

# THE ANALYST

Volume III

1878

W. Heffer & Sons Ltd.  
Cambridge, England  
Johnson Reprint Corporation  
New York 3, New York

*Reprinted photographically in Great Britain by  
Lowe & Brydone (Printers) Ltd. for W. Heffer & Sons Ltd., Cambridge*

*Distributor for North Central and South America  
Hawaii and the Philippines :*

*Johnson Reprint Corporation  
New York 3, New York*

The original numbers of *The Analyst* from which this reprint was produced were kindly loaned by T. McLachlan, Esq., D.C.M., A.C.G.F.C., F.R.I.C.

# The Analyst,

INCLUDING THE PROCEEDINGS OF

THE "SOCIETY OF PUBLIC ANALYSTS."

A MONTHLY JOURNAL FOR THE INFORMATION OF THOSE INTERESTED  
IN THE PURITY OF FOOD AND DRUGS, AND IN GENERAL  
ANALYTICAL AND MICROSCOPICAL RESEARCH.

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**VOL. III., 1878.**

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LONDON:

Published for the Proprietors, by Messrs. BAILLIÈRE, TINDALL & COX, 20, King  
William Street, Strand, W.C.

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# THE ANALYST.

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Two years ago, when *THE ANALYST* first appeared, there were not a few prophets who predicted that a small society, such as the Society of Public Analysts must ever be, could not maintain a monthly journal of its own. Such views naturally received ready credence from those who, because they were not actually analysts in practice, were not eligible to become members of the society. The appearance of our twenty-fifth number, commencing our third volume, will go far to disabuse the minds of those who still cherish such an opinion.

The object laid down in the first number of *THE ANALYST* was not only to print all papers read before the Society but to supply such information on technical points, both of general analysis and food analysis, as should meet the requirements of the ordinary analyst, and to furnish reports of such typical cases of adulteration proceedings, and other law cases in which chemical points were involved, as should furnish a permanent record for reference.

When at the end of the first year a difficulty arose in consequence of a society which is not chartered, being the owner of a copyright, a slight alteration was made to meet this difficulty, and the journal having passed into the hands of its present proprietors, a new feature was added in the form of editorial articles and notes on the questions which from time to time disturb even the quietude of laboratories. How far we have succeeded in our task must be for our readers to judge. We can only form our opinion from our increased and increasing circulation, and from the fact that nearly every technical journal quotes from our pages.

One feature of the present number, which will doubtless be examined with interest, is our annual return of the work done under the Sale of Food and Drugs' Act. We have not space to refer to this fully this month, but in our next number we shall make a comparative analysis of the results of the last and previous years.

The past year has been marked in the chemical world by the formation of the Institute of Chemistry. This company has not been formed on the same basis as the Society of Public Analysts. To become a member of the latter society it is necessary that the applicant should be an analyst in practice, even assistants not being eligible, whereas to become a member of the Institute it has hitherto been simply necessary that the council should "admit" the would-be member, as the qualification clauses are only to be enforced in the future. The Council have exercised this right to admit freely, and our readers will judge how far the criticisms we have considered it our duty to publish on the scheme were well founded, when we point out that nearly one half of those whom they have admitted have not accepted the proffered honour and "liability." Evidently, therefore, the mode of organization adopted did not commend itself to many of the elected five hundred, any more than to our correspondents and ourselves.

One word more. Opinions are expressed in certain legal circles that the company does not really fall within the scope of the Companies' Act; if this is the case what is the penalty, surely there must be some? The answer a correspondent gives is, "*Unlimited liability.*" which is not a very pleasant outlook for the shareholders, especially if every member is a shareholder.

A very unseemly difference has occurred during the year between the Public Analysts and the chemists in the Inland Revenue Laboratory. Differences of samples may of course be expected to occur occasionally, and then, if a sample has been changed either wilfully or by accident, an analyst must be expected to find different results. The matter becomes much more serious when the results obtained are identical, but the deductions drawn from these results are different, when, in fact, chemists put on one side the accumulated experience of years, and work on new data. Still more is there ground for regret when the application of our Society for the publication of those data in the only effectual way is refused.

As to the original papers which have been published in the last year, our index must speak. We shall endeavour to keep up to and even excel our present standard in the coming year, and to this end shall gladly receive any contribution containing the results of original research on any chemical subject.

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#### SOCIETY OF PUBLIC ANALYSTS.

A GENERAL MEETING was held at Burlington House, Piccadilly, on the 20th March, the President, Dr. Dupré, F.R.S., in the chair.

