

**A vindication of saccharin : the French reports refuted, its harmless proved and certified by the highest authorities in the world.**

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**Publication/Creation**

London : Wilson, Salamon & Co., 1888.

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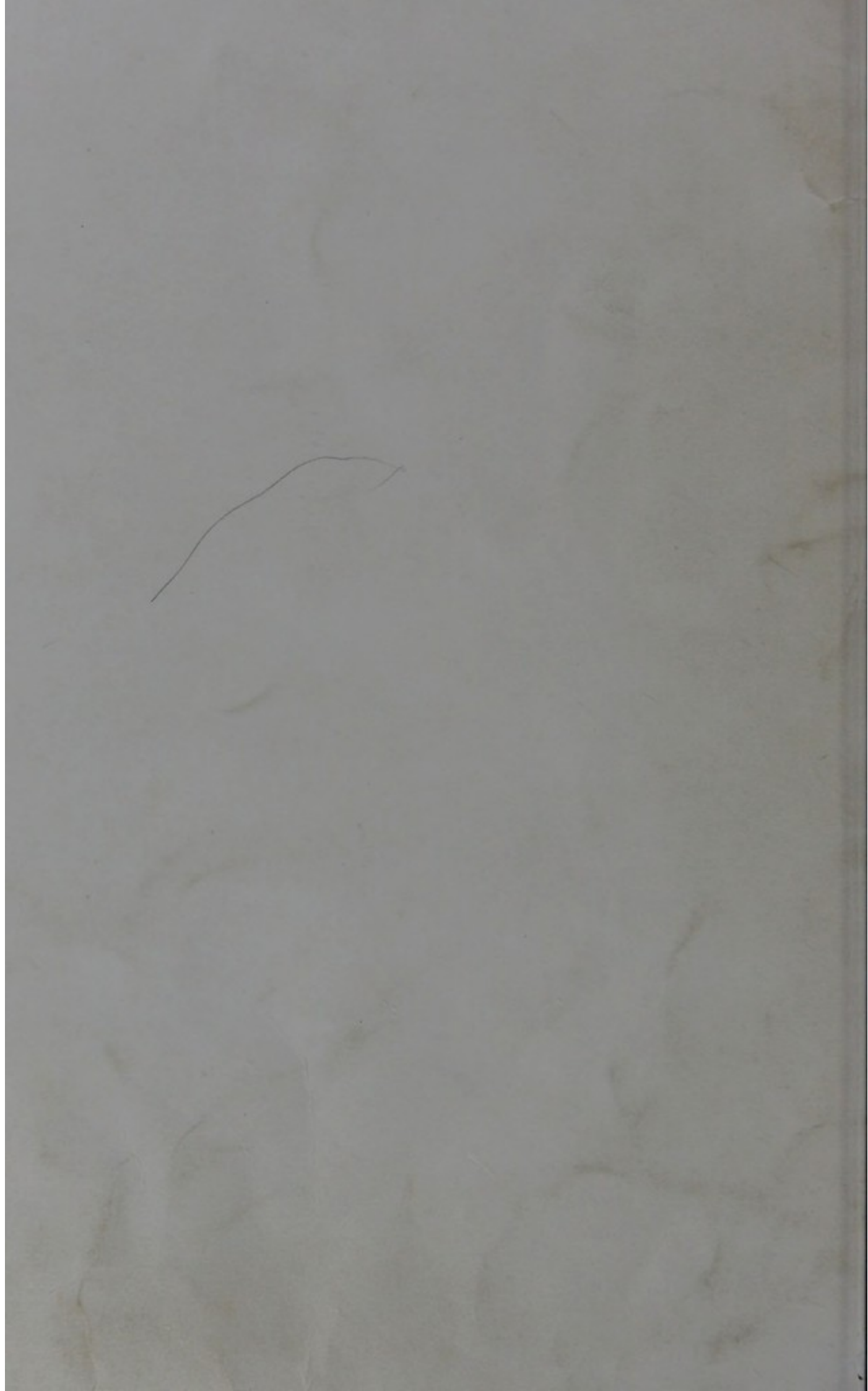
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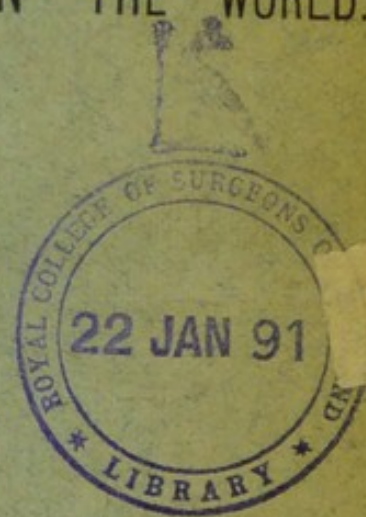


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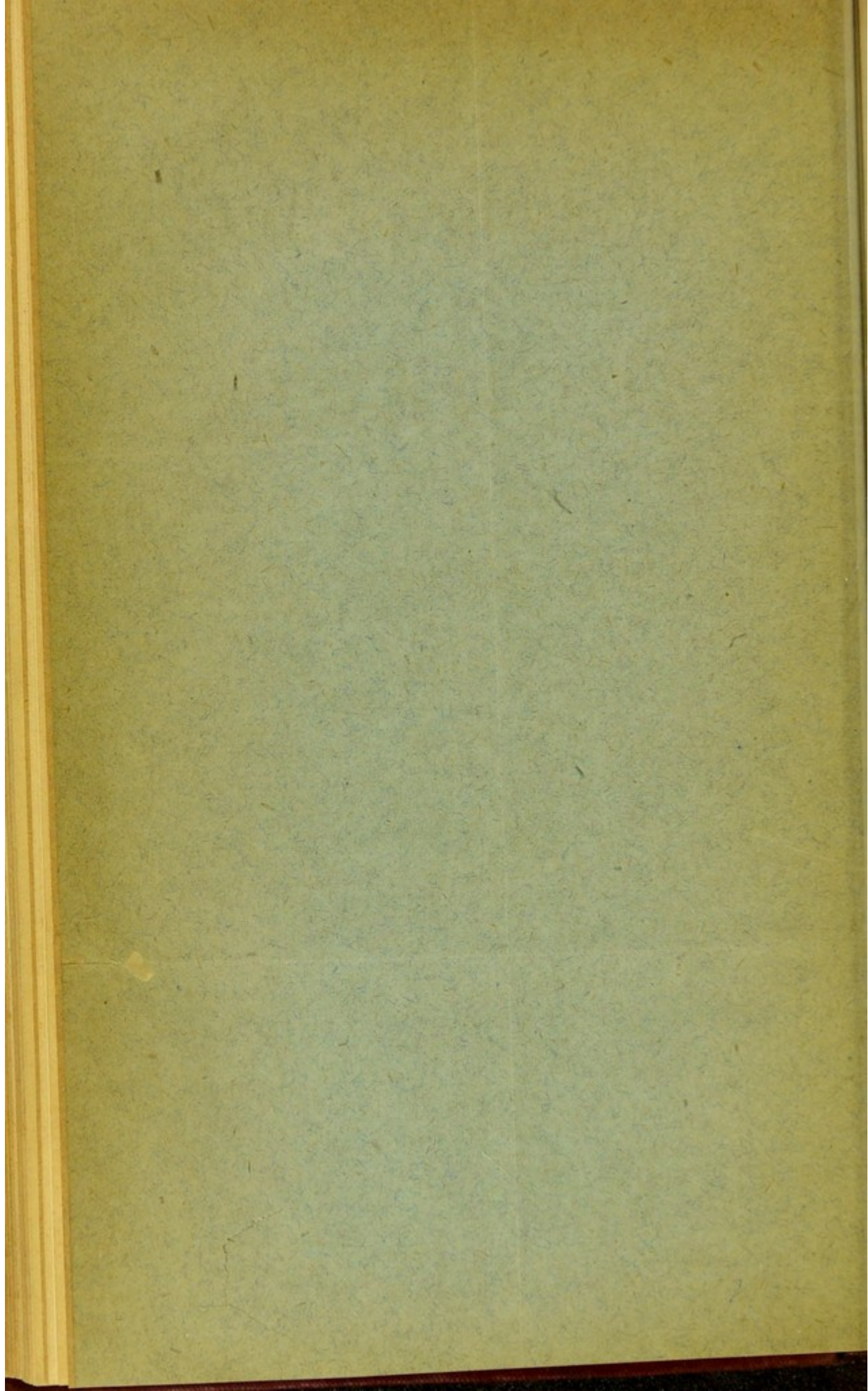
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1888



