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THE TREATMENT OF  
**DIABETES MELLITUS.**

BY AUSTIN FLINT, JR., M.D.,

Professor of Physiology in the Bellevue Hospital Medical  
College.

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Read in the Section on Practice of Medicine and Materia Medica, of Am.  
Med. Association, May, 1884.

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Reprinted from the Journal of the American Medical Association,  
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## THE TREATMENT OF DIABETES MELLITUS.

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MR. CHAIRMAN AND GENTLEMEN:—It would not be possible, within the limits to which this paper is necessarily restricted, to discuss satisfactorily the pathology or even the clinical history of diabetes mellitus, although the disease in question is one of the most interesting, as well as obscure affections which the physician is called upon to treat. While the study of diabetes and its attendant disorders of general nutrition presents difficulties, as regards questions of causation and pathology, that seem almost insurmountable, when attention is once directed to the simple problem of the presence of sugar in the urine, this condition is now easily and certainly recognizable. It is probably true that sugar exists in the urine of a certain number of persons, unattended with symptoms, so that it is detected only by accident or may never be revealed, such persons having no apparent occasion to seek medical advice. In an experience in life insurance examinations extending through a period of nearly thirteen years, I have found a small quantity of sugar in the urine of applicants who supposed themselves to be perfectly healthy; but within the time mentioned, only five such cases have come under my observation. Three of these applicants are now living and are presumably in good health, the sugar in the urine having been noted from eight to twelve years ago; one case was lost sight of, and one applicant is reported to have died of hæmoptysis nine months after the examination of the urine. During the time mentioned; viz., twelve years and nine months, I examined 1884 persons who supposed themselves to be in good health,

and nearly always made examinations of the urine. All of the applicants, with one or two exceptions, were males. The proportion, therefore, of apparently healthy persons in whose urine I have found sugar is very small (1 in 377); but even this shows that sugar may be present in the urine, either as a transient or an insignificant condition or existing without any of the general symptoms of diabetes.

In the great proportion of cases of diabetes that come under observation, attention is directed to the condition of the urine by certain general symptoms; such as excessive thirst, persistent polyuria, a sensation of dryness of the mouth and fauces, fatigue after moderate muscular exertion, or some slight affection of the external genitals. In a case of diabetes that I have had under treatment for nearly four years, now under observation, the patient first consulted a physician for herpes progeneralis, which led to an examination of the urine. In females, persistent pruritus of the vulva is often the first circumstance pointing to the possible existence of diabetes. In several cases, I have detected sugar in the urine when pruritus vulvæ was the only trouble complained of by patients. So constant is this symptom, that diabetes should always be suspected when the pruritus persists without any apparent cause and resists ordinary measures of treatment. The pruritus is seldom absent when the proportion of sugar in the urine is considerable.

*Detection of Sugar in the Urine.*—As far as purely clinical examination of the urine is concerned, the great desideratum is a simple test, easy and rapid in its application, upon which one can rely with absolute confidence. I shall pass over, without discussion or even mention, the different tests employed for the detection of sugar, except the one known as Fehling's. When the Fehling's liquid is properly prepared and carefully used, there can be no error in the results. If a quantity of this test, however, be made

and kept for some time, it is liable to change so as to become more or less unreliable. This want of stability in the test-liquid has long been recognized by those accustomed to urinary examinations; and a few years ago I prepared three separate liquids, which I mixed in certain proportions for use as required. Even this did not prove to be entirely satisfactory. Within the last year, two separate liquids have been prepared by Dr. E. R. Squibb, and are kept by him for sale, in which form, the test seems to leave nothing to be desired in the qualities of accuracy and ease of application. The test, as it is now prepared by Dr. Squibb, is simply perfect; but so much depends upon its proper use, that I shall venture to detain the "Section" with an account of its application and the necessary precautions to be adopted. These precautions are simple and demand no special skill; but they often become very important, especially in determining with certainty the absence of sugar.

The two test-liquids are prepared by Dr. Squibb according to the following formulæ:

*For the Solution of Cupric Sulphate.*—Use purified sulphate of copper, in granular crystals, air-dried. Weigh 277 grains (17.32 grammes) of the salt and dissolve it in about 4 fluidounces (120 c.c.) of distilled water, adding about 4 minims ( $\frac{1}{4}$  c.c.) of pure sulphuric acid. Add distilled water to this solution to make  $8\frac{1}{2}$  fluidounces. (260 c.c.)

*For the Solution of Alkaline Tartrates.*—Weigh 2 ounces, 391 grains (87.5 grammes) of re-crystallized sodio-potassic tartrate, or Rochelle salt, and dissolve it in about 6 fluidounces (175 c.c.) of distilled water. Filter the solution, if necessary, and add to it a clear solution of 386 grains (25 grammes) of caustic soda in about  $1\frac{3}{4}$  fluidounces (50 c.c.) of distilled water. Add distilled water to this solution to make  $8\frac{1}{2}$  fluidounces (260 c.c.)

These two solutions are to be kept in separate bottles for use. If they be made with accuracy and

mixed together in equal proportions, 200 grains of the mixture will be decolorized by exactly one grain of sugar, or each cubic centimetre of the mixture will be decolorized by 0.005 of a gramme of sugar. The liquids can therefore be employed for quantitative estimates, although I shall describe the use of the test simply for determining the fact of the presence or absence of sugar.

For use in qualitative analysis, the two liquids may be roughly mixed in about equal proportions in a test-tube, or they may be measured accurately and diluted with about an equal volume of distilled water. The latter process should be resorted to in all delicate analyses.

For ordinary use the following process may be employed :

Mix in a test-tube equal volumes of the two liquids so that the mixture will extend in the tube to the length of about an inch.

Bring the mixture to the boiling point and then add to the boiling test a quantity of urine equal to that of the test.

Bring the mixture of the test-liquid and urine to the boiling point and then allow it to cool.

If no distinct and opaque reddish or yellowish precipitate be present when the mixture of test and urine has become cool after the second boiling, it is absolutely certain that no sugar is present.

All these precautions are essential ; and I have repeatedly examined specimens of urine in which the characteristic precipitate due to the presence of sugar did not occur until one or two minutes had elapsed after the second boiling.

In very delicate testing, take a definite quantity of the copper-solution, add an equal quantity of distilled water, add then of the solution of alkaline tartrates a quantity equal to the quantity of the copper-solution, and add finally distilled water in the same quantity. When this mixture is boiled, if the test be not abso-

lutely perfect, there will be a precipitate before the urine is added. The mixture, if perfect, may be used in the same way as the simple undiluted mixture of the two solutions.