The minutes of the previous meeting were read and confirmed.

Dr. Muter and Mr. Hehner were appointed scrutincers to examine the voting papers, and they reported that the following gentlemen had been elected, viz., Dr. S. T. Rowe, M.P.S.G.B., Redruth; Mr. J. West Knights, Cambridge; Mr. H. Goode, M.B. and M.R.C.S., Derby; and Mr. H. P. Harris, Rotherham.

Mr. R. E. Owen, of Beaumaris, public analyst for Anglesey, was proposed as a member, and will be balloted for at the next meeting.

The Secretary read a paper by Mr. Wynter Blyth "On the Amendment of the Sale of Food and Drugs' Act."

The Secretary also read a paper by Messrs. A. H. Allen and R. Bodmer "On Experiments on the Determination of the Free Acids of Vinegar."

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The next meeting of the Society of Public Analysts will be held on Wednesday, May 1st, at Burlington House, Piccadilly.

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#### ON THE FATTY METAMORPHOSIS OF THE ALBUMINOIDS IN MILK AND CHEESE.

By A. WYNTER BLYTH, M.R.C.S.

*Read before the Society of Public Analysts, on 20th February, 1878.*

IN 1864, M. Ch. Blondeau contributed to the *Annales de Chimie et de Physique* (4eme Serie. t. 1) his research on the changes which the Roquefort cheese underwent probably from the influence of mycodermis.

A portion of a typical cheese was taken and divided into four parts; the first was analysed at once, the three others were replaced in cellars and analysed after one month, two months, and a year's respective sojourn.



Circumstances arose rendering an analysis by another chemist desirable. It was submitted to Mr. Wigner, who found about three weeks afterwards—

Solids not fat ...	8.96
Fat ...	.76
Ash ...	.74
Free acidity calculated as Lactic Acid, .73 per cent.	

(2.) Almost every sample of milk which has been analysed by a *second* chemist, on record in the pages of the *Analyst*, shows an increase of fat. Thus a milk analysed by Dr. C. Brown\* on the 28th of April, gave but 2.68 per cent. of fat, the same milk on May 9th, 2.98 per cent. of fat; and the same milk, analysed by Mr. Wm. Thompson, on May 15th, gave 3.017 per cent.

A milk analysed by Dr. Hill,† gave, on the 1st of March, 2.47 of fat, the same sample was returned by the Inland Revenue chemists, on the 20th of March, as containing 2.83 per cent. of fat.

(3.) The writer analysed, very carefully, two samples of milk from Stonehouse, on the 20th December, 1877. Each milk was analysed twice, and there was a close agreement between the analyses.

		Dec. 20, 1877.
(1.) Caseine and milk sugar	...	8.19
Fat	...	2.09
Ash	...	.62
Solids not fat...	...	8.81
(2.) Caseine and milk sugar	...	8.46
Fat	...	1.33
Ash	...	.65
Solids not fat...	...	9.11

The one was certified deficient in cream, and adulterated with water, the second deficient in cream only, and both were submitted to Somerset House; No. 1 alone reaching their laboratory; No. 2 bursting the bottle. The Inland Revenue chemists found, (analysed probably between 4th and 8th of January, 1878),

(1) Solids, not fat	...	7.84
Fat	...	3.38
Ash	...	.68

And they certified that there had been no abstraction of cream, but a small addition of water.

On examining the second sample, that is the one which through mis-fortune did not reach Somerset House, and which on the 20th of December, gave only 1.33 per cent. of fat. I found on the 23rd of January its composition, as follows:—

(2) Solids, not fat	...	7.62
Fat	...	1.79
Ash	...	.66

Acidity calculated as lactic acid .507 per cent.†

Further, the No. 1 milk which yielded to me on the 20th December, 2.09 per cent. of fat, and to the Government chemists on the first week of January, 3.30 per cent. of fat, on examining it on the 23rd of January, I found 3.919, or nearly 4 per cent. of fat, therefore there can be no reasonable doubt that in this particular sample of milk in about a month the fat nearly doubled in amount.

\* *Analyst*, No. 18, Sep., 1877.

† It is almost unnecessary to state that the lactic acid was neutralized before extracting with ether.

I now come to a few analyses made specially to trace the changes in decomposed milk.