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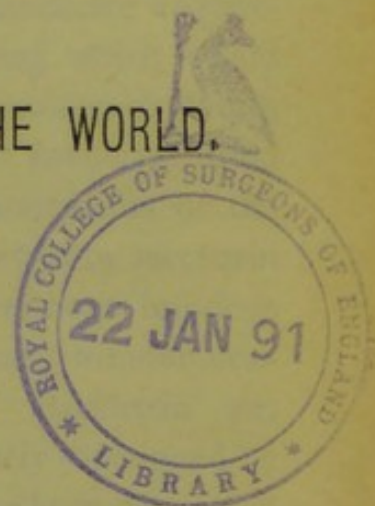
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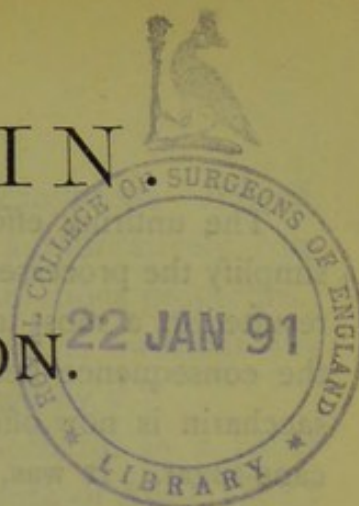
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# SACCHARIN

## A VINDICATION.



There are few industrial discoveries which do not, in the course of their commercial development, clash with existing interests, and thereby induce an amount of opposition proportional to the magnitude of such discoveries, and to the probability of their ultimate success.

The announcement that a sweetening agent, capable, in many cases, of superseding the product of the cane and the beet, had been obtained from a substance yielded in the destructive distillation of coal-tar, excited curiosity rather than apprehension, and in virtue of the conspicuous merits of the discovery, was received by leading intellects of the day with an amount of encouragement rarely extended to a newly-fledged invention.

For more than a year it was not seriously regarded in the light of a probable, much less possible, competitor by those interested in the preparation and sale of ordinary sugar. It was thought that its sphere of utility would be circumscribed by the moderate requirements of those afflicted with diabetes, an application which would obviously fall harmless upon the sugar industry, appealing, as it did, to those who could never hope to obtain a sweet flavouring from ordinary sugar. Hence the investigations and statements of the most eminent of physiologists and medical men, whereby saccharin was indubitably demonstrated and asserted to be without injurious action upon the human system, were allowed to pass without contradiction or even the semblance of challenge. Saccharin was welcomed by the medical faculty, and its use was freely sanctioned by them. Already many tons' weight of the material have been demanded by the great number to whom sugar is absolutely forbidden, and it may therefore fairly be assumed that it has constituted a solace of no ordinary character to suffering humanity.



The untiring efforts of Fahlberg, the discoverer, to perfect and simplify the processes involved in the manufacture of saccharin, have resulted in a most important reduction in the price of production; the consequence being that, in terms of relative sweetening power, saccharin is now offered for sale at a considerably lower rate than cane-sugar. It was, moreover, found, on nearer acquaintance with the properties of saccharin, that it could successfully supersede sugar as a sweetening agent in many important industrial operations. Not being a carbohydrate it was *ipso facto* incapable of undergoing fermentation; whilst its preservative properties materially retarded a tendency to putrefactive change in those substances with which it was incorporated. It should not be forgotten that in those applications saccharin did not usurp the functions of a food. It replaced sugar in cases and in quantity where it could not reasonably be argued that sugar was present in any other capacity than that of a flavouring material. For this purpose it has found ready acceptance at the hands of the wine and cider makers, the distillers, the liqueur and spruce makers, brewers, the principal producers of brandy, spirit blenders, the jam and preserve makers, bakers, syrup makers, and in many other industries of importance.

It was only when these applications were proved, and were in course of successful adoption throughout the world, that the leaders of the sugar industry became alarmed. It was not until saccharin had proved and asserted its right to be considered a competitor of sugar in these directions, that any doubt whatever was expressed as to its being harmless to the human system. It was then, and then only, that the charge was instituted that saccharin exercised a deleterious influence upon the digestive functions. Where did the statement originate? It was in France, where sugar refining is regarded as a cherished industry. By whom was it first preferred? By Dr. Worms, a medical gentleman of Paris, whose opinions will certainly not weigh against those of Dr. Pavy, admitted on all hands to be the highest authority in the world upon the subject.

It is essential to an impartial estimate of the value of the attacks that have been made upon saccharin, to bear in mind that they originated with Dr. Worms, and that outside France no single

medical man has ever declared it to be in any way injurious. Indeed, Dr. Pavy boldly alleges\* that "it is nowhere authoritatively contended that it possesses any irritant or directly injurious properties." "Vague dyspeptic troubles are spoken of," he says, "without any proof or reliable evidence that such are occasioned by it."

Dr. Worms commenced his attack upon saccharin in a paper read before the Académie de Médecine, on the 10th of April, 1888,† His experiences as a medical man being prefaced by the following purely commercial considerations: "If we succeed in dethroning beet-sugar by the substitution of saccharin in alimentation in any form . . . the universal sugar industry would be greatly disturbed." . . . "If some less costly process of manufacturing saccharin is discovered, it is without the shadow of doubt that the competition of sugar would be difficult. If we may judge by the ardour with which the proprietors of the patent pursue the campaign in asking the help of the greatest scientific notabilities of Germany, Italy, and England, we may be certain that only a brief delay will intervene before the use of saccharin becomes common, especially if all the advantages they claim for it are real." "But," he continues, "the principal point which dominates the whole question (in appearance of the second order), is that the substitution of tar-sugar for cane or beet-sugar is certain the day the cost of its manufacture becomes sensibly lessened."

After an elaborate calculation, proving that even at its present price saccharin, in terms of relative sweetening power, is less costly than beet-sugar, Dr. Worms proceeded to adduce the evidence upon which he based his assertions that its continued use occasions digestive complications. They comprised four cases of diabetics under his treatment; of these three were stated to have experienced digestive troubles which ceased when saccharin was discontinued. The respective ages of the three patients were seventy, sixty-eight and fifty. The fourth was a woman aged thirty, who took saccharin without any ill effects. No other cases were cited, no particular

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\* See letter to the *Lancet*, p. 11.

