Total	19,209	640	427	1,067	3.33	2.22	5.55	+18,142	2.000
Average	3,842	128	85	213	.....	.....	.....	+ 3,629	.400
Entire preservative period:									
Total	77,471	2,757	1,702	4,459	3.56	2.20	5.76	+73,012	6.856
Average	3,874	138	85	223	.....	.....	.....	+ 3,651	.343
After period.									
First subperiod:									
Total	19,274	619	435	1,054	3.21	2.26	5.47	+18,220	.0
Average	3,855	124	87	211	.....	.....	.....	+ 3,644	.0
Second subperiod:									
Total	18,825	[a] 517	465	982	2.75	2.47	5.22	+17,843	.0
Average	3,765	103	93	196	.....	.....	.....	+ 3,569	.0
Entire after period:									
Total	38,099	1,136	900	2,036	2.98	2.36	5.34	+36,063	.0
Average	3,810	114	90	204	.....	.....	.....	+ 3,606	.0

[a] Very small portion lost by vomiting.

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per day.]

No. 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine. (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period.									
	Calories.	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	16,804	605	436	1,041	3.60	2.59	6.19	+15,763	0.0
Average	3,361	121	87	208	.....	.....	.....	+ 3,153	.0
Second subperiod:									
Total	16,887	428	433	861	2.53	2.56	5.10	+16,026	.0
Average	3,377	86	87	172	.....	.....	.....	+ 3,205	.0
Entire fore period:									
Total	33,691	1,033	869	1,902	3.07	2.58	5.65	+31,789	.0
Average	3,369	103	87	190	.....	.....	.....	+ 3,479	.0
Preservative period.									
First subperiod:									
Total	17,262	583	449	1,032	3.38	2.60	5.98	+16,230	.856
Average	3,452	117	90	206	.....	.....	.....	+ 3,246	.171
Second subperiod:									
Total	17,829	466	462	928	2.61	2.59	5.21	+16,901	2.000
Average	3,566	93	92	186	.....	.....	.....	+ 3,380	.400
Third subperiod:									
Total	17,565	609	462	1,071	3.47	2.63	6.10	+16,494	1.600
Average	3,515	122	92	214	.....	.....	.....	+ 3,299	.320
Fourth subperiod:									
Total	17,524	450	428	878	2.57	2.44	5.01	+16,646	.0
Average	3,505	90	86	176	.....	.....	.....	+ 3,329	.0
Entire preservative period:									
Total	70,180	2,108	1,801	3,909	3.00	2.57	5.57	+66,271	4.456
Average	3,509	105	90	195	.....	.....	.....	+ 3,314	.223
After period.									
First subperiod:									
Total	16,757	359	415	774	2.14	2.48	4.62	+15,983	.0
Average	3,351	72	83	155	.....	.....	.....	+ 3,196	.0
Second subperiod:									
Total	15,990	555	420	975	3.47	2.63	6.10	+15,015	.0
Average	3,198	111	84	195	.....	.....	.....	+ 3,003	.0
Entire after period:									
Total	32,747	914	835	1,749	2.79	2.55	5.34	+30,998	.0
Average	3,275	91	84	175	.....	.....	.....	+ 3,100	.0

TABLE XIX—*Calories balances for Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Nos. 1 to 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	[a]81,365	2,634	2,188	4,822	3.24	2.69	5.93	+ 76,543	0.0
Average	3,255	105	88	193	.....	.....	.....	+ 3,062	.0
Second subperiod:									
Total	95,958	3,401	2,503	5,904	3.54	2.61	6.15	+ 90,054	.0
Average	3,199	113	83	197	.....	.....	.....	+ 3,002	.0
Entire fore period:									
Total	177,323	6,035	4,691	10,726	3.40	2.65	6.05	+166,597	.0
Average	3,224	110	85	195	.....	.....	.....	+ 3,029	.0
Preservative period.									
First subperiod:									
Total	95,254	3,325	2,606	5,931	3.49	2.74	6.23	+ 89,323	6.690
Average	3,175	111	87	198	.....	.....	.....	+ 2,977	.223
Second subperiod:									
Total	97,501	4,030	2,523	6,553	4.13	2.59	6.72	+ 90,948	15.240
Average	3,250	134	84	218	.....	.....	.....	+ 3,032	.508
Third subperiod:									
Total	94,810	3,171	2,579	5,750	3.35	2.72	6.06	+ 89,060	21.590
Average	3,160	106	86	192	.....	.....	.....	+ 2,968	.720
First, second, and third subperiods:									
Total	287,565	10,526	7,708	18,234	3.66	2.68	6.34	+269,331	43.520
Average	3,195	117	86	203	.....	.....	.....	+ 2,992	.484
After period.									
First subperiod:									
Total	95,897	3,035	2,485	5,520	3.16	2.59	5.76	+ 90,377	.0
Average	3,197	101	83	184	.....	.....	.....	+ 3,013	.0
Second subperiod:									
Total	94,337	3,038	2,501	5,539	3.22	2.65	5.87	+ 88,798	.0
Average	3,145	101	83	185	.....	.....	.....	+ 2,960	.0
Entire after period:									
Total	190,334	6,073	4,986	11,059	3.19	2.62	5.81	+179,175	.0
Average	3,171	101	83	185	.....	.....	.....	+ 2,986	.0

[a] No. 5 absent.

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 8 to 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
	Calories.	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	65,411	2,154	1,562	3,716	3.29	2.39	5.68	+ 61,695	0.0
Average	3,271	108	78	186	.....	.....	.....	+ 3,085	.0
Second subperiod:									
Total	64,376	1,995	1,658	3,653	3.10	2.58	5.67	+ 60.723	.0
Average	3,219	100	83	183	.....	.....	.....	+ 3,036	.0
Entire fore period:									
Total	129,787	4,149	3,220	7,369	3.20	2.48	5.68	+122,418	.0
Average	3,245	104	80	184	.....	.....	.....	+ 3,061	.0
Preservative period.									
First subperiod:									
Total	64,479	2,333	1,656	3,989	3.62	2.57	6.19	+ 60,490	3.424
Average	3,224	117	83	199	.....	.....	.....	+ 3,025	.171
Second subperiod:									
Total	65,306	2,252	1,428	3,680	3.45	2.19	5.64	+ 61,626	8.000
Average	3,265	113	71	184	.....	.....	.....	+ 3,081	.400
Third subperiod:									
Total	66,132	2,260	1,570	3,830	3.42	2.37	5.79	+ 62,302	8.000
Average	3,307	113	78	192	.....	.....	.....	+ 3,115	.400
Fourth subperiod:									
Total	64,834	2,480	1,578	4,058	3.83	2.43	6.26	+ 60,776	8.000
Average	3,242	124	79	203	.....	.....	.....	+ 3,039	.400
Entire preservative period:									
Total	260,751	9,325	6,232	15,557	3.58	2.39	5.97	+245,194	27.424
Average	3,259	117	78	194	.....	.....	.....	+ 3,065	.343
After period.									
First subperiod:									
Total	66,001	2,678	1,610	4,288	4.06	2.44	6.50	+ 61,713	.0
Average	3,300	134	80	214	.....	.....	.....	+ 3,086	.0
Second subperiod:									
Total	64,160	2,437	1,601	4,038	3.80	2.50	6.29	+ 60,122	.0
Average	3,208	122	80	202	.....	.....	.....	+ 3,006	.0
Entire after period:									
Total	130,161	5,115	3,211	8,326	3.93	2.47	6.40	+121,835	.0
Average	3,254	128	80	208	.....	.....	.....	+ 3,046	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 1 and 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	32,716	1,199	922	2,121	3.66	2.82	6.48	+ 30,595	0.0
Average	3,272	120	92	212	.....	.....	.....	+ 3,060	.0
Second subperiod:									
Total	31,207	1,044	813	1,857	3.35	2.61	5.95	+ 29,350	.0
Average	3,121	104	81	186	.....	.....	.....	+ 2,935	.0
Entire fore period.									
Total	63,923	2,243	1,735	3,978	3.51	2.71	6.22	+ 59,945	.0
Average	3,196	112	87	199	.....	.....	.....	+ 2,997	.0
Preservative period.									
First subperiod:									
Total	30,976	1,040	898	1,938	3.36	2.90	6.26	+ 29,038	2.230
Average	3,098	104	90	194	.....	.....	.....	+ 2,904	.223
Second subperiod:									
Total	32,114	1,311	816	2,127	4.08	2.54	6.62	+ 29,987	5.080
Average	3,211	131	82	213	.....	.....	.....	+ 2,998	.508
Third subperiod:									
Total	32,199	806	865	1,671	2.50	2.69	5.19	+ 30,528	7.620
Average	3,220	81	87	167	.....	.....	.....	+ 3,053	.762
Fourth subperiod:									
Total	32,311	990	876	1,866	3.06	2.71	5.78	+ 30,445	8.910
Average	3,231	99	88	187	.....	.....	.....	+ 3,044	.891
Entire preservative period:									
Total	127,600	4,147	3,455	7,602	3.25	2.71	5.96	+119,998	23.840
Average	3,190	104	86	190	.....	.....	.....	+ 3,000	.596
After period.									
First subperiod:									
Total	32,810	851	909	1,760	2.59	2.77	5.36	+ 31,050	.0
Average	3,281	85	91	176	.....	.....	.....	+ 3,105	.0
Second subperiod:									
Total	32,340	953	903	1,856	2.95	2.79	5.74	+ 30,484	.0
Average	3,234	95	90	186	.....	.....	.....	+ 3,048	.0
Entire after period:									
Total	65,150	1,804	1,812	3,616	2.77	2.78	5.55	+ 61,534	.0
Average	3,258	90	91	181	.....	.....	.....	+ 3,077	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 5 and 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
Second subperiod:									
Total	30,623	1,013	721	1,734	3.31	2.35	5.66	+ 28,889	0.0
Average	3,062	101	72	173	.....	.....	.....	+ 2,889	.0
Preservative period.									
First subperiod:									
Total	30,699	1,002	800	1,802	3.26	2.61	5.87	+ 28,897	2.230
Average	3,070	100	80	180	.....	.....	.....	+ 2,890	.223
Second subperiod:									
Total	30,779	1,352	786	2,138	4.39	2.55	6.95	+ 28,641	5.080
Average	3,078	135	79	214	.....	.....	.....	+ 2,864	.508
Third subperiod:									
Total	28,014	985	738	1,723	3.52	2.63	6.15	+ 26,291	6.350
Average	2,801	98	74	172	.....	.....	.....	+ 2,629	.635
Fourth subperiod:									
Total	25,678	1,087	665	1,752	4.23	2.58	6.82	+ 23,926	.0
Average	2,568	109	66	175	.....	.....	.....	+ 2,393	.0
Entire preservative period:									
Total	115,170	4,426	2,989	7,415	3.84	2.60	6.44	+107,755	13.660
Average	2,879	111	75	185	.....	.....	.....	+ 2,694	.342
After period.									
First subperiod:									
Total	28,465	1,039	665	1,704	3.65	2.34	5.99	+ 26,761	.0
Average	2,846	104	66	170	.....	.....	.....	+ 2,676	.0
Second subperiod:									
Total	27,758	969	670	1,639	3.49	2.41	5.90	+ 26,119	.0
Average	2,776	97	67	164	.....	.....	.....	+ 2,612	.0
Entire after period:									
Total	56,223	2,008	1,335	3,343	3.57	2.37	5.95	+ 52,880	.0
Average	2,811	100	67	167	.....	.....	.....	+ 2,644	.0

TABLE XIX.—*Calories balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 7 and 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.	*Calories.*	*Calories.*	*Calories.*	*Calories.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*	*Grams.*
First subperiod:									
Total	32,027	1,019	750	1,773	3.18	2.35	5.54	+ 30,254	0.0
Average	3,203	102	75	177	.....	.....	.....	+ 3,026	.0
Second subperiod:									
Total	30,647	910	752	1,662	2.97	2.45	5.42	+ 28,985	.0
Average	3,065	91	75	166	.....	.....	.....	+ 2,899	.0
Entire fore period:									
Total	62,674	1,929	1,506	3,435	3.08	2.40	5.48	+ 59,239	.0
Average	3,134	96	75	172	.....	.....	.....	+ 2,962	.0
Preservative period.									
First subperiod:									
Total	31,536	1,159	777	1,936	3.68	2.46	6.14	+ 29,600	1.712
Average	3,154	116	78	194	.....	.....	.....	+ 2,960	.171
Second subperiod:									
Total	31,663	842	728	1,570	2.66	2.30	4.96	+ 30,093	3.600
Average	3,166	84	73	157	.....	.....	.....	+ 3,009	.360
Third subperiod:									
Total	30,886	862	790	1,652	2.79	2.56	5.35	+ 29,234	3.400
Average	3,089	86	79	165	.....	.....	.....	+ 2,924	.340
First, second, and third subperiods:									
Total	94,085	2,863	2,295	5,158	3.04	2.44	5.48	+ 88,927	8.712
Average	3,136	95	76	172	.....	.....	.....	+ 2,964	.290

Nos. 7 to 12.

Fore period.									
First subperiod:									
Total	97,438	3,173	2,316	5,489	3.26	2.38	5.63	+ 91,949	0.0
Average	3,248	106	77	183	.....	.....	.....	+ 3,065	.0
Second subperiod:									
Total	95,023	2,905	2,410	5,315	3.06	2.54	5.59	+ 89,708	.0
Average	3,167	97	80	177	.....	.....	.....	+ 2,990	0
Entire fore period:									
Total	192,461	6,078	4,726	10,804	3.16	2.46	5.61	+181,657	.0
Average	3,208	101	79	180	.....	.....	.....	+ 3,028	.0
Preservative period.									
First subperiod:									
Total	96,015	3,492	2,433	5,925	3.64	2.53	6.17	+ 90,090	5.136
Average	3,200	116	81	198	.....	.....	.....	+ 3,002	.171
Second subperiod:									
Total	96,969	3,094	2,156	5,250	3.19	2.22	5.41	+ 91,719	11.600
Average	3,232	103	72	175	.....	.....	.....	+ 3,057	.387
Third subperiod:									
Total	97,018	3,122	2,360	5,482	3.22	2.43	5.65	+ 91,536	11.400
Average	3,234	104	79	183	.....	.....	.....	+ 3,051	.380
First, second, and third subperiods:									
Total	290,002	9,708	6,949	16,657	3.35	2.40	5.74	+273,345	28.136
Average	3,222	108	77	185	.....	.....	.....	+ 3,037	.313

SOLIDS BALANCE.