(1.) A milk analysed on the 24th January :—

Sp. G.	...	...	...	...	...	...	...	1032.1
Fat	...	...	...	...	...	...	...	3.52
Milk sugar	...	...	...	...	...	...	...	4.88
Albuminoids	...	...	...	...	...	...	...	4.25
Ash	...	...	...	...	...	...	...	.72

The same sample was divided into two parts—the one was put in a perfectly clean bottle, the other was contaminated with a droplet of the No. 1 Stonehouse milk before spoken of.

The uncontaminated milk 21 days after gave 3.41 per cent. of fat, 3.00 of milk sugar, .009 per cent. of acetic acid, .126 per cent. of lactic acid, and .0267 per cent. of alcohol, so that there was certainly no increase of fat, but some slight lactic fermentation, as evidenced by lactic acid, alcohol and oxidised alcohol.

The same milk which had been seeded with the ferment analysed at the same time, viz., 21 days afterwards, gave 3.9 per cent. of fat. Acetic acid, alcohol, lactic acid, and milk sugar were not estimated through accident.

(2.) A milk analysed January 27th gave the following results :—

Fat	...	...	...	...	...	...	...	2.584 per cent.
Milk sugar	...	...	...	...	...	...	...	4.566
Albuminoids	...	...	...	...	...	...	...	5.492
Ash	..	...	...	...	...	...	...	.720

The same milk 18 days afterwards gave

Fat	..	...	...	...	...	...	...	4.09
Milk sugar	...	...	...	...	...	...	...	2.75
Lactic acid	...	...	...	...	...	...	...	.119
Acetic acid	...	...	...	...	...	...	...	.002
Alcohol...	...	...	...	...	...	...	...	.0145
Albuminoids (by difference)	...	...	...	...	...	...	...	3.100
Ash	...	...	...	...	...	...	...	.72

This milk had a creamy appearance, there is a marked increase in the fat.

(3.) A milk analysed by Mr. Wigner on the 3rd of Sept., 1878.

Total solids	...	...	...	...	...	...	...	11.66
Fat	...	...	...	...	...	...	...	1.74
Solids not fat	...	...	...	...	...	...	...	9.82

The same milk analysed by the writer about 5 months afterwards on Feb. 3rd, 1878.

Total solids	...	...	...	...	...	...	...	8.37
Fat	...	...	...	...	...	...	...	1.19
Milk sugar	...	...	...	...	...	...	...	2.30
Alcohol	...	...	...	...	...	...	...	.009
Acetic acid	...	...	...	...	...	...	...	.013
Lactic acid	...	...	...	...	...	...	...	.351
Ammonia in combination	...	...	...	...	...	...	...	.070
Total nitrogen by combustion	...	...	...	...	...	...	...	.69
Ash	...	...	...	...	...	...	...	.71

In this case the fat was not increased but diminished. The whole of the volatile acids present are returned as acetic, a small portion of which was, however, butyric, or some other volatile fatty acid. The milk had an acetic ether odour.

(4.) Another milk analysed by Mr. Wigner on the 7th of Sept., 1877.

Total solids	...	...	...	...	...	...	...	10·615
Solids not fat	...	...	...	...	...	...	...	8·015
Fat	...	...	...	...	...	...	...	2·600
Ash	...	...	...	...	...	...	...	·635
Chlorine	...	...	...	...	...	...	...	·061

The same milk analysed by the writer 5 months afterwards.

Total solids	...	...	...	...	...	...	...	9·40
Fat	...	...	...	...	...	...	...	3·89
Albuminoids	...	...	...	...	...	...	...	2·09
Milk sugar	...	...	...	...	...	...	...	2·31
Alcohol	...	...	...	...	...	...	...	·213
Lactic acid	...	...	...	...	...	...	...	·548
Acetic acid	...	...	...	...	...	...	...	·385
Ammonia in combination	...	...	...	...	...	...	...	·020
Total nitrogen by combustion	...	...	...	...	...	...	...	·313

Here, again, although the milk is the same age as the former sample, there is a very marked increase of fat. The milk had an odour of acetic ether—there were small quantities of one or more volatile fatty acids present.

(5.) A milk analysed by Mr. Wigner in November:—

Total solids	...	...	...	...	...	...	...	10·77
Solids not fat	...	...	...	...	...	...	...	8·5
Fat	...	...	...	...	...	...	...	2·62

The same milk analysed by the writer 2½ months after date:—

Total solids	...	...	...	...	...	...	...	7·52
Fat	...	...	...	...	...	...	...	2·96
Solids not fat	...	...	...	...	...	...	...	4·56
Milk sugar	...	...	...	...	...	...	...	2·10
Albuminoids	...	...	...	...	...	...	...	2·10
Lactic acid	...	...	...	...	...	...	...	·081
Ammonia in combination	...	...	...	...	...	...	...	·012
Total nitrogen by combustion	...	...	...	...	...	...	...	·337

Alcohol not estimated.