When sugar is present in the urine, an opaque yellowish or reddish precipitate appears at some time during the process, the promptness of its appearance and its quantity being in direct proportion to the quantity of sugar.

It is often important to be able to determine, at least approximatively, the quantity of sugar discharged in twenty-four hours or its proportion per fluid-ounce. Using the volumetric process, this estimate requires some practice and occupies from twenty to thirty minutes; but the "differential density method" recommended by Roberts, is very simple and is sufficiently accurate for ordinary purposes. With a little practice, indeed, it may be employed by intelligent patients.

Two specimens of diabetic urine are taken, about four ounces of each, one for comparison and the other for analysis. To one is added a lump of German yeast, about the size of a filbert, in a bottle with a cork nicked to allow the escape of gas; and the other specimen is placed in a similar bottle tightly corked. The bottles are then put aside in a warm place, as the mantel-piece in winter or in the sun in summer. In the course of twenty-four hours, fermentation will have been completed in the specimen to which yeast has been added. If the specific gravity of the two specimens be then compared, the fermented specimen will be found much the lighter, from loss of the sugar which has been decomposed into alcohol and carbonic acid. The difference in the density of the two specimens, expressed in degrees of the urinometer, will represent the number of grains of sugar per fluidounce in the urine. For example, if the specific gravity of the fermented specimen be 1010, and the specific gravity of the unfer-

mented specimen, 1040, the urine contains thirty grains of sugar per fluidounce. In this process, it is essential to compare the density of the two specimens at the same temperature. If German yeast cannot be obtained readily, about a teaspoonful of ordinary baker's or brewer's yeast may be used.

*Relations of the Specific Gravity of Urine to the Proportion of Sugar.*—It has long been recognized that the specific gravity of the urine bears no definite and constant relation to the proportion of sugar in cases of diabetes. In a case that came under my observation in December, 1883 and has been under treatment until the time of writing (April, 1884) on Dec. 29, 1883, the specific gravity was 1038, with 28.4 grains of sugar per fluidounce. The next day, the specific gravity was 1036 and the proportion of sugar was nine grains per fluidounce. In another very interesting case now under treatment, I found four grains of sugar per fluidounce, the urine having a specific gravity of only 1011½. These remarkable variations in the specific gravity, occurring without any relation to the quantity of sugar, are generally dependent upon the proportion of urea, the absolute quantity of which is often very largely increased in cases of diabetes. I have often found crystals of uric acid as a persistent condition in diabetic urine, sometimes associated with a deposit of oxalate of lime.

The time allotted to me does not admit of a discussion of the possible relations of the nutritive conditions connected with diabetes to the excessive elimination of urea or the frequent presence of crystals of uric acid; but it is very important to remember that urine of a comparatively low specific gravity may contain sugar. Within a week, in another case in which the urine is examined every three or four days, I found a marked sugar-reaction in a specimen of urine with a specific gravity of 1010. I have also repeatedly found sugar in urine of a specific gravity of about 1020, the quantity of urine in twen-

ty-four hours being normal. The fact, then, that the quantity and specific gravity of the urine are normal does not in itself exclude sugar; although, in most cases of diabetes, the quantity of urine is increased and its specific gravity is notably high. In a case of diabetes very elaborately reported by Pavy, sugar was found in the urine when the specific gravity of the specimens was, on different occasions, 1010, 1011, 1012, and 1013.<sup>1</sup> In cases in which diabetes is suspected, the physician is not justified in excluding the disease when he finds no increase in the quantity of urine and a normal specific gravity; and the facts just mentioned show that, in all cases of this kind, the urine should be carefully tested for sugar.

*What constitutes Diabetes Mellitus?*—A patient with abnormal thirst, dryness of the mouth, suffering from fatigue following slight muscular exertion, progressively losing strength and weight, and passing an abnormally large quantity of urine of high specific gravity and containing sugar, has the disease known as diabetes mellitus; but the various symptoms just enumerated may exist in greater or less degree or some of them may be absent. In addition to these symptoms, others may exist; such as, abnormal dryness of the skin, deficient perspiration on exercise or in warm weather, pruritus of the vulva, a tendency to furuncles, unusual liability to “take cold,” reduction in the general temperature of the body, an excessive appetite, failure of the generative functions, etc., but these are not necessarily present in cases of diabetes.

On the other hand, none of the general symptoms that I have mentioned may be observed; the urine may be normal as regards quantity and specific gravity; but still sugar may constantly exist in small quantity. In such instances, which are not very infrequently observed, the constant, necessary, and invariable symptom of diabetes is present; namely, glycosuria.

<sup>1</sup>PAVY, *Nature and Treatment of Diabetes*, London, 1869, p. 288, et seq.

Strictly speaking, perhaps, patients with no general symptoms, with no increase in the quantity of urine, and with urine of normal specific gravity, may be said to be affected with glycosuria, but not to have diabetes. In the great majority of cases, however, unless the glycosuria be transient and dependent upon some recognizable or temporary cause, certain of the general symptoms of diabetes will sooner or later become developed, unless the glycosuria be removed by treatment. Still, even without treatment, persons may live in what seems to be perfect health for years, constantly passing considerable quantities of sugar. I can now call to mind three cases of this kind; and several cases, in which I have found sugar in the urine without any other diabetic symptoms, have passed from under my observation.

I shall have little to say concerning the etiology and pathology of diabetes. The brilliant physiological experiments, which began with the discovery of the sugar-producing function of the liver by Claude Bernard, in 1848, have failed, in a great measure, to fulfil the expectation that they would lead to a definite comprehension of the pathology of diabetes. I believe it to be true that the liver is a sugar-producing organ. The experiments of Pavy, in which he showed that the liver-substance does not actually contain sugar during life were, in my opinion, harmonized with those of Bernard, by experiments made by me in 1869.<sup>1</sup> In these experiments, I found no sugar in an extract of the liver taken from a living dog and put into boiling water in ten seconds, while sugar was present in blood taken from the hepatic veins. I am convinced that the liver is constantly forming sugar during life, but that this sugar, as fast as it is produced, is washed out of the sugar-producing organ by the blood-current. Experiments have shown,

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<sup>1</sup> FLINT, JR. *Experiments undertaken for the Purpose of reconciling some of the Discordant Observations upon the Glycogenic Function of the Liver.*—*New York Medical Journal*, 1869, vol. viii, p. 373, et seq.

also, that the sugar contained in the food, as well as that resulting from the digestion of starch, is normally destroyed in the organism. That the sugar-forming function of the liver may become exaggerated beyond the power of the organism to destroy the excess thus produced was demonstrated by the remarkable experiments of Bernard, in which he induced temporary diabetes in animals by mechanical irritation of the floor of the fourth ventricle, by stimulating the pneumogastric nerves, or by introducing irritating vapors into the lungs; but, although cases of traumatic diabetes occur in the human subject, they are exceedingly rare. No such case has as yet come under my observation.