INDIVIDUAL DATA.

The total solids of the food are considered and the balance determined. In the case of No. 1 the quantity of solid matter—that is, dry matter—ingested is quite constant during the three periods of observation. The amount of solid matter recovered in the feces is practically the same for the fore period and the preservative period, but decreases considerably during the after period, while the solids in the food are slightly increased. The quantity excreted in the urine is uniform for the three periods. Naturally the balances are positive and of very large magnitude, as the greater part of the solid bodies of the food are digested and absorbed.

The quantity of solids in the foods of No. 2 is also quite constant, and the amounts recovered in the feces and urine suffer very little variation during the three periods.

In the case of No. 3 the solids in the food are quite constant, ranging from 660 grams per day in the fore period to 682 grams in the after period. The solid matter excreted in the feces is slightly increased during the preservative period. The amount excreted in the urine is practically constant in the three periods, being slightly increased in the preservative period. There is shown, therefore, a slight increase of total solids eliminated during the preservative period, although the quantity of solid material used by the body remains practically the same, owing to the slight increase in the amount ingested.

No. 4 shows a marked uniformity both in the amounts of total solids ingested and eliminated during the three periods. It is evident from these data that the preservative in this case does not exercise any decided influence upon the metabolism of total solids.

For reasons which have already been given, the data for No. 5 are incomplete and do not afford any basis of comparison.

In the case of No. 6 the quantity of total solids in the foods is considerably increased in the after period, but the amount excreted is not proportionally increased. There is, however, a slight tendency shown to retard the absorption of solids and to increase elimination.

The data for No. 7 are incomplete and in so far as they are recorded do not show any notable influence of the preservative, although there is a slightly increased elimination in the urine. The balance is reduced in the preservative period, but corresponds to the reduction of the solids in the food.

No. 8 has a fairly uniform quantity of total solids in the food and a uniform excretion in the feces and urine, and no marked disturbing influences are noticed as a result of the administration of the preservative.

In the case of No. 9 there is a marked increase in the excretion of total solids in the feces in the after period, while there is a notable increase in the amount eliminated in the urine in the preservative period. The preservative period in this instance evidently has a slight tendency to inhibit the absorption of the total solids and to increase the katabolic activities.

With No. 10 there is a considerable increase in the total solids excreted in the feces both in the preservative period and in the after period. The amount eliminated in the urine decreases in the preservative period. There is a slight indication in this case of metabolic derangement under influence of the preservative in respect of total solids.

In the case of No. 11 the quantities of total solids in the food and the quantities excreted in the feces and urine show no marked variations in the three periods, but the same general tendency is indicated as in the case of No. 10.

In the case of No. 12 there is a slight increase in the quantity of total solids in the feces in the preservative period and an increase in the amount excreted in the urine. There is again a slight tendency to inhibit assimilation and increase excretion.

SUMMARIES.

The summaries of Nos. 1 to 6 and Nos. 8 to 11, inclusive, are interesting in showing the relations of the total solids in the food and in the feces and urine, but do not throw any additional light upon the subject of the effects produced by the administration of the preservative upon the general metabolic activities as affecting the total solids of the food. The variations between the periods as shown in the summaries are very small, but indicate the tendency noted for the majority of the individuals to inhibit assimilation and increase elimination.

TABLE XX.—*Solids balances for Series VII.*

[Averages are per day.]

No. 1.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams*
Total	3,484	135	344	479	3.87	9.87	13.75	+ 3,005	0.0
Average	697	27	69	96	.....	.....	.....	+ 601	.0
Second subperiod:									
Total	3,229	66	333	399	2.04	10.31	12.36	+ 2,830	.0
Average	646	13	67	80	.....	.....	.....	+ 566	.0
Entire fore period:									
Total	6,713	201	677	878	2.99	10.08	13.08	+ 5,835	.0
Average	671	20	68	88	.....	.....	.....	+ 583	.0
Preservative period.									
First subperiod:									
Total	3,133	107	321	428	3.42	10.25	13.66	+ 2,705	1.115
Average	627	21	64	86	.....	.....	.....	+ 541	.223
Second subperiod:									
Total	3,256	115	312	427	3.53	9.58	13.11	+ 2,829	2.540
Average	651	23	62	85	.....	.....	.....	+ 566	.508
Third subperiod:									
Total	3,270	59	352	411	1.80	10.76	12 57	+ 2,859	3.810
Average	654	12	70	82	.....	.....	.....	+ 572	.762
Fourth subperiod:									
Total	3,400	74	386	460	2.18	11.35	13.53	+ 2,940	3.810
Average	680	15	77	92	.....	.....	.....	+ 588	.762
Entire preservative period:									
Total	13,059	355	1,371	1,726	2.72	10.50	13.22	+11,333	11.275
Average	653	18	69	86	.....	.....	.....	+ 567	.564
After period.									
First subperiod:									
Total	3,403	65	351	416	1.91	10.31	12.22	+ 2,987	.0
Average	681	13	70	83	.....	.....	.....	+ 598	.0
Second subperiod:									
Total	3,411	64	336	400	1.88	9.85	11.73	+ 3,011	.0
Average	682	13	67	80	.....	.....	.....	+ 602	.0
Entire after period:									
Total	6,814	129	687	816	1.89	10.08	11.98	+ 5,998	.0
Average	681	13	69	82	.....	.....	.....	+ 600	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 2.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams*
Total	3,343	108	370	478	3.23	11.07	14.30	+ 2,865	0.0
Average	669	22	74	96	.....	.....	.....	+ 573	.0
Second subperiod:									
Total	3,272	163	365	528	4.98	11.16	16.14	+ 2,744	.0
Average	654	33	73	106	.....	.....	.....	+ 548	.0
Entire fore period:									
Total	6,615	271	735	1,006	4.10	11.11	15.21	+ 5,609	.0
Average	662	27	74	101	.....	.....	.....	+ 561	.0
Preservative period.									
First subperiod:									
Total	3,243	131	322	453	4.04	9.93	13.97	+ 2,790	1.115
Average	649	26	64	91	.....	.....	.....	+ 558	.223
Second subperiod:									
Total	3,309	171	374	545	5.17	11.30	16.47	+ 2,764	2.540
Average	662	34	75	109	.....	.....	.....	+ 553	.508
Third subperiod:									
Total	3,317	138	380	518	4.16	11.46	15.62	+ 2,799	3.810
Average	663	28	76	104	.....	.....	.....	+ 559	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(3.810)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.762)
First, second, and third subperiods:									
Total	9,869	440	1,076	1,516	4.46	10.90	15.36	+ 8,353	.....
Average	658	29	72	101	.....	.....	.....	+ 557	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	11.275
Average	.....	.....	.....	.....	.....	.....	.....	.....	.564
After period.									
First subperiod:									
Total	3,331	142	362	504	4.26	10.87	15.13	+ 2,827	.0
Average	666	.28	72	101	.....	.....	.....	+ 565	.0
Second subperiod:									
Total	3,302	128	338	466	3.88	10.24	14.11	+ 2,836	.0
Average	660	26	68	93	.....	.....	.....	+ 567	.0
Entire after period:									
Total	6,633	270	700	970	4.07	10.55	14.62	+ 5,663	.0
Average	663	27	70	97	.....	.....	.....	+ 566	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 3.

Period.	1 In food.	2 In feces.	3 In urine	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	3,231	75	307	382	2.32	9.50	11.82	+ 2,849	0.0
Average	646	15	61	76	.....	.....	.....	+ 570	.0
Second subperiod:	3,372	121	329	450	3.59	9.76	13.35	+ 2,922	.0
Average	674	24	66	90	.....	.....	.....	+ 584	.0
Entire fore period:									
Total	6,603	196	636	832	2.97	9.63	12.60	+ 5,771	.0
Average	660	20	64	83	.....	.....	.....	+ 577	.0
Preservative period.									
First subperiod:									
Total	3,271	143	324	467	4.37	9.91	14.28	+ 2,804	1.115
Average	654	29	65	93	.....	.....	.....	+ 561	.223
Second subperiod:									
Total	3,403	115	365	480	3.38	10.73	14.11	+ 2,923	2.540
Average	618	23	73	96	.....	.....	.....	+ 585	.508
Third subperiod:									
Total	3,373	160	350	510	4.74	10.38	15.12	+ 2,863	3.810
Average	675	32	70	102	.....	.....	.....	+ 573	.762
Fourth subperiod:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	(.381)
Average	.....	.....	.....	.....	.....	.....	.....	.....	(.076)
First, second, and third subperiods:									
Total	10,047	418	1,039	1,457	4.16	10.34	14.50	+ 8,590	.....
Average	670	28	69	97	.....	.....	.....	+ 573	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	7.846
Average	.....	.....	.....	.....	.....	.....	.....	.....	[a].392
After period.									
First subperiod:									
Total	3,390	91	325	416	2.68	9.59	12.27	+ 2,974	.0
Average	678	18	65	83	.....	.....	.....	+ 595	.0
Second subperiod:									
Total	3,435	100	330	430	2.91	9.61	12.52	+ 3,005	.0
Average	687	20	66	86	.....	.....	.....	+ 601	.0
Entire after period:									
Total	6,825	191	655	846	2.80	9.60	12.40	+ 5,979	.0
Average	682	19	66	85	.....	.....	.....	+ 597	.0

[a] Average for 1 day in a period of 20 days.

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	3,076	102	356	458	3.32	11.57	14.89	+ 2,618	0.0
Average	615	20	71	92	.....	.....	.....	+ 523	.0
Second subperiod:									
Total	3,002	151	360	511	5.03	11.99	17.02	+ 2,491	.0
Average	600	30	72	102	.....	.....	.....	+ 498	.0
Entire fore period:									
Total	6,078	253	716	969	4.16	11.78	15.94	+ 5,109	.0
Average	608	25	72	97	.....	.....	.....	+ 511	.0
Preservative period.									
First subperiod:									
Total	3,025	111	356	467	3.67	11.77	15.44	+ 2,558	1.115
Average	605	22	71	93	.....	.....	.....	+ 512	.223
Second subperiod:									
Total	3,140	156	370	526	4.97	11.78	16.75	+ 2,614	2.540
Average	628	31	74	105	.....	.....	.....	+ 523	.508
Third subperiod:									
Total	3,116	107	373	480	3.43	11.97	15.40	+ 2,636	3.810
Average	623	21	75	96	.....	.....	.....	+ 527	.762
Fourth subperiod:									
Total	3,132	134	385	519	4.28	12.29	16.57	+ 2,613	5.100
Average	626	27	77	104	.....	.....	.....	+ 522	1.020
Entire preservative period:									
Total	12,413	508	1,484	1,992	4.09	11.96	16.05	+10,421	12.565
Average	621	25	74	100	.....	.....	.....	+ 521	.628
After period.									
First subperiod:									
Total	3,165	111	368	479	3.51	11.63	15.13	+ 2,686	.0
Average	633	22	74	96	.....	.....	.....	+ 537	.0
Second subperiod:									
Total	3,142	137	353	490	4.36	11.23	15.60	+ 2,652	.0
Average	628	27	71	98	.....	.....	.....	+ 530	.0
Entire after period:									
Total	6,307	248	721	969	3.93	11.43	15.36	+ 5,338	.0
Average	631	25	72	97	.....	.....	.....	+ 534	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 5.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces 2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	3,129	78	266	344	2.49	8.50	10.99	+ 2,785	.0
Average	626	16	53	69	.....	.....	.....	+ 557	.0
Preservative period.									
First subperiod:									
Total	3,021	94	300	394	3.11	9.93	13.04	+ 2,627	1.115
Average	604	19	60	79	.....	.....	.....	+ 525	.223
Second subperiod:									
Total	3,072	108	295	403	3.52	9.60	13.12	+ 2,669	2.540
Average	614	22	59	81	.....	.....	.....	+ 534	.508
Third subperiod:									
Total	2,516	85	251	336	3.38	9.98	13.35	+ 2,180	2.540
Average	503	17	50	67	.....	.....	.....	+ 436	.508
Fourth subperiod:									
Total	2,120	99	201	300	4.67	9.48	14.15	+ 1,820	.0
Average	424	20	40	60	.....	.....	.....	+ 364	.0
Entire preservative period:									
Total	10,729	386	1,047	1,433	3.60	9.76	13.36	+ 9,295	6.195
Average	536	19	52	72	.....	.....	.....	+ 464	.310
After period.									
First subperiod:									
Total	2,434	87	208	295	3.57	8.55	12.12	+ 2,139	.0
Average	487	17	42	59	.....	.....	.....	+ 428	.0
Second period:									
Total	2,587	80	213	293	3.09	8.23	11.33	+ 2,294	.0
Average	517	16	43	59	.....	.....	.....	+ 459	.0
Entire after period:									
Total	5,021	167	421	588	3 33	8.38	11.71	+ 4,433	.0
Average	502	17	42	59	.....	.....	.....	+ 443	.0

TABLE XX.—*Solids balances for Series VII.*—Continued.

[Averages are per day.]