In this case there was a considerable development of acetic acid, the odour of acetic ether was very powerful, and the fat is slightly increased.

The method of analysis it is, perhaps, right to mention. The fat was weighed directly, and dissolved out by ether from the solids, first made perfectly neutral by sodic carbonate, the milk sugar was converted into grape, and determined by copper solution, the precipitated sub-oxide being dissolved in acid, and deposited as copper by electrolysis on platinum foil, and then weighed.

The alcohol was obtained by re-distilling the distillate, and subsequently oxidising into acetic acid, as in the method recommended by Dr. Dupré.

The volatile acid returned as acetic was principally, but not entirely, that acid.

The alcohol calculated as ethylic was also probably a mixture of other alcohols.

The other determinations require neither comment nor explanation.

As we all know what is usually called the caseine of milk is really four albuminoid bodies, viz., true caseine, albumin, lactoprotein, and nuclein. The last was, I think, discovered in milk by Lubavin, and is in very small quantity. What share the albumin and the caseine take in the production of fat remains an interesting subject for investigation, and also what other bodies are formed. In the course of these few experiments I have found that

in decomposed milks nearly the whole of the nitrogen they contain may be obtained by first distillation with sodic carbonate and then with alkaline permanganate, and not as would be the case were the structure of the caseine and albumin unaltered a fractional part only.

I would also point out that the fatty degeneration of muscular fibre one so often observes in dissecting rooms, the formation of adipocere, and the drops of oil appearing with more or less rapidity in the nuclei or bioplasm of animal cells, are examples of the fatty transformation of albuminous and fibrinous substances, which, so far as we know, are constructed on the same type as the milk albuminoids.

The bearing of this subject in the reference of samples to Somerset House is obvious, I believe by a very thorough examination of a decomposed milk, it will be possible even after five or six months to build up by calculation its original parts, but the subject requires much work, and I will therefore not commit myself to any definite opinion, but trust to make one or two communications on this subject at some future meeting of the Society.

#### NOTE ON AN INGENIOUS ADULTERATION OF MILK.

BY DR. J. MUTEK.

*Read before the Society of Public Analysts, on the 20th February, 1878.*

SOME time ago I received a sample of milk which, on analysis, gave:—

Fat	...	...	...	...	2.1
Solids not fat	...	...	...	...	8.3
Total	...	...	...	...	10.4
Ash	...	...	...	...	.5

I was, however, struck by the very low ash, a somewhat unusually hygroscopic appearance about the residue, and a taste which indicated a much higher degree of dilution than that indicated by the above figures. I accordingly set to work to make a full analysis, which gave:—

Fat	...	...	...	...	2.10
Sugar (taken by Fehling)	...	...	...	...	2.70
Casein	...	...	...	...	3.35
Ash	...	...	...	...	.50
Total	...	...	...	...	8.65

Here, therefore, were only 6.55 true solids (not fat), showing, as I expected, a much larger quantity of water.

After numerous researches, I at last found that the foreign matter in the milk was glycerine, which is certainly a most ingenious addition, as a solution of that body in water of 12 per cent. strength has a specific gravity of 1.030; and I found, after several experiments, that 35 per cent. of such glycerine water might be added to milk without being detectable either by gravity or by the ordinary "solids not fat" process. Moreover, such an amount does not give any extraordinary sweetness easily detectable by the taste.

The following is the modification of Mr. Wanklyn's process, which I have devised to meet this case:—

- (1.) Evaporate, as usual, and weigh the residue.
- (2.) Extract the residue with *pure* anhydrous ether, and weigh the fat or the solids not fat whichever the operator may prefer.

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กระทรวงมหาดไทย



- (3.) Extract the solids not fat with a mixture of *absolute* alcohol and ether, in equal volumes, and evaporate the solution at a gentle heat. Any oily-looking liquid that is left should now be tested for glycerine, by warming with a little sulphuric acid, and getting off the fumes of acrolein. If this be found the solids not fat are perfectly unreliable, and nothing remains but to make a full analysis of the milk, estimating both the sugar and the casein directly—the former by Fehling's solution and the latter by precipitation. If the Fehling be used gravimetrically it should be borne in mind that the true equivalent, as shown in my manual of chemistry, is not that usually given, but is 100 parts milk-sugar = 147.76 parts CuO.
- (4.) The ash must be taken on a separate portion.