† See *Bulletin de l'Académie de Médecine*, 3ème série, tome xix. Paris G. Masson.

symptoms were specified, no evidence was adduced as to what was the general condition of health at the time of observation, nor as to the diet to which the patients had been subjected, when the dyspeptic symptoms were observed. Yet upon such testimony Dr. Worms asks medical men and the public to accept the statement that saccharin may become a source of injury to the system. Moreover, these are, so far as we can ascertain, the only cases which have ever been published, in support of the assertions which have been so recklessly made, and so assiduously expanded and circulated.

In the course of the discussion following the reading of the paper Dr. Dujardin-Beaumetz said :—"I have not observed from a therapeutic point of view, amongst the patients to whom I have ordered saccharin, the digestive troubles of which our colleague speaks. My diabetics have always well-supported this drug in daily doses of six to ten centigrammes. I have even one patient who for two months has not only sweetened his drinks with saccharin, but orders his cook to make pastry with gluten—flour and saccharin, which he eats without the least inconvenience." He further added, "But as our colleague has forcibly said, the question of hygiene exceeds in this case that of therapeutics. The considerable sweetening power of saccharin makes it, notwithstanding its high price of 135 francs per kilo, a dangerous rival to sugar, and already it is considerably used in the industries."\*

It is always objectionable to impute motive, and it should not be done without the clearest possible evidence. If the statement merely emanated from us, it might fairly be argued that it was by way of counter-attack to the onslaught which has been made by Frenchmen upon saccharin; an attack which has, without doubt, filled the public mind with alarm, and reacted with extreme prejudice upon a great discovery. But the charge actually comes from France itself, the sense of fair-play having prompted a newspaper of undeniable respectability to expose the denunciation of saccharin as

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\* Dr. Prosper de Pietra Santa (Lauréat de l'Institut, Académie des Sciences, Paris) and Dr. Constantine Paul speaking at the same séance, both declared they had never met with the digestive troubles indicated by Dr. Worms.

a work of flagrant and dishonest jobbery on the part of the French sugar refiners.\*

It is evident that the only way in which the progress of development of saccharin could be checked was by asserting that it was injurious to the human system. In all other respects it was bound to win upon its merits. It may assist an impartial decision in the matter if we briefly follow further the progress of the attacks upon saccharin.

At a meeting of the Conseil d'Hygiène et de Salubrité de la Seine, held in Paris, M. Lepère, Secrétaire Général de la Préfecture de Police, stated that he had received a communication from the chief of the Laboratoire Municipal concerning the discovery of saccharin in certain kinds of food. After emphasizing the number of industrial applications which saccharin was receiving, M. Lepère concluded with the following remarks:—"The use of this new product threatens the interests of the Treasury, of Agriculture, and of the Sugar industries. *It is also possible that it may injure the public health.*" The Conseil, which, it should be remembered, is not governmental, but municipal, thereupon nominated a commission, composed of MM. Peligot, Jungfleisch, Riche, Armand Gautier, Dujardin-Beaumetz, and Prouste, to investigate and report upon the question. The commission promptly got to work, and reported so adversely to saccharin that they recommended its prohibition as dangerous to health. Dr. Dujardin-Beaumetz, the reporter to the commission, had evidently forgotten his remarks quoted above (p. 6), and also the testimony he had given at a meeting of the Therapeutical Society on the 20th of March last, when he said, "As I am speaking of diabetics I do not know how too forcibly to recommend to you the employment of saccharin, which permits of the use of dishes of a most agreeable taste, quite equal to those in which sugar has been employed. Notwithstanding its price saccharin possesses 330 times the sweetening power of sugar, consequently its use is not more expensive." The Paris correspondent of the *Lancet*, June 16th, further reports Dr. Dujardin-Beaumetz as

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\* *Courrier de Lyon*, 28th Aug., 1888.

saying, "that he could confirm the marked advantages of saccharin as a substitute for sugar in the alimentation of diabetics. It is much appreciated by patients, who find that it has a savour identical with that of sugar, of which it has none of the inconveniences. Although it does not appear to have any noxious action, it cannot be employed like sugar as an aliment, because it passes through the economy and is eliminated by the urine without being assimilated or transformed."

It should further be stated that the experiments upon which this commission based its report were all extra corporeal. The one fact upon which they considered themselves entitled to condemn the employment of saccharin being that they found that it retarded the conversion of starch into sugar by means of diastase, and from this they argued that it would have a similar influence upon the digestive functions.\* Medical men will best be able to appreciate the value of such an inference from such an experiment, which is certainly not enhanced by the fact that it was conducted, not upon the quantity of saccharin which could by any possibility be taken in an ordinary diet, but with a quantity which, when translated into its sugar equivalent, amounts to about eleven pounds in weight. The mere fact of its intense sweetness prohibits the possibility of such an excessive quantity being used for any of the above-mentioned purposes. It is not altogether foreign to the question to ask what effect eleven pounds of cane or beet-sugar, taken at one time, would exercise upon the digestive functions?

It is not unworthy of note that saccharin has hitherto been manufactured almost exclusively in Germany, whence the bulk of that employed in France was originally derived. Saccharin is condemned by the Commission of the Conseil as being dangerous to health. Yet this same Conseil have granted to M. Garnier, a chemist of Paris, a certificate in respect of a material called "Sucre

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\* Dr. Pavy says (see page 14), "The most specific charge against it is that it may interfere with digestion through the antiseptic power with which it is endowed. *The answer to this is, that it becomes quickly absorbed from the digestive system, to be eliminated from the body in an unchanged state, and thus does not remain within the sphere of capacity for operating in the manner alleged.*"

Edulcor," in which it is stated that it is innocuous, and may be used with advantage by diabetics. Yet it is capable of absolute proof that this "Sucre Edulcor" does contain, and has always contained, a notable quantity of saccharin, which, indeed, constitutes its sole recommendation, and is in all respects the same material for which this same Conseil now demands prohibition at the hands of the French Government.\*

The assertion by the Commission that saccharin gives rise to digestive complications when taken over prolonged periods of time is *solely based* upon the statement made by Dr. Worms at the Paris Académie de Médecine to this effect. Dr. Worms subsequently claimed to have received confirmation from Dr. Pavy, whom he visited in London, with a view to obtaining his experiences as to the use of saccharin. That Dr. Worms grossly misrepresented what Dr. Pavy said is sufficiently apparent upon a perusal of the indignant denial with which the latter meets the statement in his letter to the *Lancet* of November 3rd, 1888,† wherein he states his views respecting saccharin, and, moreover, clearly enforces the opinion, in which the Editor of the *Lancet* concurs, that "there is a motive power at work to depreciate the article in question."

It has been distinctly asserted, by a large section of the Press of this country, that the sale of Saccharin has been absolutely prohibited by the Governments of Great Britain, France and Portugal.

This is an entirely erroneous statement. The sale of Saccharin at the present moment has not been prohibited by any Government.

In France, no action whatever has been taken by the Government on the report of the Committee, and in Portugal the sale of saccharin has been regulated, not prohibited.

In Great Britain, its use in the brewery has alone been prohibited. Mr. Goschen, when asking the House of Commons to give him the

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\* "Saccharin Tabloids contain half a grain each of this new sweetening agent, which is doubtless destined to play an important rôle in the treatment of disease in the future. The Tabloids are very convenient in form, are certainly efficient sweetening agents, and have no reducing action on Fehling's solution, thereby showing the absence of sugar."—*Lancet*, October 15th, 1887.