No. 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	3,015	111	280	391	3.68	9.29	12.97	+ 2,624	0.0
Average	603	22	56	78	.....	.....	.....	+ 525	.0
Second subperiod:									
Total	2,963	128	287	415	4.32	9.69	14.01	+ 2,548	.0
Average	593	26	57	83	.....	.....	.....	+ 510	.0
Entire fore period:									
Total	5,978	239	567	806	4.00	9.48	13.48	+ 5,172	.0
Average	598	24	57	81	.....	.....	.....	+ 517	.0
Preservative period.									
First subperiod:									
Total	3,121	117	303	420	3.75	9.71	13.46	+ 2,701	1.115
Average	624	23	61	84	.....	.....	.....	+ 540	.223
Second subperiod:									
Total	3,031	174	323	497	5.74	10.66	16.40	+ 2,534	2.540
Average	606	35	65	99	.....	.....	.....	+ 507	.508
Third subperiod:									
Total	3,015	114	322	436	3.78	10.68	14.46	+ 2,579	3.810
Average	603	23	64	87	.....	.....	.....	+ 516	.762
Fourth subperiod:									
Total	3,116	125	309	434	4.01	9.92	13.93	+ 2,682	.0
Average	623	25	62	87	.....	.....	.....	+ 536	.0
Entire preservative period:									
Total	12,283	530	1,257	1,787	4.31	10.23	14.55	+10,496	7.465
Average	614	26	63	89	.....	.....	.....	+ 525	.373
After period.									
First subperiod:									
Total	3,313	133	318	451	4.01	9.60	13.61	2,862	.0
Average	663	27	64	90	.....	.....	.....	573	.0
Second subperiod:									
Total	3,104	123	309	432	3.96	9.95	13.92	2,672	.0
Average	621	25	62	86	.....	.....	.....	535	.0
Entire after period:									
Total	6,417	256	627	883	3.99	9.77	13.76	5,534	.0
Average	642	26	63	88	.....	.....	.....	554	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 7.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	2,979	78	233	311	2.62	7.82	10.44	+ 2,668	0.0
Average	596	16	47	62	.....	.....	.....	+ 534	.0
Second subperiod:									
Total	2,621	95	244	339	3.62	9.31	12.93	+ 2,282	.0
Average	524	19	49	68	.....	.....	.....	+ 456	.0
Entire fore period:									
Total	5,600	173	477	650	3.09	8.52	11.61	+ 4,950	.0
Average	560	17	48	65	.....	.....	.....	+ 495	.0
Preservative period.									
First subperiod:									
Total	2,727	115	265	380	4.22	9.72	13.93	+ 2,347	.856
Average	545	23	53	76	.....	.....	.....	+ 469	.171
Second subperiod:									
Total	2,674	72	269	341	2.69	10.06	12.75	+ 2,333	1.600
Average	535	14	54	68	.....	.....	.....	+ 467	.320
Third subperiod:									
Total	2,580	48	268	316	1.86	10.39	12.25	+ 2,264	1.800
Average	516	10	54	63	.....	.....	.....	+ 453	.360
First, second, and third subperiods:									
Total	7,981	235	802	1,037	2.94	10.05	12.99	+ 6,944	.....
Average	532	16	53	69	.....	.....	.....	+ 463	.....
Entire preservative period:									
Total	.....	.....	.....	.....	.....	.....	.....	.....	4.256
Average	.....	.....	.....	.....	.....	.....	.....	.....	.213

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 8.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	3,277	111	299	410	3.39	9.12	12.51	+ 2,867	0.0
Average	655	22	60	82	.....	.....	.....	+ 573	.0
Second subperiod:									
Total	3,192	130	313	443	4.07	9.81	13.88	+ 2,749	.0
Average	638	26	63	89	.....	.....	.....	+ 549	.0
Entire fore period:									
Total	6,469	241	612	853	3.72	9.46	13.18	+ 5,616	.0
Average	647	24	61	85	.....	.....	.....	+ 562	.0
Preservative period.									
First subperiod:									
Total	3,169	83	319	402	2.62	10.06	12.68	+ 2,767	.856
Average	634	17	64	80	.....	.....	.....	+ 554	.171
Second subperiod:									
Total	3,174	93	312	405	2.93	9.83	12.76	+ 2,769	2.000
Average	635	19	62	81	.....	.....	.....	+ 554	.400
Third subperiod:									
Total	3,262	155	308	463	4.75	9.44	14.19	+ 2,799	2.000
Average	652	31	62	93	.....	.....	.....	+ 559	.400
Fourth subperiod:									
Total	3,215	166	333	499	5.16	10.36	15.52	+ 2,716	2.000
Average	643	33	67	100	.....	.....	.....	+ 543	.400
Entire preservative period:									
Total	12,820	497	1,272	1,769	3.88	9.92	13.80	+11,051	6.856
Average	641	25	64	88	.....	.....	.....	+ 553	.343
After period.									
First subperiod:									
Total	3,333	111	308	419	3.33	9.25	12.58	+ 2.914	.0
Average	667	22	62	84	.....	.....	.....	+ 583	.0
Second subperiod:									
Total	3,278	129	307	436	3.94	9.36	13.30	+ 2,842	.0
Average	656	26	61	87	.....	.....	.....	+ 569	.0
Entire after period:									
Total	6,611	240	615	855	3.63	9.30	12.93	+ 5,756	.0
Average	661	24	62	86	.....	.....	.....	+ 575	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 9.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	2,765	89	288	377	3.22	10.42	13.63	+ 2,388	0.0
Average	553	18	58	75	.....	.....	.....	+ 478	.0
Second subperiod:									
Total	2,731	88	319	407	3.22	11.68	14.90	+ 2,324	.0
Average	546	18	64	81	.....	.....	.....	+ 465	.0
Entire fore period:									
Total	5,496	177	607	784	3.22	11.04	14.26	+ 4,712	.0
Average	550	18	61	78	.....	.....	.....	+ 472	.0
Preservative period.									
First subperiod:									
Total	2,709	110	325	435	4.06	12.00	16.06	+ 2,274	.856
Average	542	22	65	87	.....	.....	.....	+ 455	.171
Second subperiod:									
Total	2,760	106	328	434	3.84	11.88	15.72	+ 2,326	2.000
Average	552	21	66	87	.....	.....	.....	+ 465	.400
Third subperiod:									
Total	2,757	101	316	417	3.66	11.46	15.13	+ 2,340	2.000
Average	555	20	63	83	.....	.....	.....	+ 472	.400
Fourth subperiod:									
Total	2,731	69	363	432	2.53	13.29	15.82	+ 2,299	2.000
Average	546	14	73	86	.....	.....	.....	+ 460	.400
Entire preservative period:									
Total	10,957	386	1,332	1,718	3.52	12.16	15.68	9,239	6.856
Average	548	19	67	86	.....	.....	.....	462	.343
After period.									
First subperiod:									
Total	2,774	161	334	495	5.80	12.04	17.84	+ 2,279	.0
Average	555	32	67	99	.....	.....	.....	+ 456	.0
Second subperiod:									
Total	2,716	123	328	451	4.53	12.08	16.61	+ 2,265	.0
Average	543	25	66	90	.....	.....	.....	+ 453	.0
Entire after period:									
Total	5,490	284	662	946	5.17	12.06	17.23	+ 4,544	.0
Average	549	28	66	95	.....	.....	.....	+ 454	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 10.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	3,038	105	287	392	3.46	9.45	12.90	+ 2,646	0.0
Average	608	21	57	78	.....	.....	.....	+ 530	.0
Second subperiod:									
Total	2,892	69	303	372	2.39	10.48	12.86	+ 2,520	.0
Average	578	14	61	74	.....	.....	.....	+ 504	.0
Entire fore period:									
Total	5,930	174	590	764	2.93	9.95	12.88	+ 5,166	.0
Average	593	17	59	76	.....	.....	.....	+ 517	.0
Preservative period.									
First subperiod:									
Total	2,922	132	275	407	4.52	9.41	13.93	+ 2,515	.856
Average	584	26	55	81	.....	.....	.....	+ 503	.171
Second subperiod:									
Total	3,104	112	238	350	3.61	7.67	11.28	+ 2,754	2.000
Average	621	22	48	70	.....	.....	.....	+ 551	.400
Third subperiod:									
Total	2,989	61	273	334	2.04	9.13	11.17	+ 2,655	2.000
Average	598	12	55	67	.....	.....	.....	+ 531	.400
Fourth subperiod:									
Total	2,979	141	298	439	4.73	10.00	14.74	+ 2,540	2.000
Average	596	28	60	88	.....	.....	.....	+ 508	.400
Entire preservative period:									
Total	11,994	446	1,084	1,530	3.72	9.04	12.76	+10,464	6.856
Average	600	22	54	76	.....	.....	.....	+ 524	.343
After period.									
First subperiod:									
Total	2,962	127	304	431	4.29	10.26	14.55	+ 2,531	.0
Average	592	25	61	86	.....	.....	.....	+ 506	.0
Second subperiod:									
Total	2,924	134	269	403	4.58	9.20	13.78	+ 2,521	.0
Average	585	27	54	81	.....	.....	.....	+ 504	.0
Entire after period:									
Total	5,886	261	573	834	4.43	9.73	14.17	+ 5,052	.0
Average	589	26	57	83	.....	.....	.....	+ 506	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	3,715	143	357	500	3.85	9.61	13.46	+ 3,215	0.0
Average	743	29	71	100	.....	.....	.....	+ 643	.0
Second subperiod:									
Total	3,702	132	360	492	3.57	9.72	13.29	+ 3,210	.0
Average	740	26	72	98	.....	.....	.....	+ 643	.0
Entire fore period:									
Total	7,417	275	717	992	3.71	9.67	13.37	+ 6,425	.0
Average	742	28	72	99	.....	.....	.....	+ 643	.0
Preservative period.									
First subperiod:									
Total	3,727	157	354	511	4.21	9.50	13.71	+ 3,216	.856
Average	745	31	71	102	.....	.....	.....	+ 693	.171
Second subperiod:									
Total	3,817	129	313	442	3.38	8.20	11.58	+ 3,375	2.000
Average	763	26	63	88	.....	.....	.....	+ 675	.400
Third subperiod:									
Total	3,778	149	336	485	3.94	8.89	12.84	+ 3,293	2.000
Average	756	30	67	97	.....	.....	.....	+ 659	.400
Fourth subperiod:									
Total	3,762	139	363	502	3.69	9.65	13.34	+ 3,260	2.000
Average	752	28	73	100	.....	.....	.....	+ 652	.400
Entire preservative period:									
Total	15,084	574	1,366	1,940	3.81	9.06	12.86	+13,144	6.856
Average	754	29	68	97	.....	.....	.....	+ 657	.343
After period.									
First subperiod:									
Total	3,717	134	334	468	3.61	8.99	12.59	+ 3,249	.0
Average	743	27	67	94	.....	.....	.....	+ 649	.0
Second subperiod:									
Total	3,677	114	369	483	3.10	10.04	13.14	+ 3,194	.0
Average	735	23	74	97	.....	.....	.....	+ 638	.0
Entire after period:									
Total	7,394	248	703	951	3.35	9.51	12.86	+ 6,443	.0
Average	739	25	70	95	.....	.....	.....	+ 644	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per day.]

No. 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	3,289	138	330	468	4.20	10.03	14.23	+ 2,821	0.0
Average	658	28	66	94	.....	.....	.....	+ 564	.0
Second subperiod:									
Total	3,302	101	332	433	3.06	10.05	13.11	+ 2,869	.0
Average	660	20	66	87	.....	.....	.....	+ 573	.0
Entire fore period:									
Total	6,591	239	662	901	3.63	10.04	13.67	+ 5,690	.0
Average	659	24	66	90	.....	.....	.....	+ 569	.0
Preservative period.									
First subperiod:									
Total	3,381	142	344	486	4.20	10.17	14.37	+ 2,895	.856
Average	676	28	69	97	.....	.....	.....	+ 579	.171
Second subperiod:									
Total	3,479	104	363	467	2.99	10.43	13.42	+ 3,012	2.000
Average	696	21	73	93	.....	.....	.....	+ 603	.400
Third subperiod:									
Total	3,411	145	359	504	4.25	10.52	14.78	+ 2,907	1.600
Average	682	29	72	101	.....	.....	.....	+ 581	.320
Fourth subperiod:									
Total	3,431	106	325	431	3.09	9.47	12.56	+ 3,000	.0
Average	686	21	65	86	.....	.....	.....	+ 600	.0
Entire preservative period:									
Total	13,702	497	1,391	1,888	3.63	10.15	13.78	+11,814	4.456
Average	685	25	70	94	.....	.....	.....	+ 591	.223
After period.									
First subperiod:									
Total	3,270	77	313	390	2.35	9.57	11.93	+ 2,880	.0
Average	654	15	63	78	.....	.....	.....	+ 576	.0
Second subperiod:									
Total	3,171	122	334	456	3.85	10.53	14.38	+ 2,715	.0
Average	634	24	67	91	.....	.....	.....	+ 543	.0
Entire after period:									
Total	6,441	199	647	846	3.09	10.05	13.13	+ 5,595	.0
Average	644	20	65	85	.....	.....	.....	+ 559	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

SUMMARIES.

[Averages are per man per day.]

Nos. 1 to 6.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine. (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	[a]16,149	531	1,657	2,184	3.29	10.26	13.55	+13,961	0.0
Average	646	21	66	88	.....	.....	.....	+ 558	.0
Second subperiod:									
Total	18,967	707	1,940	2,647	3.73	10.23	13.96	+16,320	.0
Average	632	24	65	88	.....	.....	.....	+ 544	.0
Entire fore period:									
Total	35,116	1,238	3,597	4,835	3.53	10.24	13.77	+ 3,028	.0
Average	638	23	65	88	.....	.....	.....	+ 550	.0
Preservative period.									
First subperiod:									
Total	18,814	703	1,926	2,629	3.74	10.24	13.97	+16,185	6.690
Average	627	23	64	88	.....	.....	.....	+ 539	.223
Second subperiod:									
Total	19,211	839	2,039	2,878	4.37	10.61	14.98	+16,333	15.240
Average	640	28	68	96	.....	.....	.....	+ 544	.508
Third subperiod:									
Total	18,607	663	2,028	2,691	3.56	10.90	14.46	+15,916	21.590
Average	620	22	68	90	.....	.....	.....	+ 530	.720
First, second, and third subperiods:									
Total	56,632	2,205	5,993	8,198	3.89	10.58	14.48	+48,434	43.520
Average	629	25	67	91	.....	.....	.....	+ 538	.484
After period.									
First subperiod:									
Total	19,036	629	1,932	2,561	3.30	10.15	13.45	+16,475	.0
Average	634	21	64	85	.....	.....	.....	+ 549	.0
Second subperiod:									
Total	18,981	632	1,879	2,511	3.33	9.90	13.23	+16,470	.0
Average	633	21	63	84	.....	.....	.....	+ 549	.0
Entire after period:									
Total	38,017	1,261	3,811	5,072	3.32	10.02	13.34	+32,945	.0
Average	634	21	64	85	.....	.....	.....	+ 549	.0

[a] No. 5 absent.