In case the milk be sour it must be carefully neutralised by a known weight of sodium-carbonate before evaporating.

This difference between the true and the apparent solids not fat will indicate the amount of "glycerine-water" added, and if the gravity of the milk is about 1.030 it is then safe to call 12 per cent. of that glycerine and the rest water. Of course as the glycerine is slightly volatilised during the evaporation, the estimation will always be something under the truth.

## EXPERIMENTS ON THE CHEMICAL ACTION OF CHLORATE OF POTASH ON THE SYSTEM.

By OTTO HEHNER, F.C.S.

*Read before the Society of Public Analysts, on 20th February, 1878.*

CHLORATE of Potash was formerly frequently administered as a medicine with a view of supplying oxygen to the system in cases of defective oxydation. It was thought, doubtless, that since oxygen is readily obtained from it by the action of heat, it must undergo similar decomposition in the animal body. But after some investigations of Wöhler and Stehberger, who recognized chlorate of potash in the urine of patients who had taken it, this opinion was abandoned as altogether erroneous, and in all books on Pharmaceutical Chemistry and Materia Medica the statement is now to be found that chlorate of potash passes through the system without any decomposition. But this statement, true though it may be, seems at least to be based on very slender evidence; the mere "recognizing" in the urine of the salt cannot be considered conclusive as to the inertness of the compound. And since chlorate of potash, besides being a powerful diuretic, undoubtedly possesses other valuable medicinal properties, I have, at the request of Dr. Sinclair Coghill, of Ventnor, undertaken a series of experiments with a view to arrive at a definite conclusion. Whilst I have thus worked at the chemical side of the question, Dr. Coghill has investigated the medical part, and his results will be published in a medical paper.

Since the works on Analytical Chemistry did not supply me with any information as to any method for the quantitative determination of chlorate of potash in a liquid like urine, in the presence of much chloride and organic matter, I will embody in this paper the description of the several methods which I have used.

In the three series of experiments, which I am about to describe, three different methods of analysis were employed.

In the first the chlorine present as chloride was determined by means of a standard silver solution (1 c.c. 0.00355 grm. Cl) after the organic matter had, as far as

possible, been destroyed by means of a solution of permanganate of potash, the dioxide of manganese which had copiously come down, having been removed by filtration and thoroughly washed with boiling water. In another quantity of the urine the total chlorine was determined volumetrically after incinerating the urine with the addition of a little nitrate of potash, dissolving the white mass in water, acidulating slightly with nitric acid and neutralizing the acid by the addition of pure carbonate of lime. The difference between the two determinations was calculated for  $KClO_3$ .

Although on testing this method by analyzing a urine to which a known quantity of  $KClO_3$  had been added, I obtained very fair results, yet I abandoned it, in the second series, for two reasons. First, because on incineration a little chloride may be volatilized; and, second, because some chlorate may escape perfect decomposition.

In the second series of experiments I employed, as a reducing agent, the copper-zinc couple described by Messrs. Gladstone and Tribe. This useful couple is prepared by pouring over 1 metre of well-crumpled very thin zinc foil cut in shreds, a solution of 15 grms. of sulphate of copper, the resulting black spongy mass being well washed with water. It decomposes water even at ordinary temperature with the evolution of hydrogen, whilst near the boiling point the reaction is exceedingly active. It readily reduces chlorate of potash in solution, as has been shown by Thorpe and by Gladstone and Tribe, and is more clearly seen from the following experiments:—

Twenty-five c.c. of a solution containing 0.25 gm.  $KClO_3$  were boiled for five minutes with a quantity of the couple, the liquid was filtered, the precipitate washed with boiling water, and the chlorine titrated by means of standard silver solution. Used 5.10 c.c. equal to 0.0625 gm.  $KClO_3$  or 25.00 per cent.

After ten minutes' boiling, 9.0 c.c. silver solution were used, equal to 0.1103 gm.  $KClO_3$  or 44.12 per cent.

After twenty minutes, 14.9 c.c. = 0.1827 grms.  $KClO_3$  or 73.08 per cent.

After half-an-hour's boiling, 20.34 c.c. of silver solution were used, corresponding to 0.2494 grms.  $KClO_3$  or 99.76 per cent. of the total amount taken.