† See p. 11.

power to forbid its use in brewing, was most careful to say "that the question was solely one of Revenue, and he NEVER CONTENTED THAT SACCHARIN WAS A NOXIOUS SUBSTANCE;" and, while pressing for power to prohibit, he carefully provided a saving clause "to withdraw such prohibition at any time." Speaking in the same debate, Mr. Gladstone, Mr. Childers, Sir Lyon Playfair, Sir Henry Roscoe, and Dr. Farquharson, amongst others, bore emphatic testimony to the brilliancy of the discovery, and to the innocuous and useful qualities of Saccharin. On a division being called, one hundred and twenty two members of the House of Commons voted in favour of its uncontrolled use.

The public mind has been unsettled by the insidious attacks made upon saccharin. A great discovery is imperilled, because, in the words of M. Lepère, "it threatens the interests of the sugar industry." It is proposed to deny a comfort and a solace to those who need it to an extent that medical men only can appreciate. Shall the result of this strategy be the triumph of the French sugar refiners, thus involving the denial to Fahlberg of the fruit of his labours in the cause of humanity?

We purpose meeting the position by invoking that spirit of fair play which is never appealed to in vain in this country. We do not ask to be judged by our own assertions, we prefer to rest our case upon the experiments, the therapeutic experiences, and the opinions of those whose names guarantee both impartiality and ability. We are prepared to abide by the view which the public may take of their statements. These we append, in the fullest anticipation that they do constitute a complete refutation of the unworthy calumnies that have been heaped upon this marvellous discovery, and that they will have the effect of restoring the shaken confidence of the public in an article, which, if really harmless, as the highest medical authorities assert, possesses a sphere of usefulness at once widespread and unique.

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*Note.*—Since the foregoing was in the press, we have read the following in the *Evening Post*, of December 3rd:—"This morning a Reuter's Telegram from Paris announces that the *Official Journal* publishes a decree prohibiting the importation of saccharin into France and Algeria. This is the result of a petty international quarrel between the French and German Medical Schools . . . but international jealousy and commercial considerations have caused the French Academy of Medicine to lead an attack upon a newly discovered product, which attack has culminated in the prohibition of its importation into France." It may be seriously questioned whether this prohibition is not in direct conflict with the Treaty of Commerce between Germany and France.

The following is taken from the "*Lancet*," of November 3rd, 1888.

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"Audi alteram partem."

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## SACCHARIN : A DISCLAIMER.

SIRS,—In an annotation contained in your last issue, you say that the true position of saccharin is becoming somewhat difficult to define, and refer to the paragraphs that have been recently appearing in various journals in which it is spoken of in an adverse way upon the strength of a report of a commission of Paris doctors. My name having been freely made use of in France in relation to this matter, I will ask you to allow me, through the medium of your journal, to state that the opinion which has been circulated as emanating from me is an entire misrepresentation. The history of the affair is this : During the past summer I received a visit from Dr. Worms of Paris. In the course of conversation, reference was made to saccharin, and I was asked whether I had seen any ill effects arise from its employment by diabetic patients. Shortly after this interview, a copy of the *Bulletin de l'Académie de Médecine* reached me containing a statement made by Dr. Worms to the Academy that he had learnt from me that I, like he, had observed dyspeptic troubles after the prolonged use of saccharin in a certain number of patients. The following transcript of the letter I at once wrote to Dr. Worms will perhaps best serve to give a view of how the matter actually stood :—

"I was surprised beyond measure to read your representation, in the *Bulletin de l'Académie de Médecine*, of what I said to you regarding saccharin at our interview during your recent visit to London, as it stands diametrically opposed to the words I uttered, and I am at a loss to understand how such an error could have arisen. What I said was that I had never known any dyspeptic troubles to be occasioned by its use, and that I was in the habit of freely recommending its employment. I stated that I had sometimes met with persons who



spoke of it as having a flavour that they did not like, and that sometimes an impression of sweetness was left for a considerable time in the mouth, which was said to be unpleasant. Beyond these effects, which can scarcely be called dyspeptic troubles, I have never known it give rise to any ground of complaint. In justice to those whom your statement might deter from deriving the comfort of its employment, I think steps should be taken by you to correct the erroneous statement that has gone forth."

In reply to this letter, Dr. Worms wrote stating that the difference between us was to be accounted for by his considering that the persistence of a sweet taste in the mouth was to be ranked as a dyspeptic trouble, and saying that he would (as he afterwards did)\* take the opportunity of making an explanatory statement to the Académie de Médecine. But a report when started seldom loses in being reproduced. The gain is sometimes great, and the following extract from a Parisian journal of recent date shows the expansion that has here occurred: "Le docteur Pavy, de Londres, connu par ses nombreux travaux sur le diabète, estime que les diabétiques soumis à la saccharine paient bientôt, par des maux d'estomac et des troubles intestinaux, le léger adoucissement apporté à leur dur régime." I intended nothing more in my conversation with Dr. Worms than to state that the slight aromatic or kind of bitter-almond flavour which belonged to the earlier specimens of saccharin, and

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\* The explanatory statement of Dr. Worms was as follows:—"In the course of the *séance* of 3rd June, and on the occasion of the very interesting communication of our colleague, M. Dujardin-Beaumetz on saccharin, I said incidentally that Dr. Pavy, whom I had just seen in London, had observed, like myself, dyspeptic troubles in some diabetic patients who used this substance. I took care to send to Dr. Pavy the *Bulletin de l'Académie* which reproduced this mention in the form which had appeared to me to correspond with these ideas rapidly formulated in a strange language. Dr. Pavy, in reply to this communication, expresses to me the desire to see specified the nature of the troubles he had sometimes observed. These consist in a disagreeable taste left by saccharin, or a persistent sweet flavor in the mouth. He thinks the term dyspeptic troubles is hardly applicable to this kind of manifestation, and remains favorable to the use of saccharin when well tolerated. I hasten to defer to the desire of Dr. Pavy as to the qualification to be given to this genus of disagreeable phenomena caused by the use of saccharin."—*Bulletin de l'Académie de Médecine*, No. 29, *Séance* 17 Juillet, 1888.

which in the more recently prepared product is almost completely absent, did not fall in with the taste of some persons. We are accustomed in sugar to an article possessing a sweet taste pure and simple, and an aromatic character added to this, whilst pleasing to some, may not be acceptable to the palate of others; but it is only rarely that I have heard the objection expressed. The persistence of a sweet taste in the mouth I had no idea would be looked at otherwise than as a physiological phenomenon. This was, and is, my own reading of it. With its intense sweetness the liability is open for the nerves of taste to be too strongly impressed by too large a quantity of the article being brought into contact with them. The effect, as in the case of other sapid substances, to be looked for is a duration of impression standing in proportion to the intensity of impression exerted. Thus, without any intention of implying more than I have stated, I am first represented as saying that saccharin is productive of dyspeptic troubles, and later on this is made to grow into the specific allegation that diabetics employing saccharin soon pay through stomach ailments and intestinal troubles for the slight alleviation imparted to their severe regimen! In another place I am represented as having recently declared to Dr. Worms that I had abandoned the use of saccharin amongst my diabetic patients because it had gradually diminished their appetite and strength.