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 8 to 11.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	12,795	448	1,231	1,679	3.50	9.62	13.12	+11,116	0.0
Average	640	22	62	84	.....	.....	.....	+ 556	.0
Second subperiod:									
Total	12,517	419	1,295	1,714	3.35	10.35	13.69	+10,803	.0
Average	676	21	65	86	.....	.....	.....	+ 540	.0
Entire fore period:									
Total	25,312	867	2,526	3,393	3.43	9.98	13.40	+21,919	.0
Average	633	22	63	85	.....	.....	.....	+ 548	.0
Preservative period.									
First subperiod:									
Total	12,527	482	1,273	1,755	3.85	10.16	14.01	+10,772	3.424
Average	626	24	64	88	.....	.....	.....	+ 538	.171
Second subperiod:									
Total	12,855	440	1,191	1,631	3.42	9.26	12.69	+11,224	8.000
Average	643	22	60	82	.....	.....	.....	+ 561	.400
Third subperiod:									
Total	12,786	466	1,233	1,699	3.64	9.64	13.29	+11,087	8.000
Average	639	23	62	85	.....	.....	.....	+ 554	.400
Fourth subperiod:									
Total	12,687	515	1,357	1,872	4.06	10.70	14.76	+10,815	8.000
Average	634	26	68	94	.....	.....	.....	+ 540	.400
Entire preservative period:									
Total	50,855	1,903	5,054	6,957	3.74	9.94	13.68	+43,898	27.424
Average	636	24	63	87	.....	.....	.....	+ 549	.343
After period.									
First subperiod:									
Total	12,786	533	1,280	1,813	4.17	10.01	14.18	+10,973	.0
Average	639	27	64	91	.....	.....	.....	+ 548	.0
Second subperiod:									
Total	12,595	500	1,273	1,773	3.97	10.11	14.08	+10,822	.0
Average	630	25	64	89	.....	.....	.....	+ 541	.0
Entire after period:									
Total	25,381	1,033	2,553	3,586	4.07	10.06	14.13	+21,795	.0
Average	635	26	64	90	.....	.....	.....	+ 545	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 1 and 4.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sodium sulphite administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6,560	237	700	937	3.61	10.67	14.28	+ 5,620	0.0
Average	656	24	70	94	.....	.....	.....	+ 562	.0
Second subperiod:									
Total	6,231	217	693	910	3.48	11.12	14.60	+ 5,321	.0
Average	623	22	69	91	.....	.....	.....	+ 532	.0
Entire fore period:									
Total	12,791	454	1,393	1,847	3.55	10.89	14.44	+10,941	.0
Average	640	23	70	93	.....	.....	.....	+ 547	.0
Preservative period.									
First subperiod:									
Total	6,158	218	677	895	3.54	10.99	14.53	+ 5,263	2.230
Average	616	22	68	90	.....	.....	.....	+ 526	.223
Second subperiod:									
Total	6,396	271	682	953	4.24	10.66	14.90	+ 5,443	5.080
Average	639	27	68	95	.....	.....	.....	+ 544	.508
Third subperiod:									
Total	6,386	166	725	891	2.60	11.35	13.95	+ 5,495	7.620
Average	639	17	72	89	.....	.....	.....	+ 550	.762
Fourth subperiod:									
Total	6,532	208	771	979	3.18	11.80	14.99	+ 5,553	8.910
Average	653	21	77	98	.....	.....	.....	+ 555	.891
Entire preservative period:									
Total	25,472	863	2,855	3,718	3.39	11.21	14.60	+21,754	23.840
Average	637	22	71	93	.....	.....	.....	+ 544	.596
After period.									
First subperiod:									
Total	6,568	176	719	895	2.68	10.95	13.63	+ 5,673	.0
Average	657	18	72	90	.....	.....	.....	+ 567	.0
Second subperiod:									
Total	6,553	201	689	890	3.07	10.51	13.58	+ 5,663	.0
Average	655	20	69	89	.....	.....	.....	+ 566	.0
Entire after period:									
Total	13,121	377	1,408	1,785	2.87	10.73	13.60	+11,336	.0
Average	656	19	70	89	.....	.....	.....	+ 567	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 5 and 6.

Period.	1 In Food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1—4).	9 Sodium sulphite administered (SO_2).
Fore period.									
Second subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6,092	206	553	759	3.38	9.08	12.46	+ 5,333	0.0
Average	609	21	55	76	.....	.....	.....	+ 533	.0
Preservative period.									
First subperiod:									
Total	6,142	211	603	814	3.44	9.82	13.25	+ 5,328	2.230
Average	614	21	60	81	.....	.....	.....	+ 533	.223
Second subperiod:									
Total	6,103	282	618	900	4.62	10.13	14.75	+ 5,203	5.080
Average	610	28	62	90	.....	.....	.....	+ 520	.508
Third subperiod:									
Total	5,531	199	573	772	3.60	10.36	13.96	+ 4,759	6.350
Average	553	20	57	77	.....	.....	.....	+ 476	.635
Fourth subperiod:									
Total	5,236	224	510	734	4.28	9.74	14.02	+ 4,502	.0
Average	524	22	51	73	.....	.....	.....	+ 451	.0
Entire preservative period:									
Total	23,012	916	2,304	3,220	3.98	10.01	13.99	+19,792	13.660
Average	575	23	58	80	.....	.....	.....	+ 495	.342
After period.									
First subperiod:									
Total	5,747	220	526	746	3.83	9.15	12.98	+ 5,001	.0
Average	575	22	53	75	.....	.....	.....	+ 500	.0
Second subperiod:									
Total	5,691	203	522	725	3.57	9.17	12.74	+ 4,966	.0
Average	569	20	52	72	.....	.....	.....	+ 497	.0
Entire after period:									
Total	11,438	423	1,048	1,471	3.70	9.16	12.86	+ 9,967	.0
Average	572	21	52	74	.....	.....	.....	+ 498	.0

TABLE XX.—*Solids balances for Series VII*—Continued.

[Averages are per man per day.]

Nos. 7 and 12.

Period.	1 In food.	2 In feces.	3 In urine.	4 In feces and urine (2+3).	5 In feces (2÷1).	6 In urine (3÷1).	7 In feces and urine (4÷1).	8 Balance (1−4).	9 Sulphurous acid administered (SO_2).
Fore period.									
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per ct.*	*Per ct.*	*Per ct.*	*Grams.*	*Grams.*
Total	6,268	216	563	779	3.45	8.98	12.43	+ 5,489	0.0
Average	627	22	56	78	.....	.....	.....	+ 549	.0
Second subperiod:									
Total	5,923	196	576	772	3.31	9.72	13.03	+ 5,151	.0
Average	592	20	58	77	.....	.....	.....	+ 515	.0
Entire fore period:									
Total	12,191	412	1,139	1,551	3.38	9.34	12.72	+10,640	.0
Average	610	21	57	78	.....	.....	.....	+ 532	.0
Preservative period.									
First subperiod:									
Total	6,108	257	609	866	4.21	9.97	14.18	+ 5,242	1.712
Average	611	26	61	87	.....	.....	.....	+ 524	.171
Second subperiod:									
Total	6,153	176	632	808	2.86	10.27	13.13	+ 5,345	3.600
Average	615	18	63	81	.....	.....	.....	+ 534	.360
Third subperiod:									
Total	5,991	193	627	820	3.22	10.47	13.69	+ 5,171	3.400
Average	599	19	63	82	.....	.....	.....	+ 517	.340
First, second and third subperiods:									
Total	18,252	626	1,868	2,494	3.43	10.23	13.66	+15,758	8.712
Average	608	21	62	83	.....	.....	.....	+ 525	.290

Nos. 7 to 12.

Fore period.									
First subperiod:									
Total	19,063	664	1,794	2,458	3.48	9.41	12.89	+16,605	0.0
Average	635	22	60	82	.....	.....	.....	+ 553	.0
Second subperiod:									
Total	18,440	615	1,871	2,486	3.34	10.15	13.48	+15,954	.0
Average	615	20	62	83	.....	.....	.....	+ 532	.0
Entire fore period:									
Total	37,503	1,279	3,665	4,944	3.41	9.77	13.18	+32,559	.0
Average	625	21	61	82	.....	.....	.....	+ 543	.0
Preservative period.									
First subperiod:									
Total	18,635	739	1,882	2,621	3.97	10.10	14.06	+16,014	5.136
Average	621	25	63	87	.....	.....	.....	+ 534	.171
Second subperiod:									
Total	19,008	616	1,823	2,439	3.24	9.59	12.83	+16,569	11.600
Average	634	21	61	81	.....	.....	.....	+ 553	.387
Third subperiod:									
Total	18,777	659	1,860	2,519	3.51	9.91	13.42	+16,258	11.400
Average	626	22	62	84	.....	.....	.....	+ 542	.380
First, second, and third subperiods:									
Total	56,420	2,014	5,565	7,579	3.57	9.86	13.43	+48,841	28.136
Average	627	22	62	84	.....	.....	.....	+ 543	.313

SUMMARY OF RESULTS.

MEDICAL AND CLINICAL DATA.

These data clearly show that the administration of sulphites and of sulphurous acid in a free state in the quantities employed produces harmful effects. A tendency is manifested in practically every case to produce headache and digestive disturbances. In some cases these symptoms are not clearly marked, while in others they are extremely well defined. In many cases uneasy sensations and even pain were developed in the stomach and intestines, and there were complaints of "heartburn." The occurrence of this class of symptoms during the administration of the preservative and their gradual disappearance during the after period seem to be conclusive evidence that they could have been due only to the effect of the preservative itself. There were also in some cases attacks of dizziness and palpitation of the heart. In a few cases nausea was developed to the extent of vomiting.

It was recognized, as in previous experiments, that the mental attitude of the subject might play some part in producing these symptoms or at least might affect the description of them by the man himself. That this, however, does not exercise a dominant influence was more than established by the remarkable effects of the administration of salicylic acid, where, with the same opportunities for mental effects of a depressing character, there was manifested, on the contrary, a persistent demand for more food, the salicylic acid apparently serving as a stimulant. There is no doubt, therefore, of the fact that the symptoms which are described in the medical history are those actually experienced by the young men, any tendency to exaggeration in the reporting of these symptoms having been carefully considered at the time.

In the case of the men who received sodium sulphite the conclusion is inevitable that the administration of this preservative in the great majority of cases causes headache, sensations of dizziness, and occasional nausea, indigestion, pains in the stomach, and other unfavorable symptoms. With the men who received sulphurous acid in an uncombined state, headache was very common, there was a slight tendency to dizziness, accompanied in some cases by nausea, and a feeling of exhaustion and weakness.

In general it may be said that the most prominent symptom was that of headache, which could hardly have been caused by the imagination. This symptom was very commonly and very persistently experienced at some time during the preservative period.

BODY WEIGHT.

The administration of the sodium sulphite was accompanied by a slight average loss of weight during the preservative period, but the full effect of the preservative in diminishing the weight of the body was shown only toward the end of the preservative period, and there was a continued loss in weight during the after period.

It appears, therefore, that the administration of sulphurous acid in the form of sulphite tends to reduce the weight of the body slowly, and that this tendency is continued for a considerable time after the withdrawal of the preservative. There was a very slight increase in the average weight of the body under the administration of the sulphurous acid in the uncombined form, which increase continued in the after period. The comparison of the weights for individuals and for the summaries is best made by consulting the graphic charts (figs. 1 and 2).

COMPOSITION OF THE FECES.

The administration of the preservative showed a marked tendency to increase the amount of water in the feces. This was not of sufficient magnitude to warrant classing the preservative as a purgative or cathartic, as the stools were not of a watery consistency. Further, there was no tendency manifested to lessen the secretion of the urine, in fact in general a diuretic effect was shown. It is of interest to note this tendency in connection with that of other salts classified as purgatives, and the other disturbances caused by the preservative.

There was a larger quantity of dry matter excreted in the feces under the administration of the preservative, showing a tendency to decrease to this extent the absorption of the food from the intestinal canal. There is thus manifested a tendency on the part of this preservative to derange the metabolic process in so far as these changes in the composition of the feces are concerned.

THE URINE.

VOLUME AND ACIDITY.

A notable effect of the preservative upon the urine in Series VII was in the increase in volume, thus showing a slight tendency to produce a diuretic effect. This tendency to diuresis is more marked in the cases where sulphurous acid is given in a free state than when it is combined as sulphite. The total solids in the urine were also slightly increased, and there was a marked tendency to increase the acidity, especially in the case of the administration of sodium sulphite. It is evident, therefore, that sulphurous acid has a disturbing effect upon the excretion of the urine and this effect in general is confirmed by the special Series XIII, in which the sodium sulphite produced a

very slight reduction in volume, while sulphurous acid again showed a diuretic effect.

In the special Series XI no diuretic effect is shown; it must be noted, however, that only three subjects took part in this experiment, none of whom was in the original series, and the time of year also may have influenced this result to the slight extent shown, inasmuch as Series XI was conducted in the spring and Series VII in the winter.

PRESENCE OF ALBUMIN.

The data which have been recorded for Series VII and XI show unmistakable evidence that the preservative in certain cases produced albuminuria. In the cases in which traces of albumin are present in the fore period, however, there is no proof that the condition was accentuated by the preservative. A further study will be necessary to definitely establish this point.