I do not propose, at this time at least, to offer any theory with regard to the causation or pathology of diabetes, the cause of death in the so-called diabetic coma, or the supposed development in certain cases of acetonæmia. The discussion of these points has, up to the present time, been very unsatisfactory. We all know that patients presenting, in a well-marked degree, certain characteristic symptoms, in addition to glycosuria, are affected with a very grave disease, the pathology of which is imperfectly understood. The sugar resulting from digestion is in great part discharged in the urine. The nutritive processes are seriously disturbed. The power of resistance to other diseases is impaired. What is remarkable and quite interesting, in its relations to our ideas of the production of animal heat, the failure to consume the hydrocarbons seriously affects the power of resistance to cold, and the general temperature of the body is habitually  $95^{\circ}$  or  $96^{\circ}$  Fahr., instead of about  $98\frac{1}{2}^{\circ}$ . This latter point I state upon the authority of many writers; and in a case now under treatment, the temperature in the axilla has constantly been about  $96\frac{1}{2}^{\circ}$ . As the patient improved, the temperature was increased to a fraction over  $97^{\circ}$ , but it has not yet reached the normal standard.

Being brought, then, face to face with a disease, very obscure in its pathology, and not infrequent in its occurrence, the practical question, to which I intended to devote the main part of this paper, is, how far it is amenable to treatment. To this question I shall devote what remains of the time at my disposal.

*Treatment.*—In a course of lectures by Cantani, delivered at the clinical hospital of the University of Naples, in the spring of 1872, there occurs the following statement, italicised by the author :

*“Diabetes has become to-day a disease easily and certainly curable, provided that the treatment (cure) be not begun too late.”*<sup>1</sup>

The cases which Cantani details in support of this rather startling statement show certainly the most remarkable effects of treatment. Judging from the account of these cases, the general proposition that diabetes is a disease, in the main easily and certainly curable, is not too decided and absolute. Since I have been engaged in treating cases of this disease, my experience, though not extending over many years, has led me to the conviction that the claim made by Cantani is not extravagant.

In the great majority of cases in which patients will submit to certain measures of treatment as soon as it is established that they are suffering from diabetes, or as soon as glycosuria is recognized, it is possible to effect either a cure of the disease or a removal of most of the characteristic symptoms, with the exception, perhaps, of the occasional appearance of a small quantity of sugar in the urine.

Time does not permit me to discuss fully the treatment recommended by different writers. Cantani relies mainly upon dietetic measures, although he attaches considerable importance to the exhibition of lactic acid and the alkaline lactates. Of course the treatment by eliminating sugar and starch from the

<sup>1</sup>CANTANI, *Le diabète sucré et son traitement diététique*, Paris, 1876, p. 386.

diet is by no means novel. Dating from the time of Rollo, it has had the earnest support of Bouchardat, Pavy, Seegen, and many others. I desire to state at the outset, that the main and almost the sole reliance of the physician should be upon diet; and that the suppression of starch and sugar should be practically absolute. Bearing this fact constantly in mind, in considering the different measures of treatment, I shall divide them into dietetic, general, and medicinal.

*Dietetic Treatment.*—In 1869, a patient was sent to me from Omaha, Neb., whom I found to be suffering from many of the distressing symptoms of diabetes.

On Nov. 20, 1869, he passed 224 fluidounces of urine in the 24 hours, with a specific gravity of 1,035. The quantity of sugar passed in the 24 hours was 18 ounces and 30 grains, and the quantity of urea was 624 grains. I recommended a diet-table by no means as rigid as the one I now employ, and he left for home. For several years I heard from this patient, either personally or through his physician in Omaha, from time to time, and he was reported as apparently well, but occasionally passing a small quantity of sugar. He continued the diet more or less faithfully for two or three years, but took a little bread. About five years after, I was accosted in the street by this patient, who reported himself as feeling perfectly well and giving but little attention to his diet. At this time I did not have an opportunity of examining the urine. The patient has since died, and I heard from his widow that this occurred in August, 1881, his death being immediately due to inflammation of the bowels after a few days' illness. "The diabetes was much improved and troubled him very little."

This case, during the time when I was constantly receiving favorable reports, seemed to me to be quite remarkable; and in 1880, having frequent occasion to recommend a diet for diabetics, I carefully compiled

an anti-diabetic diet-table, which I have since used constantly in cases that have come under my observation, and which I shall present as an appendix to this paper. In preparing this table, my object has been to secure a diet sufficiently nutritious but free from starch and sugar, using as a basis the admirable list given by Bouchardat ;<sup>1</sup> and I have endeavored to adapt the articles and their preparation to the customs of our own country, adding to it, when possible, in order to secure the greatest available variety of food. Selecting, however, every dish known in the culinary art, without reference to the trouble or expense of its preparation, a rigid diet is by no means easy of enforcement. Patients at first have an intense craving for bread ; and this desire is so nearly universal that almost all writers on diabetes suggest some substitute for this important article of food. I do not hesitate to say, however, without specifying any one of the so-called anti-diabetic breads and flours as especially bad, that all the articles of this kind in our markets are absolutely unreliable and most of them fraudulent. I have analyzed, or caused to be analyzed, nearly all of the so-called bran-flours, and gluten-flours, and have invariably found large quantities of starch. Two specimens said to be free from starch, which were analyzed with great care by a competent chemist, were found to contain a greater proportion of this principle than exists in ordinary wheat-flour. Most of the so-called diabetic breads are pasty, heavy, and become extremely distasteful. A patient now under occasional observation, having procured a new bread which was so agreeable to the taste that he took it freely and with relish, imagined that he had found at last an article which would be regarded by diabetics as the greatest boon. This bread was made of flour which contained about 80 per cent. of starch.<sup>2</sup> The effects of this

<sup>1</sup> BOUCHARDAT, *De la glycosurie ou diabète sucré*, Paris, 1875, p. clxxxvi

<sup>2</sup> Ordinary wheaten flour contains about 70 per cent. of starchy matters.

fraud upon the patient were quite serious. His health had become nearly restored and the sugar had disappeared from the urine. Under the use of the bread, the sugar returned, and it was several weeks before it disappeared again under a strict diet. In the rigid dietetic treatment, bread should be absolutely interdicted, or, in case patients should refuse to submit to a strict diet, a small quantity of crust of bread taken with an abundance of butter may be allowed under protest.<sup>1</sup>

A rigid diet, without bread, should be continued until the sugar has disappeared from the urine and all the diabetic symptoms have been removed. Although many diabetics rebel under this regimen, and the execution of this measure demands, on their part, much self-denial and fortitude, patients may be encouraged to persevere, by the statement that the craving for saccharine and starchy articles is likely to diminish and may almost disappear after a few weeks. I have now under observation and treatment several patients who have actually lost all desire for most of the interdicted articles of food.