It is not for me to speculate upon the grounds for the misrepresentation that has been put forward, but it is evident that there has been a motive power at work to depreciate the article in question in public estimation, and that not over-scrupulous measures have been brought into use for carrying this out. Sugar employed with our food not only serves to render it agreeable to the palate, thereby promoting its being taken with zest, but contributes in itself under conditions of health as an alimentary article. Saccharin fulfils the first purpose, but is not of a nature to possess any virtue in relation to the second. It cannot, therefore, take the position of a representative of sugar, and, I need hardly say, should not be used to give a fictitious sweetness in lieu of sugar. It stands upon its own ground, however, regarded purely as a sweetening agent, and I know of nothing to preclude its use with perfect safety from harm by those whom circumstances

may render it advisable to employ it in place of sugar. To the diabetic it must undoubtedly be looked upon as a great acquisition. To the unduly stout it may also be regarded as fitted to render similar service. There are others also who, for reasons well founded or not, desire to avoid sugar; and to these it affords the means of giving effect to their wish without having to sacrifice anything as regards sense of taste. It is a striking attribute that it should have the power of affecting our nerves of taste in what may be appropriately designated the transcendent manner it does. In other respects, no special effects are exerted by it. It is nowhere authoritatively contended that it possesses any irritant or directly injurious properties, Vague dyspeptic troubles are spoken of without any proof or reliable evidence that such are occasioned by it. The most specific charge against it is that it may interfere with digestion through the antiseptic power with which it is endowed. *The answer to this is that it becomes quickly absorbed from the digestive system, to be eliminated from the body in an unchanged state, and thus does not remain within the sphere of capacity for operating in the manner alleged.* Moreover, if the circumstances stood otherwise, the quantity required to be employed for flavouring purposes is so minute that little room is afforded for any material action to be exerted in the direction named. It is no valid ground of argument, it is true, to say that other articles admitted into our dietary as condiments possess antiseptic properties or the power of exerting a restraining influence over fermentative changes in organic matter. Salt, vinegar, and the spices all act as antagonistic agents to change; indeed, we make use of this principle of action appertaining to them when they are brought into use for preservative purposes.

It is under a sense of duty that I have written this letter. I have no feeling otherwise to actuate me. A scare has been started against Saccharin upon the ground of hurtful effects having been observed to follow its employment, and I have been falsely represented as participating in this assertion. Under such circumstances, to remain silent would give sanction to the statements that have been circulated. I am, Sirs, yours obediently,

Grosvenor Street, W., Oct. 29th, 1888.

F. W. PAVY.

\* \* \* Dr. Pavy has apparently misunderstood our remarks upon the value of Saccharin. By saying that its true position was becoming hard to define, we merely indicated that it was being repressed in certain quarters as an article of diet, while it had no pretensions to the position of a drug. The nearest approach to a definition afforded by Dr. Pavy is that to the diabetic it is "a great acquisition," with which we cordially agree. Our concluding remarks sufficiently indicated that we suspected there might be, as Dr. Pavy suggests, some "motive power at work to depreciate the article in question."—ED. *Lancet*.

## SACCHARIN.

BY THOMAS STEVENSON, M.D., F.R.C.P., LOND.,  
*Lecturer on Forensic Medicine and Chemistry at Guy's Hospital,*  
*Official Analyst to the Home Office, and*

L. C. WOOLDRIDGE, M.D., D.Sc., M.R.C.P., LOND.,  
*Assistant Physician, Co-Lecturer on Physiology to Guy's Hospital.*

(From the "*Lancet*," November 17th, 1888.)

In view of the enormous increase in the use of saccharin for the purpose of sweetening foods, beverages, and medicines, we have been led to institute experiments with the view of determining whether this substance is poisonous or not, when given even in excessive quantities; and if not poisonous, under these or other conditions, whether its use in moderation so interferes with the digestive processes as to render it advisable to forbid its use as a substitute for sugar. That saccharin is not a food is manifest; but there are so many circumstances under which the use of a sweetening agent in place of sugar is desirable, as to render it advisable to determine, if possible, whether the dietetic use of saccharin is innocuous.

1. As to the non-toxic nature of saccharin we have no doubt. Reliable Continental experimenters have admitted this, and we have confirmed their observations. To an under-fed dog we gave daily, for five days, two grammes of saccharin (equal in sweetening power

to more than a pound of sugar) in addition to food *ad libitum*. The animal increased in weight, and no inconvenient results were observed. We mixed large quantities of saccharin with the food of mice; they ate of this mixture *ad libitum* freely, and for a considerable period, and in no single case was there any manifest action on the health of the animal.

2. As saccharin has decided antiseptic properties, and is capable, in sufficient quantities, of stopping the action of organized ferments, we ascertained its extra-corporeal action on the soluble ferments, and found that in respect of the peptic digestion of fibrine 0·1 per cent. of saccharin has no retarding influence, whilst 0·25 per cent. shows the process decidedly, and one per cent. greatly retards it. 0·1 per cent. of saccharin is the equivalent of thirty per cent. of sugar, an impossible dietetic quantity. The diastatic solution of starch was not hindered by two per cent. of saccharin. The ammoniacal fermentation of urine is retarded when saccharin is added to it, or when saccharin is taken: an important fact in clinical medicine.

The putrefactive decomposition of a pancreatic digestive mixture, we found, was not prevented by the admixture of saccharin to the extent of one per cent.

Experiments on the extra-corporeal action of saccharin on the digestive ferments are, however, of no significance in determining the effects which saccharin would have when taken with food, since they involve the maintenance of a constant, fairly strong solution of saccharin in the digestive medium—a condition which does not obtain when saccharin is taken, since this substance is quickly absorbed, and is excreted in the urine.

The following experiment was made for the purpose of exactly determining whether saccharine influences gastric digestion:—Two similar dogs, after having fasted for thirty hours, were each fed with 300 grammes (about 11 oz.) of lean beef-steak equally cut up and divided. The 300 grammes of steak contained 69 grammes (*i.e.*, 23 per cent.) of dry solids. No. 1 dog weighed 21 lbs., and had no saccharin; No. 2 dog weighed 15½ lbs. and had one gramme of saccharin (equal in sweetening power to more than 8 oz. of sugar) with his meat. Five-and-a-half hours after the meal, the dogs were

killed with chloroform, and the contents of the stomach and intestines carefully removed from each animal. The small intestine in each case was empty, except the duodenum, which contained a small quantity of digestive mixture that had passed from the stomach, and at the lower end just above the large intestine, where there was material obviously of older duration. In each dog the stomach contained some undigested meat. The dry weight of the contents of the stomach and duodenum of No. 1 dog was 23 grammes, or 33 per cent. of the dry meat taken, whilst the similar dry weight in No. 2 dog (which had taken saccharin) was 21 grammes, or 30 per cent. of the dry meat taken. Obviously the injection of a gramme of saccharin, equal in sweetening power to over 8 oz. of sugar, had not in the least interfered with the gastric digestion of the dog.

One of us has, moreover, taken considerable quantities of saccharin daily without experiencing any ill effect.

The saccharin used by us was soluble saccharin, which is equal in power to about nine-tenths of its weight of commercial "pure saccharin." "Soluble saccharin" is as soluble in water as table salt, and when appropriately diluted is, perhaps, indistinguishable in taste from cane sugar, and is free from all the bitterness of flavour met with in the soluble saccharin first brought into the market.

**Summary.**—We conclude that

1. Saccharin is QUITE INNOCUOUS when taken in quantities largely exceeding what would be taken in any ordinary dietary.

2. Saccharin *does not interfere with or impede the digestive processes when taken in any practicable quantity.*

3. Our personal experience is that SACCHARIN MAY BE TAKEN FOR AN EXTENDED PERIOD WITHOUT INTERFERING WITH THE DIGESTIVE AND OTHER BODILY FUNCTIONS; hence there is no reason to think that its continued use is in any way harmful.

Guy's Hospital,

October 10th, 1888.