MICROSCOPIC BODIES.

In general, there is shown an increase in the various bodies indicated in the routine examination, particularly in the case of mucous strands and mucous cylindroids. There was no evidence shown which would indicate any lesions produced, as would be evidenced by a largely increased production of the various casts, but the data taken as a whole indicate a strong tendency on the part of the preservative to produce an increased renal activity as evidenced by the general increase of the microscopic bodies.

DISTRIBUTION OF NITROGENOUS BODIES.

In the special study (Series XI) made to determine the effects of the preservative on the distribution of the nitrogen-bearing bodies in the urine, there is shown a decrease in the quantity of urea excreted during the preservative period. There is also a decrease in the total nitrogen excreted which is contrary to the tendency shown in Series VII. For the reasons given under the discussion of the volume of the urine the data for Series VII must be given greater weight.

The other bodies remain very constant. There is a tendency to slightly decrease the amounts of uric acid and ammonia, under the influence of the preservative, while kreatinin is slightly increased. This disturbance, the decrease of urea and the increase of kreatinin, shows an interesting relation in so far as the normal processes in regard to the excretion of these bodies is concerned. Urea, which of all the materials excreted contains the largest amount of nitrogen, is believed by some to be an indication of the proteid metabolism. Recently the excretion of kreatinin has received more attention and is regarded by Folin and others as an index to katabolic changes, as during normal metabolism it should remain constant.

The fact that here one is decreased, while the other is increased, is quite significant, and, considered in connection with other disturbances noted, shows that the preservative has exerted a marked influence in deranging the metabolic functions.

SULPHUR.

Under the conditions of the experiment the sulphur studies present especially interesting data.

As would be expected, the quantity of inorganic sulphates excreted in the urine is very largely increased by the administration of sulphurous acid and sulphite, this increase, whether sulphite or sulphurous acid was ingested, accounting for the greater part of the preservative sulphur eliminated.

In addition to the increase in inorganic sulphates, an important fact brought out by the data is the increase in the organic combination of sulphur, known as neutral sulphur. This sulphur was uniformly increased in every case, during the preservative period, and in some instances, particularly in the subjects receiving sulphurous acid, where there was no interval between the preservative and after periods, this increase was carried into the after period.

A point worthy of notice here is the fact that the sum of the increase in neutral and inorganic sulphur in the preservative period alone more than accounts for the preservative sulphur ingested. This, when the after period is considered, may be derived from an increase in katabolic activities. There does not appear to be any marked effect on the excretion of ethereal sulphates. Half of the subjects, however, show an increase in the excretion of this form of sulphates, which, in the case of these individuals, may indicate a slight increase in the putrefactive changes taking place in the intestines, although, since this increase occurred in the case of the subjects receiving sulphurous acid, it may be attributed to direct combination in the intestines.

There is the same tendency shown throughout by the data, namely, the rapid elimination of practically all of the preservative sulphur in an oxidized form in the urine.

MICROSCOPIC EXAMINATION OF THE BLOOD.

One of the most important conclusions established by the experimental data is that which relates to the comparative number of blood corpuscles and the quantity of hemoglobin, as influenced by the action of the sulphurous acid. The data here are of such a character as to admit of no doubt whatever as to their interpretation. Under the influence of the sulphurous acid both the number of red and of white corpuscles in the blood is largely diminished. This is true whether the sulphurous acid is exhibited in the form of sulphites or as free

acid. In Series VII the number of red corpuscles in a cubic millimeter of the blood is about one million less in three individual cases, and a uniform decrease is recorded for all but two individuals. In the special study, Series XIII, this effect is confirmed. During the after period the loss in the number of red corpuscles is partially restored and doubtless would have been completely restored had the after period been continued longer. The relative decrease of the white corpuscles is even greater than that of the red corpuscles, but is not marked by the same uniformity. This loss is also partially restored during the after period. The data, therefore, are very striking in showing the tendency of the sulphurous acid to diminish the number of both red and white corpuscles, and also to diminish the percentage of hemoglobin. The relation between the decrease in hemoglobin and red corpuscles, as expressed by the color index, shows that the relative decrease of hemoglobin in the blood is not so great as that of the red cells.

NITROGEN METABOLISM.

The general effect of the preservative upon the assimilation and excretion of nitrogen, as shown by the balance sheets, is not strongly marked. It is evident, however, that there is some disturbance of nitrogen metabolism, especially in inhibiting the absorption of nitrogen in the intestines, inasmuch as both summaries agree in showing an increase of nonmetabolized nitrogen during the preservative period. There was a much more marked disturbance in the case of the subjects receiving sodium sulphite, those receiving sulphurous acid (representing a smaller ingestion of SO_2) showing but little variation from normal conditions.

PHOSPHORIC-ACID METABOLISM.

The summaries show that there is quite a marked tendency on the part of the preservative to derange in a measurable degree the metabolism of phosphoric acid. Sulphur both as sulphite and as free sulphurous acid tends to increase the quantity of phosphoric acid excreted in the feces and to decrease the quantity excreted in the urine. It may, therefore, be said to have a decidedly inhibiting effect upon the phosphoric-acid metabolism.

SULPHUR METABOLISM.

The most important point brought out by an inspection of the sulphur balance sheets is the increased elimination of sulphur over that ingested as preservative. There is an increase in both the urine and the feces, the increase in the urine during the preservative period alone in the case of the subjects receiving sodium sulphite being

greater than the amount of preservative sulphur ingested, while in the case of sulphurous acid the increase corresponds almost exactly to the amount of preservative sulphur ingested.

The increase in the feces, considering the same tendency shown in the nitrogen and phosphoric-acid balances, can hardly be attributed to an elimination of preservative sulphur through this channel, but rather, as is before mentioned, to a decrease in assimilation and absorption from the ingested food. This fact, together with the probable increase in katabolic activities shown as regards the sulphur, indicates that the administration of the preservative produced decidedly unfavorable effects.

These tendencies are more marked in the case of sodium sulphite, though the variations in the conditions of the experiment must be considered in making this statement.

TABLE XXI.—*Comparative summary of principal determinations made, Series VII.*

Data.	Sodium sulphite (Nos. 1-6).[a]			Sulphurous acid (Nos. 8-11).[b]		
	Fore period.	Preservative period.	After period.	Fore period.	Preservative period.	After period.
Body weights (kilos)	63.71	62.78	62.28	61.87	62.00	62.07
Composition of feces:						
Weight (grams)	82.00	103.00	85.00	87.00	102.00	115.00
Water content (per cent)	72.50	76.15	75.40	74.97	76.60	77.63
Dry matter (grams)	23.00	25.00	21.00	22.00	24.00	26.00
Urine:						
Volume (cc.)	1,092.00	1,139.00	1,076.00	1,195.00	1,402.00	1,415.00
Microscopic sediments (per cent of relative occurrence)[c]	54.50	66.70	65.50	.....	.....	.....
Albumin (arbitrary values for relative occurrence)[d]	0	13	7	.....	.....	.....
Sulphur (as SO_3):						
Neutral	.312	.419	.372	.281	.371	.409
Inorganic	2.164	2.729	2.104	1.943	2.249	2.016
Ethereal	.165	.167	.156	.140	.155	.142
Total	2.642	3.316	2.631	2.364	2.774	2.567
Metabolism (percentage results):						
Nitrogen—						
Nonmetabolized (feces)	7.50	8.54	7.47	8.04	8.78	9.26
Metabolized (urine)	85.10	87.17	88.17	80.55	79.10	81.13
Phosphoric acid:						
Nonmetabolized (feces)	29.93	36.34	29.91	32.81	37.13	36.66
Metabolized (urine)	60.03	58.82	57.60	53.66	52.85	51.01
Sulphur:						
Nonmetabolized (feces)—						
Food sulphur only	11.20	12.13	10.05	11.05	11.85	11.73
Including S in preservative	.....	10.16	.....	.....	10.42	.....
Metabolized (urine)—						
Food sulphur only	82.55	106.66	85.32	74.09	89.36	80.31
Including S in preservative	.....	89.30	.....	.....	78.52	.....

[a] Received an average of 0.472 gram per day of SO_2.
[b] Received an average of 0.343 gram per day of SO_2.
[c] Nos. 1 to 12.
[d] Calculated only for subjects who showed no albumin in fore period; including Nos. 1 to 12.

SERIES XI.

THE EFFECT OF SULPHUROUS ACID AND SODIUM SULPHITE ON THE DISTRIBUTION OF THE NITROGENOUS ELEMENTS OF THE URINE.

INTRODUCTION.

This special study was undertaken in the spring of 1905 to supplement the work already done in Series VII in regard to the effects of the preservative on the distribution of the nitrogenous bodies in the urine. The same methods of analysis were employed as in the special study made in regard to salicylic acid and salicylates, the experiment having been conducted at the same time.[a]

SCHEDULE OF ADMINISTRATION OF THE PRESERVATIVE.

In Table I are given the dates of the periods and subperiods for the special study and the amounts of preservative administered:

TABLE I.—*Schedule of administration of preservative, Series XI.*

Period.	Sulphurous acid as SO_2 (Nos. 3 and 4).	Sodium sulphite as SO_2 (No. 10).
Fore period.	*Grams.*	*Grams.*
First subperiod: Apr. 17-21	0.0	0.0
Second subperiod: Apr. 22-26	.0	.0
Preservative period.		
First subperiod:		
Apr. 27	0.1	0.3
28	.1	.3
29	.1	.3
30	.1	.3
May 1	.1	.3
Total	.5	1.5
Second subperiod:		
May 2	.2	.6
3	.2	.6
4	.2	.6
5	.2	.6
6	.2	.6
Total	1.0	3.0
Third subperiod:		
May 7	.3	.9
Preservative period—Cont'd.	*Grams.*	*Grams.*
Third subperiod—Continued.		
May 8	0.3	0.9
9	.3	.9
10	.3	.9
11	.3	.9
Total	1.5	4.5
Fourth subperiod:		
May 12	.4	1.2
13	.4	1.2
14	.4	1.2
15	.4	1.2
16	.4	1.2
Total	2.0	6.0
Entire preservative period	5.0	15.0
After period.		
First subperiod: May 17-21	0	0
Second subperiod: May 22-26	0	0

[a] See Bulletin 84, Pt. II, p. 722.

PRESENCE OF ALBUMIN AND REACTION OF THE URINE.

A special comparison of the reaction of the urine and the presence of albumin is made in this supplemental study, the results being given in Table II. The acidity is expressed in quantities of tenth-normal sodium hydroxid required to neutralize the acid of 100 cc of urine. Nos. 3, 4, and 10, in this supplemental series are not the same individuals as those so designated in Series VII.

In the case of No. 3, it is noticed that the urine is decidedly more acid in the preservative period than in the fore period and less acid in the after period than in either of the other periods, as measured by sodium hydroxid. The urine reacted acid four times and was amphoteric four times in the fore period, as determined by litmus paper. It reacted acid twelve times and was amphoteric twice in the preservative period, determined in the same way. In the after period the reaction with litmus paper is acid in every case. In regard to the tests for albumin, three tests out of five are negative in the fore period. In the preservative period reactions for albumin are positive three times and negative four times. In the after period the reaction for albumin is positive once and three times the tests are negative. There is a slightly greater relative occurrence, therefore, of albumin in the preservative period than in either of the others.

In the case of No. 4 the acidity of the urine as measured by sodium hydroxid is greater in the preservative period than in the fore period. The number of amphoteric reactions of the urine in the fore period is greater than that of the acid reactions, and in the preservative period the number is the same, while in the after period 7 tests give an acid reaction, while only 1 gives an amphoteric reaction. Traces of albumin are found at all observations in the urine of No. 4.

In the case of No. 10 the acidity is greater in the fore period than in either the preservative or after period. The reaction is acid in all cases except two and uniformly acid during the preservative period. Albumin is found at every test during all periods of the observation. The summary for Nos. 3, 4, and 10 show the average acidity measured by sodium hydroxid to be 42.9 in the fore period, 44.3 in the preservative period, and 34.6 in the after period. The average number of acid reactions in the fore period is 12, in the preservative period 34, and in the after period 21, while the number of amphoteric reactions is 10 in the fore period, 9 in the preservative period, and 2 in the after period. Albumin occurs in 10 tests out of 13 in the fore period, in 16 out of 20 in the preservative period, and in 11 out of 14 in the after period. These data indicate a very slight tendency on the part of the preservative to increase the number of albumin reactions in the urine.

TABLE II.—*Reaction of the urine and presence of albumin, Series XI.*

No. 3.

Period and subperiod.	Reaction expressed in cc $\frac{N}{10}$ NaOH per 100 cc.	Reaction determined by litmus paper.		Albumin.	
		Times acid.	Times amphoteric.	Times negative.	Times positive.
Fore period.					
First subperiod: Total	.....	3	2	2	1
Second subperiod:					
Total	.....	1	2	1	1
Average	46.5	.....	.....	.....	.....
Entire fore period: Total	.....	4	4	3	2
Preservative period.					
First subperiod:					
Total	.....	2	1	1	1
Average	55.5	.....	.....	.....	.....
Second subperiod:					
Total	.....	3	1	2	0
Average	51.5	.....	.....	.....	.....
Third subperiod:					
Total	.....	3	0	1	0
Average	52.8	.....	.....	.....	.....
Fourth subperiod:					
Total	.....	4	0	0	2
Average	59.2	.....	.....	.....	.....
Entire preservative period:					
Total	.....	12	2	4	3
Average	54.8	.....	.....	.....	.....
After period.					
First subperiod:					
Total	.....	3	0	1	1
Average	41.7	.....	.....	.....	.....
Second subperiod:					
Total	.....	5	0	2	0
Average	44.1	.....	.....	.....	.....
Entire after period:					
Total	.....	8	0	3	1
Average	42.9	.....	.....	.....	.....

TABLE II.—*Reaction of the urine and presence of albumin, Series XI*—Continued.

No. 4.