In cases in which the treatment is followed by an apparent cure, sugar disappearing from the urine, a gradual return to the normal diet should be begun about two months after the glycosuria has ceased; but it is of the greatest importance, during this part of the treatment, to keep patients, if possible, under constant observation, examining the urine at least once in five or six days. When the sugar disappears, patients may regard themselves as permanently cured, and no general symptoms present themselves for some time after glycosuria has returned under a mixed

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<sup>1</sup> Since this article has been in print, I have seen a bread made by George V. Hecker & Co., 205 Cherry street, New York City, made of wheaten flour said to contain only 5 per cent. of starch. This bread is light and agreeable, but it requires great care in its preparation. A specimen of the bread was examined by Prof. G. A. Doremus who found a little more than one per cent. of starch.

diet. Several unfortunate examples of this have come under my observation.

*General Treatment.*—Measures of general treatment are to be directed mainly to promoting the proper action of the skin, which is often harsh and abnormally dry, and to general muscular exercise. Systematic rubbing, as practiced by massage, and Turkish or Russian baths once a week, if they be not contraindicated by some complicating conditions, are useful. A reasonable restriction in the taking of liquids is quite important in diminishing the quantity of urine. Under the dietetic treatment the excessive thirst is almost always relieved; but when this persists, it may often be temporarily met, as far as dryness of the mouth is concerned, by taking small pieces of ice from time to time instead of drinking water. I do not know that any reliance is to be placed upon the use of the various mineral waters that are said to exert a curative influence over the disease in question. Alcoholic stimulants are to be avoided. I have seen several cases of diabetes in which the disease seemed to be attributable to the abuse of alcohol, especially the habitual and excessive drinking of champagne. In certain cases, some kind of alcoholic beverage seems to be necessary to maintain the vital powers. For this purpose, a fairly good, sound claret has seemed to me to be the best form in which alcohol may be taken. Spirits should be interdicted or given very sparingly, and not more than a pint of claret should be taken daily.

Patients suffering from diabetes lose, to a certain extent, their capacity for sustained mental effort. They should be cautioned, therefore, against excessive intellectual work. Mental anxiety and "worry" over business or other affairs exert a very unfavorable influence on the progress of the disease. In some cases apparently cured, I have noted a return of the glycosuria, which seemed to be fairly attributable to mental causes. The insomnia rarely demands the

use of narcotics and is usually relieved with the other symptoms by the anti-diabetic diet.

The various minor complications that are liable to occur can usually be overcome by appropriate treatment. The occurrence of boils is very common and they are likely to be persistent and annoying. When the tendency to boils is very marked, the sulphide of calcium is useful, although this agent does not seem to exert a curative influence over the diabetes itself. The sulphide of calcium has been recommended very highly as a remedy controlling the glycosuria; but it is often disagreeable to patients and disturbs digestion. In a few instances in which I have employed it for a considerable period, it has not seemed to affect the discharge of sugar, and I regard it as useful only to combat the furuncular tendency. It is dangerous to rely upon drugs to any extent in the treatment of this disease. Patients willingly put faith in remedies rather than in a rigid diet; but, after all, diet is the main and almost the only reliance in treatment.

A very important, and perhaps the most important, measure of general treatment is systematic muscular exercise, not carried to the extent of producing excessive fatigue. This may be taken in the form of gymnastics, or of out-door exercise, such as riding or athletic sports; but patients should always be cautioned to avoid "taking cold." If a patient suffering from diabetes can be made to develop his muscular strength by moderate and systematic exercise, not too prolonged, and followed by a proper and not excessive sense of fatigue and some perspiration, with a good reaction after bathing and rubbing, much will be gained in the way of treatment. This is strongly recommended by all writers upon diabetes.

The diminished power of resistance to cold which exists nearly always in diabetics renders it necessary to enjoin great care in avoiding exposure to the vicissitudes of the weather, and the constant protection

of the body by warm clothing, especially flannels next the skin.

*Medicinal Treatment.* There is no remedy that exerts a curative influence over diabetes in the absence of proper dietetic measures. Opium, the bromides, sulphide of calcium, various mineral waters, and other medicinal agents that have been recommended from time to time, have all proved very unsatisfactory in practice. Of course it is difficult to estimate the value of drugs in this as in many other diseases, particularly as the physician is not justified, in my opinion, in neglecting to enforce a rigid diet which, in itself, in the great majority of cases, exerts a most decided influence over the glycosuria and the general symptoms. On theoretical grounds, Cantani recommends lactic acid, taken in the form of a "lemonade," in small quantities throughout the day. The formula for this mixture is the following :

Pure lactic acid..... ℥iiss to ℥v.

Aromatic water..... ℥v to ℥j.

Water..... Ojj.

This remedy is regarded by Cantani as useful in many cases but not essential. I have little experience in its employment.

Keeping in mind the small reliance to be placed in the efficacy of drugs unconjoined with dietetic measures, I must bear testimony to the apparent advantage to be derived from the use of the arsenite of bromine, recently proposed by Clemens. While I have not felt justified in using this remedy to the exclusion of the anti-diabetic diet in treatment, for the reason that the bad effects of an unrestricted diet frequently persist for some time, I have noted very marked effects from Clemens's solution in controlling the discharge of sugar and some of the distressing symptoms, particularly the excessive thirst; so that, aside from simple measures to relieve sleeplessness, constipation, or other intercurrent difficulties, I have lately been in the habit of prescribing, in addition

to the diet, three drops of Clemens's solution, three times daily, in a wine-glass of water, after each meal, gradually increasing the dose to five drops. The following is the formula for this remedy, which I have had prepared by Mr. William Neergaard, 1183 Broadway, New York City, and which may be written for under the name of "Clemens's Solution of Arsenite of Bromine."