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"Saccharin has no injurious action in man."—*Pharmacology, Therapeutics and Materia Medica.* T. LAUDER BRUNTON.

“In those dreaded bladder affections of old age, when we are forced to limit the character and quantities of food which is in itself, or for culinary purposes, of a saccharine form; this addition will come as a pleasant surprise to the patient, and prove of material aid to the physician in prescribing.”—DR. MACNAUGHTEN, JONES, M.D., F.R.C.S., M.A.O. *Ex-University Professor Q.U.I., Examiner in the Royal University. Extracted from the “Medical Press.”*

Abstract of a clinical lecture upon “The value of recent additions to the genito-urinary pharmacopœia,” delivered by Mr. Hurry Fenwick, at St. Peter’s Hospital for Stone and Urinary Diseases. *Reported for the “Hospital Gazette,” April 7th, 1888.*

Saccharin has a very important influence in diseases of the urinary system. It is especially useful in cases of muco-cystitis. Mr. Fenwick related two cases in which all the ordinary drugs had failed to cure a muco-cystitis, but which were completely cured by five-grain doses of saccharin in an alkaline mixture. Mr. Fenwick has also found it of benefit in cases of renal calculus, and certainly it relieves the lumbar pain. Saccharin is said to be excreted in the urine almost in the same state it is ingested. Its beneficial action is probably due to its causing an increase in the quantity of the urine, and its sedative and antiseptic action upon the mucous membrane of the urinary tract.

JOHN DOUGALL, Esq., M.D., F.P.S.G.,  
*Lecturer on Materia Medica and Therapeutics at the Glasgow Royal Infirmary School of Medicine; Senior Assistant Physician, Royal Infirmary, &c.,*

in a paper on saccharin, says: “It seems that saccharin, both in health and disease, in doses up to seventy-five grains, IS PRACTICALLY HARMLESS. I have not found three ten-grain doses, taken at intervals of an hour, cause any appreciable effect on the normal temperature or pulse. The fact that its aqueous solutions do not ferment like those of sugar suggests a wide scope for its employment in pharmacy.”

*Note on the power of saccharin in preventing ammoniacal change  
in urine in chronic cystitis,*

BY JAMES LITTLE, M.D.,

*President of the King and Queen's College of Physicians in Ireland ;  
Physician to the Adelaide Hospital.*

(*Read in the Section of Medicine, April 26th, 1888.*)

For the past three years I have been asked, from time to time, to see a lady, nearly eighty years of age, who is quite confined to bed in consequence of chronic disease of the bladder, which gives rise to frequent and painful calls to pass water. The urine always threw down a copious purulent sediment, and, except when decomposition was prevented by treatment, was always ammoniacal. The lady has many times passed, with great suffering, phosphatic calculi, and, I have no doubt, many such exist in the bladder, but she has always refused to permit any surgical interference beyond the occasional introduction of a soft catheter, and the washing out of the bladder by a lady who acts as her nurse. Quinine and boric acid, when taken in fair doses, always purified the urine; but about three months ago her stomach became so irritable that these drugs could not be borne, and the washing out of the bladder by a weak, warm sublimate solution could no longer be practised, as the passage of the catheter had become exquisitely painful. The consequence was, that the urine became so offensive that the odour met one on the stairs, and the patient's attendants had often to leave the room to avoid being sick. In this difficulty it occurred to me to try saccharin. I directed six of the tabloids to be used daily. In three or four days the urine was no longer offensive. The patient has continued their use ever since, and the urine has not again become ammoniacal, though there is little, if any, diminution in the quantity of contained pus.

Since the foregoing case came under my observation, I have noted



the effect of saccharin in other patients who were passing ammoniacal urine. They were all males; one a case of catarrh of the bladder, in a paraplegic gentleman; one a case of chronic cystitis, with enlarged prostate; and two cases, in which there had existed stricture of the urethra, but in which, although a surgeon had successfully dilated the stricture, the urine remained ammoniacal. In all these cases the saccharin was distinctly useful, but in all, its administration, had been combined with the daily use, by the patient himself, of a catheter, so as to prevent the accumulation of residual urine in the bladder—a precaution without which no drug will, I think, prevent decomposition of the urine.

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THE "LANCET," 9th June, 1888.

To THE EDITORS OF THE "LANCET."

SIRS,

As you are doubtless aware, an attempt has recently been made in this country to demonstrate that saccharin, so far from being a harmless agent, is in reality a dangerous one. Much has been said respecting the digestive derangements which result from its prolonged employment, whilst the circumstance that bees and wasps avoid it has been cited as a warning to diabetics. Believing that one fact in medicine outweighs an infinitude of theories, I would state that a patient of mine, who, six months ago, passed a large amount of sugar daily, and presented other marked symptoms of *diabetes mellitus*, has been nearly cured by the use of saccharin alone. Since November last he has taken saccharin twice daily in coffee, and not only has there been an entire absence of dyspeptic symptoms, but his urine has become nearly normal, whilst he has notably increased in strength and weight. I regard saccharin not only as an admirable substitute for sugar, but as a positive curative agent in the treatment of Diabetes.

I am, Sirs, yours very faithfully,

(Signed) EDWARD WARREN BEY, M.D., C.M., LL.D.

Paris, 23rd May, 1888.

## SACCHARIN.

Dr. B., writes :—"Some short time ago a gentleman connected with the Inland Revenue Department informed me that he believed the Government Analysts have, in certain liquors (beer and stout, I think), found Saccharin used in place of sugar, and that as Saccharin was dangerous or harmful to the human system, they decided to stop its being added to the above-mentioned fluids; the harmful quality of Saccharin being that it formed concretions in the bowels, or some such effects. I also understand that the Portuguese Government are prohibiting the use of Saccharin altogether. Now in view of the above statements, and considering the fact that Saccharin is prescribed by many members of the profession, including myself, in those cases where sugar is inadmissible, it would be well to know if they are true, or to what extent. Again, may not impure or badly prepared Saccharin have a deleterious effect, where good Saccharin is comparatively harmless? Some information on the matter would much oblige."

(Saccharin is perfectly wholesome, or, at all events, harmless; it passes out of the body as it enters, having merely an antiseptic action on the mucous membrane of the kidneys. The Excise Authorities are objecting, not from any zeal for the public health, but because the use of Saccharin would upset their present alcoholic tests. It is doubtful whether they have power to prevent it. Governmental efforts to prevent the use of Saccharin will be quite futile.—ED. *Medical Press*, October 31st, 1888.)

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*Extracts from the Debate in the House of Commons, April 27th, 1888.*

Mr. GLADSTONE said "that the Inland Revenue, as at present advised, saw their way to prohibition only, but the time might come

when they might be able to proceed by the method of regulation, thanks to the growth of professional knowledge. What he wished to ask the Chancellor of the Exchequer was this—whether before he asked the House finally to sanction a measure so harsh as the prohibition of the use of a substance which in itself *was undoubtedly harmless, and evidently having very important economic properties*, he would give the committee an assurance that in the time immediately before them, before the law was enacted or brought into operation, the Inland Revenue would do their best to ascertain, by the use of their guides, that nothing but prohibition was available, that they would exhaust the means of examining the case, and that they would only resort to prohibition under a sense of their own responsibility, and under a sense that no other alternative was possible.”

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Mr. CHILDERS said: “Saccharin *is perfectly innocuous* — it can do no harm, and *really does some good*. *I speak from experience*, for I have not taken sweetening, except in the shape of saccharin, for some months.