Period and subperiod.	Reaction expressed in cc $\frac{N}{10}$ NaOH per 100 cc.	Reaction determined by litmus paper.		Albumin.	
		Times acid.	Times amphoteric.	Times negative.	Times positive.
Fore period.					
First subperiod: Total	.....	3	2	0	3
Second subperiod:					
Total	.....	0	3	0	2
Average	36.6	.....	.....	.....	.....
Entire fore period: Total	.....	3	5	0	5
Preservative period.					
First subperiod:					
Total	.....	0	3	0	1
Average	42.5	.....	.....	.....	.....
Second subperiod:					
Total	.....	2	2	0	2
Average	33.7	.....	.....	.....	.....
Third subperiod:					
Total	.....	1	2	0	1
Average	33.3	.....	.....	.....	.....
Fourth subperiod:					
Total	.....	4	0	0	2
Average	52.0	.....	.....	.....	.....
Entire preservative period:					
Total	.....	7	7	0	6
Average	40.4	.....	.....	.....	.....
After period.					
First subperiod:					
Total	.....	2	1	0	2
Average	30.9	.....	.....	.....	.....
Second subperiod:					
Total	.....	5	0	0	2
Average	33.6	.....	.....	.....	.....
Entire after period:					
Total	.....	7	1	0	4
Average	32.3	.....	.....	.....	.....

TABLE II.—*Reaction of the urine and presence of albumin, Series XI*—Continued.

No. 10.

Period and subperiod.	Reaction expressed in cc $\frac{N}{10}$ NaOH per 100 cc.	Reaction determined by litmus paper.		Albumin.	
		Times acid.	Times amphoteric.	Times negative.	Times positive.
Fore period.					
First subperiod: Total	.....	1	1	0	1
Second subperiod:					
Total	.....	4	0	0	2
Average	.....	.....	.....	.....	.....
Entire fore period: Total	45.5	5	1	0	3
Preservative period.					
First subperiod:					
Total	.....	3	0	0	1
Average	42.4	.....	.....	.....	.....
Second subperiod:					
Total	.....	3	0	0	1
Average	47.1	.....	.....	.....	.....
Third subperiod:					
Total	.....	4	0	0	3
Average	35.2	.....	.....	.....	.....
Fourth subperiod:					
Total	.....	5	0	0	2
Average	25.9	.....	.....	.....	.....
Entire preservative period:					
Total	.....	15	0	0	7
Average	37.7	.....	.....	.....	.....
After period.					
First subperiod:					
Total	.....	2	1	0	2
Average	25.2	.....	.....	.....	.....
Second subperiod:					
Total	.....	4	0	0	4
Average	31.9	.....	.....	.....	.....
Entire after period:					
Total	.....	6	1	0	6
Average	28.6	.....	.....	.....	.....

TABLE III.—*Reaction of the urine and presence of albumin, Series XI*—Continued.

Summary (Nos. 3, 4, and 10).

Period and subperiod.	Reaction expressed in cc $\frac{N}{10}$ NaOH per 100 cc.	Reaction determined by litmus paper.		Albumin.	
		Times acid.	Times amphoteric.	Times negative.	Times positive.
Fore period.					
First subperiod: Total	.....	7	5	2	5
Second subperiod:					
Total	.....	5	5	1	5
Average	.....	.....	.....	.....	.....
Entire fore period: Total	42.9	12	10	3	10
Preservative period.					
First subperiod:					
Total	.....	5	4	1	3
Average	46.8	.....	.....	.....	.....
Second subperiod:					
Total	.....	8	3	2	3
Average	44.1	.....	.....	.....	.....
Third subperiod:					
Total	.....	8	2	1	4
Average	40.4	.....	.....	.....	.....
Fourth subperiod:					
Total	.....	13	0	0	6
Average	45.7	.....	.....	.....	.....
Entire preservative period:					
Total	.....	34	9	4	16
Average	44.3	.....	.....	.....	.....
After period.					
First subperiod:					
Total	.....	7	2	1	5
Average	32.6	.....	.....	.....	.....
Second subperiod:					
Total	.....	14	0	2	6
Average	36.5	.....	.....	.....	.....
Entire after period:					
Total	.....	21	2	3	11
Average	34.6	.....	.....	.....	.....

ANALYTICAL RESULTS.

INDIVIDUAL DATA.

In this supplementary investigation an attempt was made to supply a constant quantity of nitrogen in the food. This was done by using only one kind of meat, namely, beefsteak, and varying the other foods in such a way as not to disturb the quantity of nitrogen ingested, which calculation was based upon the average analyses of the foods of the preceding year. It is evident that there are certain variations in the composition of beef and other foods which render it improbable that the quantity of nitrogen ingested is exactly that given, but it is fair to assume that the quantity of nitrogen consumed daily varies but slightly from the constant figure used to express it.

Table XXIV shows the total volume of urine, the specific gravity, the weight of total solids, the total nitrogen ingested, the total nitrogen excreted in the urine, and the distribution of that nitrogen among the various nitrogenous constituents. The total quantities of these constituents and the percentage of these bodies in terms of total nitrogen eliminated are also given.

In the case of No. 3 the volume is diminished during the preservative period and slightly increased in the after period. There is a gradual increase in solids excreted throughout the periods of observation. There is also shown a tendency on the part of the preservative to diminish the total quantity of nitrogen appearing in the urine. The quantity of urea is also less in the preservative period than in the fore period. The total nitrogen in the urine and the nitrogen as urea are increased during the after period. The uric acid is slightly decreased during the preservative period, and there is also a slight decrease of xanthin, while kreatinin is increased in the preservative period. The ammonia diminishes and the undetermined nitrogen increases. The percentage of nitrogen excreted, based on the total ingested, also diminishes in the preservative period, and likewise the percentage of nitrogen excreted as urea and as uric acid.

In the case of No. 4 there is an indication, as in the case of No. 3, of a diminution in the average volume of urine excreted. The total solids excreted during the preservative period is greater than in the fore period or in the after period. The total nitrogen excreted in the urine is less in the preservative period than in the fore period, and the total urea is likewise less. The uric acid excreted in the preservative period is almost the same as in the fore and after periods. There is little change in the distribution of the other nitrogenous bodies of the urine, kreatinin again being slightly increased. The percentage of nitrogen excreted in the urine, based on the total nitrogen ingested, decreases during the preservative period and again in the fore period. The percentage of nitrogen excreted as urea increases in the preservative period and again slightly in the after period; the percentage excretion of uric acid remains almost the same. The percentage of kreatinin-nitrogen is slightly increased in the preservative period. The percentage of nitrogen excreted as ammonia is the same in the fore and preservative periods, and is slightly decreased in the after period.

In the case of No. 10 the volume of the urine is slightly increased during the preservative period and to a much greater extent in the after period. The weight of total solids excreted is slightly diminished during the preservative period, but very markedly increased in the after period. The total nitrogen excreted in the urine is somewhat less in the preservative period than in the fore period. The nitrogen excreted as urea is also less in the preservative period than in the fore period. The quantity of nitrogen excreted as ammonia slightly increases in the preservative period over the fore period. The percentage of nitrogen excreted in the urine of total ingested nitrogen is very markedly decreased in the preservative period, while it rises to some extent in the after period. The percentage of nitrogen excreted as urea is slightly less in the preservative period and is increased in the after period over the percentage of the fore period. The percentage of nitrogen as uric acid is slightly increased during the preservative

period and also the percentage of nitrogen excreted as ammonia. The nitrogen excreted as kreatinin is slightly less in the preservative period than in either the fore or after periods.

SUMMARIES.

Summaries are given for Nos. 3 and 4, and for 3, 4, and 10, but only the latter is discussed, as the two show the same general tendencies throughout.

The volume of the urine is slightly less in the preservative period than in the fore period, while it is considerably increased over the fore period in the after period, due to the large increase in the case of No. 10. There is no indication in this case, therefore, of any diuretic property of the preservative. The total solids in the urine are slightly increased during the preservative period, and this increase is repeated in the after period. The total nitrogen in the urine is slightly decreased in the preservative period, but there is a tendency shown in the after period to restore the amount to that of the fore period. The quantity of urea excreted during the preservative period is less than during the fore period, and there is a tendency shown during the after period to increase the quantity to that of the fore period. The excretion of uric acid does not seem to be appreciably affected by the exhibition of the preservative. There appears to be no notable effect produced upon the excretion of xanthin under the influence of the preservative. In respect of kreatinin there is a slight increase in the quantity excreted in the preservative period. The excretion of ammonia is not greatly affected by the exhibition of the preservative, but there is a tendency shown to a diminished excretion.

The percentage of nitrogen excreted in the urine of the total ingested nitrogen is considerably diminished during the preservative period and is not fully restored in the after period. The percentage of nitrogen excreted as urea is slightly diminished in the preservative period, but is increased in the after period to a larger percentage than in the fore period. The percentage of nitrogen excreted as uric acid is practically the same in the preservative and after periods. The percentage of nitrogen excreted as xanthin is less in the preservative period and is decidedly less in the after period. The percentage of nitrogen excreted as kreatinin is notably increased in the preservative period, while it is almost the same in the after period as in the fore period. The percentage of nitrogen excreted as ammonia is decreased in the preservative period and increased in the after period to a slightly greater amount than in the fore period.

A summary of the data shows quite unmistakably a tendency on the part of the added preservative to diminish the percentage of urea nitrogen excreted. This diminution is shown to a less extent in all of the nitrogenous constituents of the urine except kreatinin, which slightly increases.

TABLE III.—*Nitrogenous constituents of the urine, Series XI.*

No. 3.

Period.	Volume of urine.	Specific gravity of urine at 25°/25° C.	Total solids in urine.	total nitrogen ingested.	Nitrogen in the urine determined as: Total.	Urea.	Uric acid by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.											
First subperiod:	*cc.*		*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
Total	3,600	1.0306	269.9	.....	65.29	58.90	0.92	0.19	2.07	1.50	1.71
Average	720	.....	54.0	15.75	13.06	11.78	.18	.04	.41	.30	.34
Second subperiod:											
Total	4,040	1.0276	273.2	.....	63.13	57.69	1.00	.22	2.56	1.36	.30
Average	808	.....	54.6	15.75	12.63	11.54	.20	.04	.51	.27	.06
Entire fore period:											
Total	7,640	.....	543.1	.....	128.42	116.59	1.92	.41	4.63	2.86	2.01
Average	764	1.0291	54.3	15.75	12.84	11.66	.19	.04	.46	.29	.20
Preservative period.											
First subperiod:											
Total	3,470	1.0313	266.1	.....	62.65	56.28	.85	.10	3.49	.66	.127
Average	694	.....	53.2	15.75	12.53	11.26	.17	.02	.70	.13	.25
Second subperiod:											
Total	3,620	1.0324	287.4	.....	62.16	55.89	.83	.18	2.30	1.36	1.60
Average	724	.....	57.5	15.75	12.43	11.18	.17	.04	.46	.27	.32
Third subperiod:											
Total	3,830	1.0315	295.6	.....	66.85	59.98	.96	.20	2.47	.78	2.46
Average	766	.....	59.1	15.75	13.37	12.00	.19	.04	.49	.16	.49
Fourth subperiod:											
Total	3,520	1.0324	279.4	.....	60.33	53.15	.78	.17	2.27	1.22	2.74
Average	704	.....	55.9	15.75	12.07	10.63	.16	.03	.45	.24	.55
Entire preservative period:											
Total	14,440	.....	1,128.5	.....	251.99	225.30	3.42	.65	10.53	4.02	8.07
Average	722	1.0319	56.4	15.75	12.60	11.27	.17	.03	.53	.20	.40
After period.											
First subperiod:											
Total	3,740	1.0308	282.2	.....	65.01	58.16	.89	.09	2.42	1.70	1.75
Average	748	.....	56.4	15.75	13.00	11.63	.18	.02	.48	.34	.35
Second subperiod:											
Total	3,965	1.0300	291.4	.....	65.30	60.66	.89	.07	2.28	1.24	. 16
Average	793	.....	58.3	15.75	13.06	12.13	.18	.01	.46	.25	.03
Entire after period:											
Total	7,705	.....	573.6	.....	130.31	118.82	1.78	.16	4.70	2.94	1.91
Average	771	1.0304	57.4	15.75	13.03	11.88	.18	.02	.47	.29	.19

TABLE III.—*Nitrogenous constituents of the urine, Series XI*—Continued.

No. 3—Continued.

Period.	Nitrogenous bodies in urine.					Per cent of ingested nitrogen excreted in urine.	Per cent of total nitrogen of urine determined as:					
	Urea.	Uric acid determined by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).		Urea.	Uric acid by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.												
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Total	126.08	2.75	0.50	5.56	1.82	.....	90.21	1.41	0.29	3.17	2.30	2.62
Average	25.22	.55	.10	1.11	.36	82.92	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	123.50	3.01	.59	6.87	1.65	.....	91.38	1.58	.35	4.06	2.15	.48
Average	24.70	.60	.12	1.37	.33	80.19	.....	.....	.....	.....	.....	.....
Entire fore period:												
Total	249.58	5.76	1.09	12.43	3.47	.....	90.79	1.50	.32	3.61	2.23	1.57
Average	24.96	.58	.11	1.24	.35	81.52	.....	.....	.....	.....	.....	.....
Preservative period.												
First subperiod:												
Total	120.48	2.55	.27	9.37	.80	.....	89.83	1.36	.16	5.57	1.05	2.0
Average	24.10	.51	.05	1.87	.16	79.56	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	119.65	2.47	.49	6.17	1.65	.....	89.91	1.34	.29	3.70	2.19	2.57
Average	23.93	.49	.10	1.23	.33	78.92	.....	.....	.....	.....	.....	.....
Third subperiod:												
Total	128.40	2.87	.53	6.65	.95	.....	89.72	1.44	.30	3.69	1.17	3.68
Average	25.68	.57	.11	1.33	.19	84.89	.....	.....	.....	.....	.....	.....
Fourth subperiod:												
Total	113.78	2.34	.45	6.11	1.49	.....	88.10	1.29	.28	3.76	2.02	4.54
Average	22.76	.47	.09	1.22	.30	76.63	.....	.....	.....	.....	.....	.....
Entire preservative period:												
Total	482.31	10.23	1.74	28.30	4.89	.....	89.41	1.36	.26	4.18	1.60	3.2
Average	24.12	.51	.09	1.42	.24	80.00	.....	.....	.....	.....	.....	.....
After period.												
First subperiod:												
Total	124.50	2.67	.24	6.49	2.06	.....	89.46	1.37	.14	3.72	2.61	2.69
Average	24.90	.53	.05	1.30	.41	82.54	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	129.86	2.67	.20	6.12	1.50	.....	92.89	1.36	.11	3.49	1.90	.25
Average	25.97	.53	.04	1.22	.30	82.92	.....	.....	.....	.....	.....	.....
Entire after period:												
Total	254.36	5.34	.44	12.61	3.56	.....	91.18	1.37	.12	3.61	2.26	1.47
Average	25.44	.53	.04	1.26	.36	82.73	.....	.....	.....	.....	.....	.....