"Liquor brom-arsen consists simply of a chemical union of arsenious acid and bromine, dissolved in water and glycerine, in such a manner that two drops represent the twenty-fourth part of a grain of arsenite of bromine."<sup>1</sup>

In a case of diabetes of more than five years' standing, now under treatment, the patient has been taking Clemens's solution constantly, with the exception of a single week, from Dec. 27, 1882, to April 2, 1884, more than fifteen months, without any unpleasant effects. I began with a dose of two drops, three times daily, gradually increased to five drops. On May 13, 1883, the urine having been free from sugar, with the exception of a trace on two or three occasions, for thirteen weeks, I stopped the arsenite of bromine for one week, the anti-diabetic diet being continued. At the end of the week, sugar was found in large quantity in the urine. The use of the arsenite of bromine was then resumed. At the end of the first week, the sugar still existed in small quantity. At the end of the second week, the sugar had disappeared and there was no return of glycosuria for six weeks. The patient then left the city and committed many indiscretions in diet. Seven weeks later, I examined a specimen of urine and found it loaded with sugar, with a specific gravity of 1,030. While absent from New York, the patient had indulged in peas, egg-plant, stuffed tomatoes, green corn, ice-cream, charlotte russe, peaches, raspberries, blackberries,

<sup>1</sup> *Medical Times*, Philadelphia, Dec. 2, 1882, p. 160.

and melons. On September 20, after returning to New York and resuming a strict diet with the exception of the crust of half a white roll three times daily, the patient improved. The urine, on September 20 had a specific gravity of 1031 and was loaded with sugar. The following week the sugar was much diminished in quantity, and it disappeared at the end of the second week.

*Summary of Treatment.*—The more I study the cases of diabetes that have come under my observation, especially those that are now under treatment, in connection with the writings of those who have faithfully followed the dietetic plan, notably Bouchardat and Cantani, the more thoroughly am I convinced that the prognosis in a recent and uncomplicated case of this disease in an adult is invariably favorable, provided, always, that the proper measures of treatment be rigidly enforced. In the hope of convincing the profession that this statement is reliable, I shall, at the risk of what may appear to be needless repetition, give a summary of treatment, with brief statements of the progress of cases that I am now actually observing.

At the outset, patients should be impressed with the fact that they are suffering from a grave disorder, and that everything depends upon their full coöperation in the treatment, which treatment is essentially dietetic. The diet-table should be carefully studied, and the diet regulated and carried out absolutely.

In case a rigid anti-diabetic diet does not promptly influence the glycosuria, it may be well to subject a patient to an absolute fast for twenty-four hours and follow this with the anti-diabetic regimen. This rather harsh measure is suggested by Cantani. I shall not hesitate to employ it in cases in which it may seem to be required, although no such case has as yet come under my observation.

The various measures that I have mentioned under the head of *General Treatment* should be enforced,

especially systematic daily muscular exercise. A moderate system of training on the plan adopted by athletes is most useful; and this, if continued, will do much to render a cure permanent after a return to the normal diet.

The return to a normal diet should be gradual, and during this time the urine should be frequently examined, the rigid diet being resumed at the first re-appearance of sugar in the urine; but all alcoholic excesses, the immoderate use of sweet fruits, and any use of sugar, should be interdicted at all times. A patient who has once had diabetes is always liable to a return of the disorder. He must lead a thoroughly careful, hygienic, and temperate life. In the words of Bouchardat, "you will not be cured except on the condition that you never believe yourself to be cured."<sup>1</sup>

While I believe that the physician is justified in encouraging patients to expect relief, and even cure, in recent, uncomplicated cases, the diet is all important, and its regulation cannot be expected to be perfect without professional aid in its enforcement. A diabetic is never safe from a return of his disease, even when he believes himself to be cured; and under no circumstances should he pass more than a few weeks without an examination of the urine.

The arsenite of bromine, or Clemens's solution, appears to be useful. We may begin with 3 drops three times daily in a little water immediately after eating, gradually increasing the dose to 5 drops. This may be continued for weeks and months without producing any unfavorable effects; but the administration of this remedy does not supply the place of the dietetic treatment, which should be enforced in all cases. A rigid diet should be continued for two months, at least, even in the mildest cases of the disease. It may be necessary, in certain cases, to

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<sup>1</sup> BOUCHARDAT, *De la Glycosurie ou Diabète Sucré*. Paris, 1875, p. 49.

continue it for a longer period, even twelve or more months.

There is probably no such disease as intermittent diabetes. In some instances glycosuria occurs during the season of sweet fruits, when they are indulged in excessively, and disappears when the diet is changed; but these are mild cases of diabetes, excluding those in which a transient glycosuria follows the inhalation of irritating vapors, the taking of anæsthetics, etc.

Robust or corpulent persons are more tolerant of the disease than those who are feeble or spare, and the glycosuria yields, in such cases, more readily to treatment.

Diabetes occurs at all ages. Bouchardat mentions a case in an infant of 3 years, although the disease is rare before the age of 12. The most unfavorable cases are those which occur before the age of puberty. An adult male presents the most favorable conditions for cure. In old persons, when the disease is of long standing, the dietetic treatment will secure practical immunity from nearly all the distressing symptoms, although the glycosuria may not be entirely removed.

A study of any of the diet-papers recommended will make it evident that those who are able to follow the required regimen, without regard to the cost of articles of food, present much more favorable conditions, as regards the prospect of cure, than persons in straightened or indigent circumstances. Diabetes, however, occurs in all classes and is by no means a rare disease. A hospital devoted to such cases, where the dietetic treatment could be strictly carried out, would be a boon to the rich and poor alike.

*Cases.*—I have accounts, more or less complete, of fifty cases of diabetes. A certain number of these cases have been lost sight of; others were followed out in their histories to a fatal termination; and twelve, exclusive of a few that are reported to be cured, are still under either observation or treatment.

Of these fifty cases, sixteen have been lost sight of, nineteen are either known to be living or are under observation, and twelve have died at periods between nine months and over twelve years after I first examined the urine.

Of the seven patients who are living, but whom I do not consider as under observation, one passes sugar constantly and is under an imperfect anti-diabetic diet, but is in what may be called fair health; two are reported as cured, although I have not examined the urine for a long time; four I simply know to be living.

The twelve cases that are under observation are instructive as indicating the value and influence of treatment.