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“Mr. Goschen said the question was solely one of Revenue, and he never contended that saccharin was a noxious substance.”

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The Rev. C. H. Spurgeon volunteers the following statement, with the desire that his words may be published with a view to assist in the popularizing of Saccharin: “It must be a great thing for persons to whom sugar is injurious, to be able to have their food sweetened by another and equally pleasant means. Saccharin answers all the desirable purposes of a sugar to a gouty person, and yet it is not sugar, and does not go to form surplus nourishment. I regard the discovery of Saccharin as a great blessing, so far as my own health is concerned; and I am only one of thousands.”

It is a matter of common experience that substances which do not exert an immediate toxic effect may be injurious to the system after they have been administered during extended periods of time. Saccharin *has been subjected to, and has* SATISFACTORILY WITHSTOOD, THIS CRUCIAL TEST; and

PROFESSOR DR. LEYDEN,\*

*Privy Counsellor Physician (Geh. Med. Rath) of the "I. Medicinischen Universitätsklinik der Königl. Charité zu Berlin,"*

has given a formal certificate, of which the following is a translation, respecting his experience of the use of saccharin as an article of diet DURING A PERIOD OF FIVE MONTHS:—

"Since February of this year, Fahlberg's saccharin, obtained from the firm of Fahlberg & List, of Leipzig (now of Salbke Westerhüsen), has been directly administered in this hospital to *a great number of patients, convalescents, and healthy individuals*. It was further incorporated as a relish for sweetening foods and beverages, and tested in order to see whether its taste could be differentiated in individual cases, how it would act upon the system, and whether evils or advantages accompanied its employment. At the same time it was given to diabetic patients, and its therapeutic effects noted. As the result of these experiments and this experience, Messrs. Fahlberg, List & Co. are hereby informed, in answer to their enquiry, that Fahlberg's saccharin agrees both with invalids and healthy individuals, THAT NO ANXIETY AS TO ITS EFFECT UPON HEALTH NEED ATTEND ITS USE, and that saccharin *may be consumed over prolonged periods*. Some of our patients have taken it regularly during five months, without its exerting the slightest injurious action upon the human system. The use of saccharin allows of a much-needed enrichment of the diet of diabetic patients, inasmuch as they may now enjoy a sweet flavouring in diabetic bread and cakes, food, tea, coffee, soup and other nutriment, without the introduction of carbohydrates (sugar) into the system.

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\* Dr. Leyden will be remembered as the eminent physician who attended the late Emperor Frederick during his illness.

These applications of saccharin were made in a neutral carbonate of soda solution; and also in the very practical and suitable form of tablets, containing five centigrammes of Fahlberg's saccharin and two centigrammes of carbonate of soda. The daily quantity which appeared to suit the taste of ordinary patients averaged 0·15 grammes to 0·2 grammes of saccharin; half to one-and-a-half grain of saccharin, suitably embodied, will be found ample to sweeten a cup of tea or coffee; *larger quantities were, however, taken without derangement or injurious results of any kind whatever.*

“Berlin, 15th July, 1886.”

“Professor Dr. GERHARDT, Berlin, has confirmed the experiments of Dr. Leyden in his practice with success, so that saccharin, in his opinion, constitutes an important aid in the difficult task of finding acceptable nourishment for diabetes.”

“*Berliner Rundschau*,” 13th April, 1886.

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#### DR. DUJARDIN-BEAUMETZ,

Mentioned by a Paris newspaper as “one of the medical glories of France,” speaking at a meeting of the Therapeutical Society, on 28th March last, said:—

“As I am speaking of diabetes, I do not know how to sufficiently forcibly recommend to you the employment of saccharin, which permits of the use of dishes of a most agreeable taste, quite equal to those in which sugar has been employed. Notwithstanding its price, saccharin possesses 330 times the sweetening power of sugar, consequently its use is not more expensive.”

The Paris correspondent of the *Lancet*, June 16th, reports Dr. Beaumetz as saying, “that he could confirm the marked advantages of saccharin as a substitute for sugar in the alimentation of diabetics. It is much appreciated by patients, who find that it has a savour identical with that of sugar, of which it has none of the inconveniences. Although it does not appear to have any noxious action, it cannot be employed like sugar as an aliment, because it passes through the economy, and is eliminated by the urine *without being assimilated or transformed.*”

DR. PROSPER DE PIETRA SANTA.

*Editor of "Le Journal d'Hygiène," Lauréat de l'Institut, Académie des Sciences, Paris, says:—*

"The proscription of saccharin from food as 'dangerous to the public health' does not seem justifiable. All that could be required by the Council of Hygiene and Health of the Seine would be to order manufacturers of sweets, syrups, and chocolates to specify on their labels the presence of saccharin. All that the minister of Finance has a right to do is to levy a tax upon it so long as it remains a foreign production and manufacture."

DR. CONSTANTIN PAUL,

In the discussion following M. Worms' paper, read before the Académie de Médecine, says:—

"In a thousand circumstances of life, saccharin could render service to users of it without being dangerous to public health; and until more ample information is forthcoming, I much prefer to rely upon the seventh conclusion arrived at as the results of experimental researches of MM. Aducco and Mosso of Turin. SACCHARIN IS A THOROUGHLY INOFFENSIVE SUBSTANCE BOTH TO MANKIND AND ANIMALS."

Dr. Constantin Paul made a communication on saccharin to the Academy of Medicine in Paris,\* considered as an antiseptic for the digestive canals. Saccharin is a valuable agent for this purpose, as it is NOT *toxic*. In doses of 0.20 grs., whilst it causes *no digestive troubles*, it possesses special antiseptic properties which make it a drug endowed with qualities which are utilizable for the treatment of diseases of the mouth, stomach, and urinary passages.

"RHEINISCHER COURIER," WIESBADEN,

3rd August, 1886.

PROFESSOR DR. HEINRICH FRESENIUS, WIESBADEN.

Naturally, the first consideration is, how saccharin works on the organic system. There have been many experiments upon frogs,

\* *Bulletin de l'Académie de Médecine*, No. 28, 10 Juillet, 1888.

dogs, and men in Berlin, Bonn, and Turin. The Italian professors seem to have been the most industrious. These experiments have shown that saccharin enters the body and leaves it without experiencing any change; *it can therefore effect no influence* on the organic system. It is of great significance that the new material is an adaptable means for the restoration of health. Fahlberg and List have so united saccharin with alkaloids that it possesses the not disagreeable taste of the latter. As an example saccharin successfully masks the very bitter taste of pure quinine.

*Physiological Experiments upon the action of Saccharin.*

BY DRs. V. ADUCCO AND M. MOSSO, OF TURIN.

*Extracted from the Italian Biological Archives. Vol. VII., page 11.*

*Conclusions.*

1. The experiments made upon dogs demonstrates that the saccharin introduced into animal organism passes into the urine without sustaining any change.
2. Saccharin taken during a series of days, and in large doses, does not show any action upon the nutritive changes.
3. The normal cycle of changes in the composition of the urine is also observed when saccharin is injected.
4. Saccharin passes only into the urine.
5. Saccharin does not pass either into the milk or into the saliva.
6. Introduced into the stomach and under the skin, it is rapidly absorbed, and appears in the urine in less than half-an-hour.
7. Saccharin is A PERFECTLY INOFFENSIVE SUBSTANCE EITHER FOR MAN OR ANIMALS.