No. 4.

Period.	Volume of urine.	Specific gravity of urine at 25°/25° C.	Total solids in urine.	Total nitrogen ingested.	Nitrogen in the urine determined as: Total.	Urea.	Uric acid by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.											
First subperiod:	*cc.*		*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
Total	4,210	1.0260	268.2	.....	62.66	56.71	0.85	0.13	2.31	1.17	1.49
Average	842	.....	53.6	16.65	12.53	11.34	.17	.03	.46	.23	.30
Second subperiod:											
Total	4,700	1.0253	290.2	.....	67.72	61.38	.91	.24	2.69	.80	1.70
Average	940	.....	58.0	16.65	13.54	12.28	.18	.05	.54	.16	.34
Entire fore period:											
Total	8,910	.....	558.4	.....	130.38	118.09	1.76	.37	5.00	1.97	3.19
Average	891	1.0257	55.8	16.65	13.04	11.81	.18	.04	.50	.20	.32
Preservative period.											
First subperiod:											
Total	4,275	1.0268	280.7	.....	65.46	59.85	.92	.19	3.58	.92	.00
Average	855	.....	56.1	16.65	13.09	11.97	.18	.04	.72	.18	.00
Second subperiod:											
Total	4.230	1.0286	296.4	.....	57.89	52.58	.70	.18	2.55	.94	.94
Average	846	.....	59.3	16.65	11.58	10.52	.14	.04	.51	.19	.19
Third subperiod:											
Total	4,740	1.0256	297.3	.....	68.14	62.38	.88	.14	2.86	.80	1.08
Average	948	.....	59.5	16.65	13.63	12.48	.18	.03	.57	.16	.22
Fourth subperiod:											
Total	4,040	1.0282	279.1	.....	63.18	57.17	.84	.19	2.44	1.17	1.37
Average	808	.....	55.8	16.65	12.64	11.43	.17	.04	0.49	.23	.27
Entire preservative period:											
Total	17,285	.....	1,153.5	.....	254.67	231.98	3.34	.70	11.43	3.83	3.39
Average	864	1.0273	57.7	16.65	12.73	11.60	.17	.04	.57	.19	.17
After period.											
First subperiod:											
Total	4,550	1.0236	236.1	.....	56.07	51.33	.73	.11	2.29	.85	.76
Average	910	.....	47.2	16.65	11.21	10.27	.15	.02	.46	.17	.15
Second subperiod:											
Total	4,960	1.0245	297.7	.....	67.78	62.35	.91	.12	2.30	.85	1.25
Average	992	.....	59.5	16.65	13.56	12.47	.18	.02	.46	.17	.25
Entire after period:											
Total	9,510	.....	533.8	.....	123.85	113.68	1.64	.23	4.59	1.70	2.01
Average	951	1.0240	53.4	16.65	12.39	11.37	.16	.02	.46	.17	.20

TABLE III.—*Nitrogenous constituents of the urine, Series XI*—Continued.

No. 4—Continued.

Period.	Nitrogenous bodies in urine.					Per cent of ingested nitrogen excreted in urine.	Per cent of total nitrogen of urine determined as:					
	Urea.	Uric acid determined by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).		Urea.	Uric acid determined by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
First subperiod:												
Total	121.40	2.54	0.36	6.20	1.42	.....	90.50	1.36	0.21	3.69	1.87	2.38
Average	24.28	.51	.07	1.24	.28	75.26	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	131.40	2.73	.65	7.22	.98	.....	90.64	1.34	.35	3.97	1.18	2.51
Average	26.28	.55	.13	1.44	.20	81.32	.....	.....	.....	.....	.....	.....
Entire fore period:												
Total	252.80	5.27	1.01	13.42	2.40	.....	90.57	1.35	.28	3.83	1.51	2.45
Average	25.28	.53	.10	1.34	.24	78.32	.....	.....	.....	.....	.....	.....
Preservative period.												
First subperiod:												
Total	128.12	2.77	.50	9.62	1.12	.....	91.43	1.41	.29	5.47	1.41	.00
Average	25.62	.55	.10	1.92	.22	78.62	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	112.56	2.10	.49	6.85	1.14	.....	90.83	1.21	.31	4.40	1.62	1.62
Average	22.51	.42	.10	1.37	.23	69.55	.....	.....	.....	.....	.....	.....
Third subperiod:												
Total	133.54	2.63	.38	7.68	.97	.....	91.55	1.29	.21	4.20	1.17	1.58
Average	26.71	.53	.08	1.54	.19	81.86	.....	.....	.....	.....	.....	.....
Fourth subperiod:												
Total	122.37	2.51	.51	6.55	1.41	.....	90.49	1.33	.30	3.86	1.85	2.17
Average	24.47	.50	.10	1.31	.28	75.92	.....	.....	.....	.....	.....	.....
Entire preservative period:												
Total	496.59	10.01	1.88	30.70	4.64	.....	91.09	1.31	.27	4.49	1.51	1.33
Average	24.83	.50	.94	1.54	.23	76.46	.....	.....	.....	.....	.....	.....
After period.												
First subperiod:												
Total	109.88	2.18	.30	6.14	1.03	.....	91.55	1.30	.20	4.08	1.52	1.36
Average	21.98	.44	.06	1.23	.21	67.33	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	133.47	2.71	.33	6.18	1.03	.....	91.99	1.34	.18	3.39	1.25	1.84
Average	26.69	.54	.07	1.24	.21	81.44	.....	.....	.....	.....	.....	.....
Entire after period:												
Total	243.35	4.89	.63	12.32	2.06	.....	91.79	1.32	.19	3.71	1.37	1.62
Average	24.34	.49	.06	1.23	.21	74.41	.....	.....	.....	.....	.....	.....

No. 10.

Period.	Volume of urine.	Specific gravity of urine at 25°/25° C.	Total solids in urine.	Total nitrogen ingested.	Nitrogen in the urine determined as—						
					Total.	Urea.	Uric acid determined by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.	*cc.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
First subperiod:											
Total	3,675	1.0258	232.3	.....	56.19	51.05	0.84	0.16	2.77	0.89	0.48
Average	735	.....	46.5	14.66	11.24	10.21	.17	.03	.55	.18	.10
Second subperiod:											
Total	4,190	1.0276	283.3	.....	62.49	56.57	.95	.17	2.53	.89	1.38
Average	838	.....	56.7	14.66	12.50	11.31	.19	.03	.51	.18	.28
Entire fore period:											
Total	7,865	1.0267	515.6	.....	118.68	107.62	1.79	.33	5.30	1.78	1.86
Average	787	.....	51.6	14.66	11.87	10.76	.18	.03	.53	.18	.19
Preservative period.											
First subperiod:											
Total	3,650	1.0271	242.3	.....	52.66	45.70	.83	.14	2.20	.56	3.23
Average	730	.....	48.5	14.66	10.53	9.14	.17	.03	.44	.11	.65
Second subperiod:											
Total	4,140	.....	270.8	.....	60.57	54.81	.88	.18	2.50	1.18	1.02
Average	828	1.0267	54.2	14.66	12.11	10.96	.18	.04	.50	.24	.20
Third subperiod:											
Total	4,890	.....	269.6	.....	58.28	52.18	.98	.06	2.46	1.46	1.14
Average	978	1.0225	53.9	14.66	11.66	10.44	.20	.01	.49	.29	.23
Fourth subperiod:											
Total	3,850	.....	239.6	.....	50.73	45.89	.85	.03	2.02	.92	1.02
Average	770	1.0254	47.9	14.66	10.15	9.18	.17	.01	.40	.18	.20
Entire preservative period:											
Total	16,530	1.0254	1,022.3	.....	222.24	198.58	3.54	.41	9.18	4.12	6.41
Average	827	.....	51.1	14.66	11.11	9.93	.18	.02	.46	.21	.32
After period.											
First subperiod:											
Total	4,530	1.0260	288.6	.....	58.88	53.42	.65	.03	2.73	1.06	.79
Average	906	.....	57.7	14.66	11.78	10.68	.13	.01	.55	.21	.20
Second subperiod:											
Total	5,930	1.0220	319.6	.....	56.45	53.13	1.09	.10	2.55	1.10	−2.00
Average	1,186	.....	63.9	14.66	11.29	10.63	.22	.02	.51	.22	− .40
Entire after period:											
Total	10,460	1.0240	608.2	.....	115.33	106.55	1.74	.13	5.28	2.16	−1.21
Average	1,046	.....	60.8	14.66	11.53	10.66	.17	.01	.53	.22	− .12

TABLE III.—*Nitrogenous constituents of the urine, Series XI*—Continued.

No. 10—Continued.

Period.	Nitrogenous bodies in urine.					Per cent of ingested nitrogen excreted in urine.	Per cent of total nitrogen of urine determined as—					
	Urea.	Uric acid determined by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).		Urea.	Uric acid determined by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.												
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Total	109.27	2.51	0.42	7.44	1.08	.....	90.85	1.49	0.28	4.93	1.58	0.85
Average	21.85	.50	.08	1.49	.22	76.67	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	121.09	2.85	.46	6.79	1.08	.....	90.53	1.52	.27	4.05	1.42	2.21
Average	24.22	.57	.09	1.36	.22	85.27	.....	.....	.....	.....	.....	.....
Entire fore period:												
Total	230.36	5.36	.88	14.23	2.16	.....	90.68	1.51	.28	4.47	1.50	1.57
Average	23.04	.54	.09	1.42	.22	80.97	.....	.....	.....	.....	.....	.....
Preservative period.												
First subperiod:												
Total	97.83	2.50	.37	5.91	.68	.....	86.78	1.58	.27	4.18	1.06	6.13
Average	19.57	.50	.07	1.18	.14	71.83	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	117.34	2.62	.49	6.71	1.44	.....	90.49	1.45	.30	4.13	1.95	1.68
Average	23.47	.52	.10	1.34	.29	82.61	.....	.....	.....	.....	.....	.....
Third subperiod:												
Total	111.70	2.95	.16	6.60	1.77	.....	89.53	1.68	.10	4.22	2.51	1.96
Average	22.34	.59	.03	1.32	.35	79.54	.....	.....	.....	.....	.....	.....
Fourth subperiod:												
Total	98.24	2.54	.07	5.43	1.12	.....	90.46	1.68	.06	3.98	1.81	2.01
Average	19.65	.51	.01	1.09	.22	69.24	.....	.....	.....	.....	.....	.....
Entire preservative period:												
Total	425.11	10.61	1.09	24.65	5.01	.....	89.35	1.59	.18	4.13	1.85	2.88
Average	21.26	.53	.05	1.23	.25	75.78	.....	.....	.....	.....	.....	.....
After period.												
First subperiod:												
Total	114.36	1.93	.08	7.34	1.28	.....	90.73	1.10	.05	4.64	1.80	1.34
Average	22.87	.39	.02	1.47	.26	80.35	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	113.74	3.27	.28	6.86	1.33	.....	94.12	1.93	.18	4.52	1.95	−3.54
Average	22.75	.65	.06	1.37	.27	77.01	.....	.....	.....	.....	.....	.....
Entire after period:												
Total	228.10	5.20	.36	14.20	2.61	.....	92.39	1.51	.11	4.58	1.87	−1.50
Average	22.81	.52	.04	1.42	.26	78.65	.....	.....	.....	.....	.....	.....

SUMMARY—Nos. 3 and 4.

Period.	Volume of urine.	Specific gravity of urine at 25°/25° C.	Total solids in urine.	Total nitrogen ingested.	Nitrogen in the urine determined as—						
					Total.	Urea.	Uric acid by Folin's method.	Xanthin.	Kreatinin.	Ammonia.	Undetermined.
Fore period.											
First subperiod:	*cc.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
Total	7,810	.....	538.1	.....	127.95	115.61	1.77	0.32	4.38	2.67	3.20
Average	781	1.0283	53.8	16.20	12.80	11.56	.18	.03	.44	.27	.32
Second subperiod:											
Total	8,740	.....	563.4	.....	130.85	119.07	1.91	.46	5.25	2.16	2.00
Average	874	1.0265	56.3	16.20	13.09	11.91	.19	.05	.53	.22	.20
Entire fore period:											
Total	16,550	.....	1,101.5	.....	258.80	234.68	3.68	.78	9.63	4.83	5.20
Average	828	1.0274	55.1	16.20	12.94	11.73	.18	.04	.48	.24	.26
Preservative period.											
First subperiod:											
Total	7,745	.....	546.8	.....	128.11	116.13	1.77	.29	7.07	1.58	1.27
Average	775	1.0291	54.7	16.20	12.81	11.61	.18	.03	.71	.16	.13
Second subperiod:											
Total	7,850	.....	583.8	.....	120.05	108.47	1.53	.36	4.85	2.30	2.54
Average	785	1.0305	58.4	16.20	12.01	10.85	.15	.04	.49	.23	.25
Third subperiod:											
Total	8,570	.....	592.9	.....	134.99	122.36	1.84	.34	5.33	1.58	3.54
Average	857	1.0286	59.3	16.20	13.50	12.24	.18	.03	.53	.16	.35
Fourth subperiod:											
Total	7,560	.....	558.5	.....	123.51	110.32	1.62	.36	4.71	2.39	4.11
Average	756	1.0303	55.9	16.20	12.35	11.03	.16	.04	.47	.24	.41
Entire preservative period:											
Total	31,725	.....	2,282.0	.....	506.66	457.28	6.76	1.35	21.96	7.85	11.46
Average	793	1.0296	57.1	16.20	12.67	11.43	.17	.03	.55	.20	.29
After period.											
First subperiod:											
Total	8,290	.....	518.3	.....	121.08	109.49	1.62	.20	4.71	2.55	2.51
Average	829	1.0272	51.8	16.20	12.11	10.95	.16	.02	.47	.26	.25
Second subperiod:											
Total	8,925	.....	589.1	.....	133.08	123.01	1.80	.19	4.58	2.09	1.41
Average	893	1.0273	58.9	16.20	13.31	12.30	.18	.02	.46	.21	.14
Entire after period:											
Total	17,215	.....	1,107.4	.....	254.16	232.50	3.42	.39	9.29	4.64	3.92
Average	861	1.0272	55.4	16.20	12.71	11.63	.17	.02	.46	.23	.20

TABLE III.—*Nitrogenous constituents of the urine, Series XI*—Continued.