*Case A.*—The patient, a gentleman thirty-eight years of age, first became aware that he suffered from diabetes mellitus about June 1, 1883. He is five feet five inches in height, and weighs one hundred and twenty-nine pounds. A year ago he weighed one hundred and sixty pounds. He suffered from excessive discharge of urine, with increased appetite, thirst, dryness of the mouth, sleeplessness, fatigue on slight exercise, and, indeed, most of the symptoms of diabetes; but a careful physical examination failed to reveal any other disease. At the time I first saw him, he had been taking quinine and various tonic remedies and had been subjected to an imperfect anti-diabetic diet. At this time, December 29, 1883, he passed eighty ounces of urine in twenty-four hours, containing in all 3,072 grains of sugar. He was immediately put upon a strict diet, taking no bread, drinking very little, and relieving the thirst temporarily by taking pieces of ice. In addition, he took three drops of Clemens's solution three times daily, and continued to take ten grains of quinine each day. After forty-eight hours of this treatment, his intense thirst and excessive urination disappeared, but he expressed himself as feeling rather weak although

generally much better. The effect, however, upon the discharge of sugar was remarkable. He passed, during the second twenty-four hours of treatment, forty-three ounces of urine, and the total quantity of sugar was reduced from 3,072 grains to 387 grains.

I heard from this patient January 19, 1884, and received a specimen of the urine of the twenty-four hours of January 17th. For the twenty days since December 29, 1883, he had maintained an absolute anti-diabetic diet, taking no bread. During this time, he took three drops of Clemens's solution three times daily. He had gained three-quarters of a pound in weight. He had suffered somewhat from indigestion but was otherwise quite well. "The very large appetite and thirst are very materially lessened." The quantity of urine in twenty-four hours was forty-eight and one-half fluid-ounces; specific gravity, 1026; absolutely no sugar; there was rather an abundant deposit of amorphous urates with a number of crystals of uric acid. As far as the diabetic condition is concerned, the general symptoms had disappeared as well as the sugar in the urine.

On January 25, 1884, the dose of Clemens's solution was increased to five drops three times daily. The urine was free from sugar. There was no sugar in the urine on January 27 and 29. He was then allowed the crust of half a French roll at breakfast.

On February 4, 1884, I saw the patient again. He had been at home and had committed some slight indiscretions in diet. The urine had a specific gravity of 1030 and contained a small quantity of sugar. The strict diet was resumed.

On February 10, 1884, there was a trace of sugar in the urine.

On February 24, 1884, the patient still under a strict diet and the use of Clemens's solution, there was no sugar in the urine. The patient went home, feeling perfectly well, and promised to send a specimen of urine in two weeks. At no time since the

beginning of treatment was there any excessive quantity of urine.<sup>1</sup>

*Case B.*—The patient is a gentleman fifty-seven years of age, five feet eleven and one-half inches in height, weighing one hundred and twenty-two pounds. He had suffered from diabetes to his knowledge for about one year, with thirst, fatigue after moderate exertion, and other mild symptoms. He had been under a moderate anti-diabetic diet for some weeks. After he came under my observation, his urine, under a strict anti-diabetic diet, was either entirely free from sugar or contained merely a trace, for ten months. He had no symptoms and regarded himself as cured. For about three months he took four drops of Clemens's solution three times daily.

On January 17, 1884, he presented himself, passing a large quantity of urine of a specific gravity of 1,027, and loaded with sugar. Having regarded himself as permanently cured, he had returned to his old diet, including sugar, and had stopped the arsenite of bromine for six months. He felt perfectly well but had noticed for some days that he was passing a large quantity of urine. He was again put upon an anti-diabetic diet (which I fear is not strictly followed) with six drops of Clemens's solution twice daily. On February 7, 1884, he passed a normal quantity of urine of a specific gravity of 1,022, containing but a trace of sugar.

In this case, I cannot secure a strict adherence to the diet and regular examinations of the urine.<sup>2</sup>

*Case C.*—This patient has been under observation since October, 1880. He was at that time 53 years of age, five feet eight and one-half inches in height, and weighed from 168 to 172 pounds. The diabetes

<sup>1</sup>On April 29, 1884, I received a specimen of urine from this patient. The quantity in twenty-four hours was said to be about fifty fluidounces. The specific gravity was 1022½ and it contained a trace of sugar. The general health was reported as perfect.

<sup>2</sup>I saw this patient on April 29, 1884, and he reported himself as perfectly well, but I did not have an opportunity of examining the urine.

had been recognized a few weeks before he came under my observation, and he had been subjected to an imperfect anti-diabetic diet. He was immediately put upon to a strict diet, and from October 21, 1880, to May 18, 1881, his urine generally contained no sugar, although there was occasionally a trace. In this case the diet was strictly followed, and the patient soon lost his desire for prohibited articles, even bread.

On May 18, 1881, he was allowed the fruits in season, to be taken without sugar. On June 27 he was allowed a little bread. His urine was practically free from sugar until February 17, 1882, with the exception of an occasion on November 5, 1882, when it had a specific gravity of 1,029 and contained considerable sugar following a slight excess at table in taking claret and whiskey and water.

On February 17, 1882, his urine had a specific gravity of 1,026 and contained considerable sugar. He had been living rather freely for some time without committing any actual excesses at table. He moderated his living and was given, in addition to the strict diet, one-quarter of a grain of sulphide of calcium three times daily. From February 17, 1882, to September 1, 1883, his urine was practically free from sugar when examined on ten different occasions, once, only, presenting a mere trace. During the entire treatment he has taken considerable exercise in walking. He took the sulphide of calcium rather irregularly for six months, but it was very disagreeable.

On January 11, 1883, he began to take the arsenite of bromine, which he continued rather irregularly.

On January 23, 1884, his weight had increased to 175½ pounds. Since September 1, 1883, his diet had been practically unrestricted. His urine had a specific gravity of 1021 and contained a small quantity of sugar. He was put on a moderate anti-diabetic diet and the dose of arsenite of bromine was

increased to five drops. On February 7, 1884, the sugar was still marked in the urine, but he indulged rather too freely in claret at dinner and drank some brandy and soda during the evening. From February 7, to April 3, 1884, the urine had been nearly always free from sugar.

This may almost be called a case of cure. For the greatest part of the time from October, 1880, to April, 1884, three and one-half years, the urine has been practically free from sugar, for some of the time under an ordinary diet. During this period, sugar has appeared temporarily and in small quantity, possibly as a consequence of occasional indiscretions in the use of wine, which could not by any means be regarded as excesses in a person in ordinary health.<sup>1</sup>

*Case D.*—This is the case of a lady, rather stout, fifty-nine years of age, who came to me for treatment in December, 1882. The patient has already been referred to in connection with the fact of the existence of sugar in urine of a low specific gravity, (1,011½) and the return of glycosuria immediately following the suspension for one week of the administration of arsenite of bromine.

In December, 1880, the patient was in a deplorable condition, suffering from some of the most distressing symptoms of diabetes. She suffered intensely from thirst, night and day, and was forced to pass the urine nearly every hour. She also suffered greatly from pruritus vulvæ. Her disease was of five years' standing, and she had been subjected to various forms of treatment, but never to a strict diet. She had consulted many distinguished physicians in this country and in Europe.