As to whether saccharin is inoffensive or not, an objection might be raised that in a more prolonged use of the substance, phenomena might take place that we have not had occasion to observe, on account of the comparatively short duration of our researches. This objection has only a relative value when taken into consideration with the fact that we have given thirty-seven grammes of saccharin

to a dog in ten days, and that it did not experience the least bad effects, and that we ourselves have both taken five grammes\* of saccharin at one time, for many consecutive days, and *we remarked no change in the functions of our organism.*

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## SACCHARIN.

*Trial of its Chemico-Physiological Relations.*

BY DR. A. STUTZER,

*Director of the Chemical Experimental Laboratory, Bonn.*

To the question, "Whether saccharin possesses any injurious effects in those quantities in which it is mingled in nourishments as a sweetener," our experiments and research prove clearly that *saccharin possesses many favourable attributes, and CAN BE USED WITHOUT HESITATION as an additional nourishment and means of enjoyment.* Besides its utility in the manufacture of confectionery and liqueurs, saccharin can be utilized in Pharmacy as an intense sweetener for powders, pastilles, and other medicines, whilst as a means of sweetening the nourishment of sufferers from diabetes, it would render essential service; and I may as well remark that I had the opportunity of becoming acquainted with a diabetic, who had used saccharin for six months as an exclusive means for sweetening coffee, tea, and various kinds of food, without observing the slightest disadvantageous result from its continued use.

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*Concerning the retention of so-called Saccharin in Organisms.*

BY PROFESSOR E. SALKOWSKY.

*The Chemical Laboratory of the Pathological Institute, Berlin.*

As the result of our experiments it is impossible to withhold the acknowledgment that ANY INJURY TO HEALTH FROM THE USE OF SACCHARIN IS A GROUNDLESS FEAR.

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\*Equal in sweetening power to about three pounds of sugar.



*On the innocuousness of Saccharin for the CONTINUED use of Man.*

BY DR. ERNST STADELMANN,

*Of the Medical Clinical Staff of the University of Heidelberg.*

*Specialist in Medicine for the Intestines.*

SACCHARIN IS QUITE HARMLESS TO MAN, EVEN IN THE CONTINUED USE OF LARGE DOSES. Indeed, by way of additional remark, I can assert, after *close observation for many months*, that *not the slightest deleterious effects have been experienced by those to whom saccharin was administered.*

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CARLSBAD,

19th August, 1886.

From the nature of the substance and the results of the different investigators received herewith, it is quite certain, firstly, that saccharin, even in the organism of a sufferer from diabetes, cannot be changed into sugar. On the contrary, it was imagined, if even not possible, that saccharin could conduce in an indirect way to the pathologic formation of sugar, the same as this is worked under cure according to the example. Now, this is not in any way the case. A number of sufferers from diabetes, who were specially prohibited from eating sugar beforehand, received as much saccharin for many days with their ordinary diet as was necessary to make their tea or coffee very sweet, and which they had taken previously without sugar at all. The prohibition of the sugar *did not influence the result in any way*, as the quantity of saccharin that is necessary to sweeten drinks generally is so very small. In order to arrive at a more certain result I gave to others suffering a greater mixture, and really in isolated cases an increase of one gramme, certainly more than was required to sweeten a drink or other food. In these cases the *prohibition of sugar* continued, and the *general health* remained quite *uninfluenced* by the saccharin.

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DR. M. ABELES.

TRIER,

25th March 1886.

You were so kind as to send me over a small quantity of saccharin

at the end of December of this year, for which I offer you my best thanks in return. As far as the quantity allowed, I have employed it upon diabetics, and have not found the *slightest indication of any deleterious influence*. If your discovery is capable of being made commercial, as it has every appearance of being, it will create for these sufferers an increase in the range of their diet; a most benevolent action.

DR. ADELHEIM.

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KRUMAN I. B.,

8th August, 1886.

You were kind enough, a little while ago, to send me a sample of saccharin. I herewith thank you for it, and congratulate you upon this magnificent discovery. I am sure diabetics cannot thank you enough. Unfortunately, I am one myself; but since I have used your saccharin, and in consequence, I have renewed life on account of the new diet which it has enabled me to have prepared. Almond, bread, pudding, coffee, tea, etc., can all be sweetened by it, and *I do not observe* THE SLIGHTEST DELETERIOUS EFFECT.

DR. JULIUS FANTL.

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BERLIN,

7th December, 1887.

I cannot be sufficiently grateful to you for the great amiability with which you have dedicated the saccharin essence to me. It certainly supplies the effects of sugar, and so effectually, that I do not miss it at all. I have tried and used it with all possible foods and drinks, AND NEVER FOUND THE SLIGHTEST DISTURBING INFLUENCE, or after-taste. It surpasses in this respect even the exquisite saccharin pastilles. A further advantage of the essence is the easy capability of dividing it, which enables the food to be sweetened quite according to requirements: one never risks the danger of receiving the repugnant excess of sweetness.

A. STRECKFUSS.

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“Since saccharin is an aromatic derivation, it is not likely to undergo fermentation, and hence may be employed without fear of

this destructive decomposition occurring. But besides this, as saccharin possesses considerable antiseptic powers, its use in medicine may often be attended with advantage—as, for example, in cases of alkaline fermentation of urine, upon which it has been shown to exert a strongly retarding influence. . . . While producing no injurious effect on the system, it is found to agree both with invalids and healthy individuals, and no anxiety as to its effect upon the health need be felt even when taken for lengthened periods. As much as thirty to eighty grains have been administered daily without producing any injurious effect even upon the appetite. In two cases of diabetes in which we tried it, we found its use attended with marked benefit.”—*British Medical Journal*, 15th October, 1887.

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“For medical purposes it is valuable, as its composition renders it harmless in diabetic complaints.”—*The Standard*, 3rd January, 1888.

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“The immunity of saccharin from fermentative decomposition is a most important consideration in its favour when we come to consider its physiological effects on the system. Some very extensive experiments have been carried out on this head as the result of which, it has been found that, however administered, the saccharin has entirely passed away from the system unchanged, and that within twenty-four hours, leaving behind it no trace of its former presence. Saccharin may thus be taken as a flavouring with impunity by persons suffering from various affections for which the use of sugar is rigorously interdicted, notably in diabetes, Bright’s disease, fatty degeneration, and obesity.”—*Morning Post*, October 11th, 1887.

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“Saccharin is a perfectly wholesome extract, and will be available for purposes of sweetening in all cases where the essential ingredients of sugar are not needed.”—*Leeds Mercury*, 11th May, 1888.

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“Cane-sugar has to undergo preparatory changes in the system before it can be assimilated, and the imperfection or failure of these

changes constitutes a series of diseases, such as indigestion, acidity, gout, and rheumatism, which are among the chief ills that human flesh is heir to. It is only medical men who are familiar with this class of ailments who can fully appreciate the advantages which are likely to result from the discovery of a condiment which shall satisfy the natural craving for sweetness, without the evil results which have hitherto attended its gratification by cane-sugar."—*Saturday Review*, October 15th, 1887.



changes constitutes a series of diseases, such as indigestion, acidity, gout and rheumatism, which are among the chief ills that human flesh is heir to. It is only medical men who are familiar with this class of ailments who can fully appreciate the advantages which are likely to result from the discovery of a combination which shall satisfy the natural craving for sweetness, without the evil results which have hitherto attended its gratification by cane sugar. — *Starbuck's Review*, Oct. 1887.



The following is a list of the names of the persons who have been admitted to the membership of the Society since the last meeting. The names are arranged in alphabetical order, and the date of admission is given in parentheses. The names are: [Faint, illegible text]