SUMMARY—Nos. 3 and 4—Continued.

Period.	Nitrogenous bodies in urine.					Per cent of ingested nitrogen excreted in urine.	Per cent of total nitrogen of urine determined as—					
	Urea.	Uric acid determined by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).		Urea.	Uric acid by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.												
First subperiod:	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Total	247.48	5.29	0.86	11.76	3.24	.....	90.36	1.38	0.25	3.42	2.09	2.50
Average	24.75	.53	.09	1.18	.32	79.01	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	254.90	5.74	1.24	14.09	2.63	.....	100.00	1.46	.35	4.01	1.65	1.53
Average	25.49	.57	.12	1.41	.26	80.80	.....	.....	.....	.....	.....	.....
Entire fore period:												
Total	502.38	11.03	2.10	25.85	5.87	.....	90.68	1.42	.30	3.72	1.87	2.01
Average	25.12	.55	.11	1.29	.29	79.88	.....	.....	.....	.....	.....	.....
Preservative period.												
First subperiod:												
Total	248.60	5.32	.77	18.99	1.92	.....	90.65	1.38	.23	5.52	1.23	.99
Average	24.86	.53	.08	1.90	.19	79.07	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	232.21	4.57	.98	13.02	2.79	.....	90.35	1.27	.30	4.04	1.92	2.12
Average	23.22	.46	.10	1.30	.28	74.14	.....	.....	.....	.....	.....	.....
Third subperiod:												
Total	261.94	5.50	.91	14.33	1.92	.....	90.64	1.36	.25	3.95	1.17	2.62
Average	26.19	.55	.09	1.43	.19	83.33	.....	.....	.....	.....	.....	.....
Fourth subperiod:												
Total	236.15	4.85	.96	12.66	2.90	.....	89.32	1.31	.29	3.81	1.94	3.33
Average	23.62	.49	.10	1.27	.29	76.23	.....	.....	.....	.....	.....	.....
Entire preservative period:												
Total	978.90	20.24	3.62	59.00	9.53	.....	90.25	1.33	.27	4.33	1.55	2.26
Average	24.47	.51	.09	1.48	.24	78.21	.....	.....	.....	.....	.....	.....
After period.												
First subperiod:												
Total	234.38	4.85	.54	12.63	3.09	.....	90.43	1.34	.17	3.89	2.11	2.07
Average	23.44	.49	.05	1.26	.31	74.75	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	263.33	5.38	.53	12.30	2.53	.....	92.43	1.35	.14	3.44	1.57	1.06
Average	26.33	.54	.05	1.23	.25	82.16	.....	.....	.....	.....	.....	.....
Entire after period:												
Total	497.71	10.23	1.07	24.93	5.62	.....	91.48	1.35	.15	3.66	1.83	1.54
Average	24.89	.51	.05	1.25	.28	78.46	.....	.....	.....	.....	.....	.....

SUMMARY—Nos. 3, 4, and 10.

Period.	Volume of urine solidus.	Specific gravity of urine at 25°/25° C.	Total solids in urine.	Total nitrogen ingested.	Nitrogen in the urine determined as—						
					Total.	Urea.	Uric acid by Folin's method.	Xanthin	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.											
First subperiod:	*cc.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*
Total	11,485	.....	770.4	.....	184.14	166.66	2.61	0.48	7.15	3.56	3.68
Average	766	1.0275	51.4	15.69	12.28	11.11	.17	.03	.48	.24	.25
Second subperiod:											
Total	12,930	.....	846.7	.....	193.34	175.64	2.86	.63	7.78	3.05	3.38
Average	862	1.0268	56.4	15.69	12.89	11.71	.19	.04	.52	.20	.23
Entire fore period:											
Total	24,415	.....	1,617.1	.....	377.48	342.30	5.47	1.11	14.93	6.61	7.06
Average	814	1.0272	53.9	15.69	12.58	11.41	.18	.04	.50	.22	.24
Preservative period.											
First subperiod:											
Total	11,395	.....	789.1	.....	180.77	161.83	2.60	.43	9.27	2.14	4.50
Average	760	1.0284	52.6	15.69	12.05	10.79	.17	.03	.62	.14	.30
Second subperiod:											
Total	11,990	.....	854.6	.....	180.62	163.28	2.41	.54	7.35	3.48	3.56
Average	799	1.0292	57.0	15.69	12.04	10.89	.16	.04	.49	.23	.24
Third subperiod:											
Total	13,460	.....	862.5	.....	193.27	174.54	2.82	.40	7.79	3.04	4.68
Average	897	1.0265	57.5	15.69	12.88	11.64	.19	.03	.52	.20	.31
Fourth subperiod:											
Total	11,410	.....	798.1	.....	174.24	156.21	2.47	.39	6.73	3.31	5.13
Average	761	1.0287	53.2	15.69	11.62	10.41	.16	.03	.45	.22	.34
Entire preservative period:											
Total	48,255	.....	3,304.3	.....	728.90	655.86	10.30	1.76	31.14	11.97	17.87
Average	804	1.0282	55.1	15.69	12.15	10.93	.17	.03	.52	.20	.30
After period.											
First subperiod:											
Total	12,820	.....	806.9	.....	179.96	162.91	2.27	.23	7.44	3.61	3.30
Average	855	1.0268	53.8	15.69	12.00	10.86	.15	.02	.50	.24	.22
Second subperiod:											
Total	14,855	.....	908.7	.....	189.53	176.14	2.89	.29	7.13	3.19	— .59
Average	990	1.0255	60.6	15.69	12.64	11.74	.19	.02	.48	.21	— .04
Entire after period:											
Total	27,675	.....	1,715.6	.....	369.49	339.05	5.16	.52	14.57	6.80	+2.71
Average	923	1.0261	57.2	15.69	12.32	11.30	.17	.02	.49	.23	.09

TABLE III.—*Nitrogenous constituents of the urine, Series XI*—Continued.

SUMMARY—Nos. 3, 4, and 10—Continued.

Period.	Nitrogenous bodies in urine.					Per cent of ingested nitrogen excreted in urine.	Per cent of total nitrogen of urine determined as—					
	Urea.	Uric acid determined by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).		Urea.	Uric acid by Folin's method.	Xanthin.	Kreatinin.	Ammonia (NH_3).	Undetermined.
Fore period.	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Grams.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
First subperiod:												
Total	356.75	7.80	1.28	19.20	4.32	.....	90.51	1.42	0.26	3.88	1.93	2.00
Average	23.78	.52	.09	1.28	.29	78.27	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	375.99	8.59	1.70	20.88	3.71	.....	90.85	1.48	.33	4.02	1.58	1.75
Average	25.07	.57	.11	1.39	.25	82.15	.....	.....	.....	.....	.....	.....
Entire fore period:												
Total	732.74	16.39	2.98	40.08	8.03	.....	90.68	1.45	.29	3.96	1.75	1.87
Average	24.42	.55	.10	1.37	.27	80.18	.....	.....	.....	.....	.....	.....
Preservative period.												
First subperiod:												
Total	346.43	7.82	1.14	24.90	2.60	.....	89.52	1.44	.24	5.13	1.18	2.49
Average	23.10	.52	.08	1.66	.17	76.80	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	349.55	7.19	1.47	19.73	4.23	.....	90.40	1.33	.30	4.07	1.93	1.97
Average	23.30	.48	.10	1.32	.28	76.74	.....	.....	.....	.....	.....	.....
Third subperiod:												
Total	373.64	8.45	1.07	20.93	3.69	.....	90.31	1.46	.21	4.03	1.57	2.42
Average	24.91	.56	.07	1.40	.25	82.09	.....	.....	.....	.....	.....	.....
Fourth subperiod:												
Total	334.39	7.39	1.03	18.09	4.02	.....	89.65	1.42	.22	3.86	1.90	2.94
Average	22.29	.49	.07	1.21	.27	74.06	.....	.....	.....	.....	.....	.....
Entire preservative period:												
Total	1,404.01	30.85	4.71	83.65	14.54	.....	89.98	1.41	.24	4.27	1.64	2.45
Average	23.40	.51	.08	1.39	.24	77.44	.....	.....	.....	.....	.....	.....
After period.												
First subperiod:												
Total	348.74	6.78	.62	19.97	4.37	.....	90.53	1.26	.13	4.13	2.01	1.83
Average	23.25	.45	.04	1.33	.29	76.48	.....	.....	.....	.....	.....	.....
Second subperiod:												
Total	377.07	8.65	.81	19.16	3.86	.....	92.94	1.52	.15	3.76	1.68	— .31
Average	25.14	.58	.05	1.28	.26	80.56	.....	.....	.....	.....	.....	.....
Entire after period:												
Total	725.81	15.43	1.43	39.13	8.23	.....	91.76	1.40	.14	3.94	1.84	.73
Average	24.19	.51	.05	1.30	.27	78.52	.....	.....	.....	.....	.....	.....

GENERAL CONCLUSIONS.

From a careful consideration of the data in the individual cases and the summaries of the results, it appears that the administration of sulphurous acid in the food, either in the form of sulphurous acid gas in solution or in the form of sulphites, is objectionable and produces serious disturbances of the metabolic functions and injury to health and digestion. This injury manifests itself in a number of different ways, both in the production of clinical symptoms which indicate serious disturbances, malaise, or positive suffering, and also by inducing certain changes in the metabolic processes which are not manifested in the way of ordinary clinical symptoms, and are only detected by careful chemical and microscopical study of the excretory products. It can be safely said from the evidence adduced that the administration of sodium sulphite and sulphurous acid as above indicated produces a marked influence of an unfavorable character on metabolism. As a result of this action an assimilation of food materials containing organic phosphorus is retarded, while there is evidence of increased sulphur katabolism. The sulphur balance sheets show what an immense burden has been added to the already overworked kidneys, which are called upon in this case to remove nearly all, if not quite all, of the added sulphur from the body, previously converted, in great part, to sulphuric acid. It is not possible that placing upon the kidneys this increased work of excreting sulphur can result in anything but injury. The fact that the microscopic crystalline and amorphous bodies in the urine are increased in number under the influence of the added sulphur, is another indication of the extraordinary demands made upon the kidneys in such circumstances.

This increase is interesting in respect of the effect which the continued exhibition of sulphurous acid must eventually have upon the structure of the kidney. It is reasonable to suppose that the continued use of a body which produces such results would cause lesions of a histological character that eventually would develop conditions which would give serious apprehension. In the nature of these experiments it was not possible to examine the organs of the body histologically and hence the above conclusion is only based upon experience of a similar character where the organs in question have been subject to such examinations. While there might be no distinguishable lesion

of the kidneys produced during a period of twenty or thirty days, or even longer, it is plain that sooner or later lesions of a very serious character producing organic diseases, possibly of an incurable type, would be induced. The further observation that there is a marked tendency to the production of albuminuria, although of an incipient character, is an indication of the unfavorable results of the administration of the sulphurous acid. It is, therefore, evident that by increasing the burden upon the excretory organs, the administration of sulphur in the form mentioned is highly detrimental to health.

All of these tendencies can not be interpreted as being other than of a decidedly harmful nature. Another effect which the administration of the sulphur produced, and one of a more serious character still, is found in the impoverishment of the blood in respect of the number of red and white corpuscles therein. The administration of a substance which diminishes by a notable percentage these important component particles of the blood must be regarded in every sense as highly prejudicial to health. Some of the most important functions of the blood, as has been well established by careful physiological studies, are intimately connected with the number and activity of both the red and white corpuscles. The bleaching effect of the sulphurous acid upon the color of the blood is a matter of less consequence and no great effect is produced upon the hemoglobins, but the diminution of the number of red and white corpuscles is a matter of serious concern.

The variations of the metabolic processes from the normal, as indicated in this series of experiments, were never of a character favorable to a more healthy condition of the system, but, on the other hand, all these variations, in so far as the effect of the changes could be distinguished, are of a prejudicial character. There is no evidence whatever that the sulphur added to the foods in the form of sulphurous acid, or sulphites, takes any part in the nutrition of the tissues of the body containing sulphur, namely, the proteids; hence, no claim of food value can be established for these bodies. The evidence all points to the fact that they are purely drugs, devoid of food value, having no favorable effects upon the metabolic processes, but, on the other hand, exerting deleterious and harmful effects. The conclusion, therefore, is inevitable that, as a whole, the changes produced in metabolic activity by the administration of sulphur in the forms noted above in the comparatively short time covered by the experiments are decidedly injurious.

The verdict which must be pronounced in this case is decidedly unfavorable to the use of this preservative in any quantity or for any period of time, and shows the desirability of avoiding the addition of any form of sulphurous acid to products intended for human food.

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