On December 16, 1882, she passed 128 ounces of urine, of a specific gravity of 1,036, containing twenty-two grains of sugar per fluidounce, or 2,816

<sup>1</sup>On April 28, 1884, this patient reported himself as perfectly well. His urine had a specific gravity of 1,020½ and contained no sugar. The diet had been not absolutely strict but was what may be called moderately anti-diabetic.

grains in the twenty-four hours. The next day she was put upon a strict anti-diabetic diet.

On December 22, 1882, the daily quantity of urine was reduced to 52 ounces, with a specific gravity of 1026, containing eight grains of sugar per fluid-ounce, or 416 grains in the twenty-four hours. The urine constantly presented crystals of uric acid. The thirst, pruritus, and constant desire to pass urine were relieved.

With the exception of one week, this patient took Clemens's solution, two drops three times daily, the dose finally increased to five drops, from December 27, 1882, to April 2, 1884. The treatment during this period consisted of the diet and Clemens's solution, with occasional remedies to act upon the bowels. She has been almost constantly under treatment, and I made 91 examinations of the urine up to April 6, 1884. Her urine is now examined regularly once a week.

Under treatment, the quantity of sugar in the urine diminished until the glycosuria disappeared January 27, 1883, about thirty days after the first examination. From January 27, 1883, to April 6, 1884, with the exception of about six weeks passed at a watering-place in the summer of 1883, under very unfavorable conditions as regards diet, the urine has either been free from sugar or has contained a very small quantity. The quantity of urine has been constantly normal, and the general diabetic symptoms have never reappeared. She now uses the anti-diabetic diet with the crust of one-half of a French roll at each meal, a pint of cream daily, and a little fruit in season.

While this cannot be called an instance of perfect cure, the fact that the patient lives comfortably and in apparently good health under a diet that is not particularly irksome shows that cases of long standing and presenting very unfavorable features are by no means hopeless. This case presented to a

remarkable degree the example of a loss of desire for prohibited articles of food. She now looks forward to eating melons in season, which is about the only strong wish she has expressed for food not suited to her condition.<sup>1</sup>

*Case E.*—The patient in this case is a gentleman about fifty years of age, living in Ohio. I examined his urine May 24, 1878, and November 17, 1881, for some reason not connected with a suspicion of diabetes and found no sugar. On May 4, 1882, I again examined the urine, on account of certain diabetic symptoms, and found a large quantity of sugar. He was at once put on the anti-diabetic diet, which he attempted to carry out by himself at his home in Ohio. In January, 1884, he reported that all his symptoms had been relieved and that he suffers nothing unless he commits indiscretions in diet.

*Case F.*—The patient in this case is a gentleman about fifty years of age, and of medium muscular and adipose development. Having been suffering for some months from diabetic symptoms, his urine was examined by me on March 22, 1878. I then found a specific gravity of 1022 and a large quantity of sugar. He was at once put upon a moderate anti-diabetic diet.

On April 26, 1878, I found the urine normal, and the diabetic symptoms had disappeared. Between April 26, 1878, and January 10, 1882, I examined the urine seven times, always finding it normal.

On October 14, 1882, he passed ninety-six ounces of urine in the twenty-four hours, with a specific gravity of 1027 and containing 4 grains of sugar per fluidounce. His diet for some time had been irregular, and he had depended on various remedies,

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<sup>1</sup> The urine of this patient is examined regularly once a week, and there has been no sugar, with the exception of a trace on one occasion, for twelve weeks. The last examination was made on May 4, 1884, and no sugar was found. With the exception of sugar, the diet has been but little restricted for three weeks. For the last three weeks the patient has been taking about a pint daily of the lactic acid drink recommended by Cantani.

such as the bromides and the sulphide of calcium. He then began to take the arsenite of bromine, but his diet, though moderately anti-diabetic, was still imperfectly regulated. His urine, examined February 20, May 18, and May 28, 1883, contained a small quantity of sugar. On August 15, 1883, I examined the urine and found a trace of sugar.<sup>1</sup>

This patient suffers very little from diabetic symptoms. I have little doubt that the glycosuria could be arrested by a few weeks of strict dietetic treatment.

*Case G.*—The patient is a lady, rather stout, and about seventy-five years of age. Attention was directed to the urine on February 7, 1884, by excessive thirst and urination, with pruritus vulvæ. Before I examined the urine, it was reported to me that she was passing it in large quantity, the specific gravity being 1040, and that it was loaded with sugar. Under an anti-diabetic diet and the arsenite of bromine, in three days the quantity of urine was reduced to the normal standard and the diabetic symptoms disappeared. I examined the urine on February 13, 19, 28, March 4, 11, 17, 21, 25, 31, and April 5, 1884. The urine, with one exception, presented sugar in small but variable proportions, but its quantity was usually normal, and the specific gravity varied between 1007 and 1020. The urine on one occasion, with a specific gravity of 1010, contained a trace of sugar. On March 17, the urine had a specific gravity of 1007 and contained no sugar. The general diabetic symptoms are now entirely relieved. The only fault in the diet is that the patient takes a quart of milk daily. The progress of this case is quite favorable up to the present time.<sup>2</sup>

*Case H.*—The patient is a large and rather corpulent man, about 60 years of age. I examined the

<sup>1</sup> From April 5 to May 2, 1884, I have made six examinations of the urine. The specific gravity has been between 1012½ and 1020 and a small quantity of sugar has always been noted, but there have been no general diabetic symptoms. The diet has not been rigidly carried out.

<sup>2</sup> This patient died of apoplexy, June 1, 1884.

urine December 27, 1882, and found it with a specific gravity of 1027 and containing a considerable quantity of sugar. He was at once put upon the anti-diabetic diet. Under this treatment the glycosuria and other diabetic symptoms disappeared. In July, 1883, he was attacked with hemiplegia, from which he has substantially recovered. He was reported in March, 1884, as perfectly well, having returned to the normal diet.

*Cases I, J, K and L.*—These are cases of patients who are constantly passing sugar in large quantities, under little or no treatment, but who enjoy fair health. In one of these cases the patient obstinately refuses to regulate the diet, and although he suffers but little from diabetic symptoms, he has become greatly reduced in weight and strength within the past two years. A young daughter of this patient, whom I saw repeatedly and who never followed out the anti-diabetic diet, died of diabetes about three years ago. Another patient has fair health under a rather irregular diet. He is so situated as to be unable to carry out a strict regimen. The two other patients are large and corpulent men, who pass immense quantities of sugar, with no restriction in diet or in drinking.

Of the fifteen cases of death the reports are generally imperfect. Four are reported as having died of diabetes; one, of diabetic coma, possibly acetonæmia; three, of albuminuria; one, of apoplexy; one, of hæmoptysis; one, of "inflammation of the bowels"; and in the remaining four cases I have not been able to learn the cause of death.

*Case M.*—I have already referred to this case. The patient was a stout, heavy man, about 40 years of age. I examined him November 20, 1869. He then passed 224 ounces of urine in the twenty-four hours, with a specific gravity of 1035, containing 18 ounces and 30 grains of sugar, and 624 grains of urea. He was immediately put upon a moderate anti-diabetic

diet and returned to his home in Nebraska. I heard from time to time for several years that he enjoyed good health and had little or no glycosuria unless he committed serious indiscretions in diet. He died of "inflammation of the bowels," after a short illness, in August, 1881, nearly twelve years after I first saw him, in 1869.

*Case N.*—On November 6, 1879, I saw in consultation a lady about 58 years of age, rather spare in figure, who had been suffering for some months with diabetes. At this time the quantity of urine was not notably increased, the specific gravity was 1030, and it contained a small quantity of sugar. The treatment had consisted mainly of an imperfect anti-diabetic diet. A more rigid diet was recommended, but it was not strictly enforced. On November 10 and 15, 1877, the urine contained a trace of sugar. On November 29, 1877, the urine was free from sugar, and the patient was much improved. She left for her home in Cuba, and I saw her again on Sept. 2, 1880, when the urine was still free from sugar. In July, 1881, she was passing large quantities of sugar, and I learned that for several months the diet had been unrestricted and she had eaten sweets and fruits immoderately. She returned to the anti-diabetic diet, and I found the urine free from sugar with all the diabetic symptoms relieved on August 2, 1881. She then returned to her old habits of eating, and the urine was found loaded with sugar on Sept. 27, and Oct. 29, 1881. I learned that she died "of diabetes," never having returned to the anti-diabetic diet, in Cuba, in 1882. During the last few weeks of her life she was much prostrated, suffering intensely with boils and carbuncles, which were probably the immediate cause of death.

The diet-table which follows is adapted to those who are able to provide themselves with any kind of food required without regard to cost rather than to persons of restricted pecuniary resources; but I have

recognized the fact that those who are subjected to the anti-diabetic diet should secure every possible variety of food. In making this table, I have drawn largely from those already published, particularly the list of permissible articles given by Bouchardat, but, after many trials of the so-called anti-diabetic flours and bread, I have come to the conclusion, as I have already stated, that they are nearly all unreliable. I prefer to make patients abstain entirely from bread, or I allow the crust of half a French roll two or three times daily if I cannot eliminate bread altogether from the diet. The gluten-breads, so-called, are not only unreliable, but they soon become very distasteful. When ordinary bread is allowed, the physician knows, at least, about how much starch is taken.

## APPENDIX.

### DIET-TABLE.

**BREAKFAST.**—Oysters stewed, without milk or flour; clams stewed, without milk or flour.

Beefsteak, beefsteak with fried onions, broiled chicken, mutton or lamb chops, kidneys, broiled, stewed, or deviled; tripe, pig's feet, game, ham, bacon, deviled turkey or chicken, sausage, corned-beef hash without potato, minced beef, turkey, chicken, or game, with poached eggs.

All kinds of fish, fish-roe, fish-balls, without potato.

Eggs cooked in any way except with flour or sugar, scrambled eggs with chipped smoked beef, picked salt cod-fish with eggs, omelets plain or with ham, with smoked beef, kidneys, asparagus-points, fine herbs, parsley, truffles, or mushrooms.

Radishes, cucumbers, water-cresses, butter, pot-cheese.

Tea or coffee, with a little cream and no sugar. (Glycerine may be used instead of sugar if desired.)

Light red wine for those who are in the habit of taking wine at breakfast.

LUNCH OR TEA.—Oysters or clams cooked in any way except with flour and milk, chicken, lobster, or any kind of salad except potato, fish of all kinds, chops, steaks, ham, tongue, eggs, crabs, or any kind of meat, head-cheese.

Red wine, dry sherry, or Bass's ale.

DINNER.—Raw oysters, raw clams.

*Soups*.—*Consommé* of beef, of veal, of chicken, or of turtle, *consommé* with asparagus-points, *consommé* with okra, ox-tail, turtle, terrapin, oyster or clam, without flour or milk; chowder, without milk or potatoes, mock turtle, mullagatawny, tomato, gumbo *filet*.

*Fish, etc.*—All kinds of fish, lobsters, oysters, clams, terrapin, shrimps, crawfish, hard-shell crabs, soft-shell crabs. (No sauces containing flour or milk.)

*Relishes*.—Pickles, radishes, celery, sardines, anchovies, olives.

*Meats*.—All kinds of meat cooked in any way except with flour, all kinds of poultry without dressings containing bread or flour, calf's head, kidneys, sweet-breads, lamb-fries, ham, tongue, all kinds of game; veal, fowl, sweet-breads, etc., with currie but not thickened with flour. (*No liver*.)

*Vegetables*.—Truffles, lettuce, romaine, chiccory, endive, cucumbers, spinach, sorrel, beet-tops, cauliflower, Brussels-sprouts, dandelions, tomatoes, radishes, oyster-plant, celery, onions, string-beans, water-cresses, asparagus, *artichauts*, Jerusalem artichokes, parsley, mushrooms, all kinds of herbs.

*Substitutes for Sweets*.—Peaches preserved in brandy without sugar, wine-jelly without sugar, *gelée au kirsch* without sugar, *omelette au rhum* without sugar, *omelette à la vanille* without sugar, *gelée au rhum* without sugar, *gelée au café* without sugar.

*Miscellaneous*.—Butter, cheese of all kinds, eggs

cooked in all ways except with flour or sugar, sauces without sugar, milk, or flour.

Almonds, hazel-nuts, walnuts, cocoanuts.

Tea or coffee with a little cream and without sugar. (Glycerine may be used instead of sugar if desired.)

Moderately palatable ice-creams and wine-jellies may be made, sweetened with pure glycerine; but although these may be quite satisfactory for a time they soon become distasteful.

*Alcoholic Beverages.*—Claret, burgundy, dry sherry, Bass's ale or bitter beer. (No sweet wines.)

PROHIBITED.

Ordinary bread, cake, etc., made with flour, sugar, desserts made with flour or sugar, vegetables, except those mentioned above, sweet fruits.