Hence at boiling temperatures the reduction of chlorate in aqueous solutions by means of the couple is very rapid. At ordinary temperatures, however, the reduction is slow. Thus allowing 25 c.c. of chlorate solution to stand over night with a considerable quantity of the couple, only 4.4 c.c. of standard silver solution were used, equal to 0.0539 grms.  $KClO_3$  or no more than 21.56 per cent. of the chlorate had been converted into chloride.

The reduction is also far slower in urine than in pure water. 25 c.c. of urine and 25 c.c. of the above chlorate solution were boiled for one hour with the couple, the total chlorine was then determined, and from it the amount of chloride contained in the urine was subtracted. Only about 50 per cent. of the chlorate taken were found to have been reduced. After 3 or 4 hours' boiling, however, the total amount of chlorate had been converted into chloride, the determinations coming to within 1 milligram of the quantity taken.

In these experiments the couple was added gradually so as always to have an active evolution of hydrogen from the liquid.

Although, however, the reduction of the chlorate was quite perfect, the method was found to be troublesome, on account of the persistent frothing of the urine, and its

liability to run over. Moreover, in the dilute liquids with which I had to deal the difference between the determinations of the chloride and of the total chlorine was often very small, and the slightest mistake was enormously multiplied in calculating from the small volume analysed to the total volume of urine voided. I therefore, in the last series of experiments made, employed a third, a gravimetical and eminently satisfactory and simple method. I removed from a measured quantity of the urine the chlorine present as chloride, by means of an excess silver nitrate, rendered the filtrate acid with dilute sulphuric acid, and added metallic zinc. Chloride of silver was at once formed, but by the further action of the zinc this was reduced, leaving the fluid quite clear, into metallic silver, which was washed, first with water, then with dilute ammonia, and in the filtrate the hydrochloric acid was precipitated with silver nitrate, the precipitate being collected and weighed. The reduction is finished in about half-an-hour if the liquid be very gently warmed.

The reduction was also tried, after the removal of the chloride as above, by means of an acid solution of ferrous sulphate. On heating, the chlorate is readily converted into chloride and separates as chloride of silver. I found this method to be the best, simplest, and quickest qualitative test for chlorate, being far superior to the usual incineration method, where loss by volatilisation is very possible. The test, in fact, is quite as sensitive as that for chloride, and quite as simple. As I do not find it described in any test book I have consulted, I recommend it here most emphatically, and consider it the more useful in qualitative analysis, since at the same time the nitrates are indicated before heating the liquid.

I further investigated the Indigo method, but found, that however exact it is in aqueous solution it is not applicable to liquids containing large quantities of organic matter, such as urine.

I now proceed to the experiments themselves.

I. SERIES. An inmate of the Ventnor hospital took on six successive days, in four portions daily, doses of 120 grains (or 7.776 grms.) or 720 grains in all of chlorate of potash. The urine was collected, the daily quantity measured and sampled. The following results are calculated for each day's volume:—

1st day.—Excreted 7.27 gm. total chlorine, and 6.20 gm. as chloride; difference, 1.07 gm. Cl as chlorate, equal to 3.69 gm.  $KClO_3$ , or 47.5 per cent. of the daily dose.

2nd day.—7.64 total Cl, 5.34 as chloride = 2.30 Cl as chlorate equal to 7.94 gm.  $KClO_3$  or 102.1 per cent. of a dose.

3rd day.—7.418 total Cl, 4.772 as chloride = 2.646 Cl as chlorate, or 9.138 gm.  $KClO_3$ , or 117.5 per cent.

4th day.—6.16 gm. total Cl, 4.25 as chloride, or 1.91 as chlorate, equal to 6.59 gm.  $KClO_3$ , or 84.8 per cent.

5th day.—Total Cl 8.84 gm., 5.79 as chloride; difference, 3.05 as chlorate or 10.53 gm.  $KClO_3$ , = 135.4 per cent.

6th day.—Total Cl 3.27, as chloride 3.05; difference, 0.22 Cl = 0.76 gm.  $KClO_3$ , = 9.7 per cent.

7th day.—Total Cl 4.45 gm., as chloride, 4.47 gm. therefore chlorate absent.

Obtained therefore altogether 497.0 per cent., of the daily dose, or 82.8 per cent. of the total chlorate taken

J. MUTER	26	9	3	—	92	1	13	—	7	2	3	4	—	11	—	144	0
Bermondsey .....	16	4	2	—	44	2	—	—	15	3	49	4	—	24	—	150	—
Lambeth .....	18	4	17	11	2	1	—	—	3	1	—	—	—	—	40	17	1
Newington .....	10	3	6	1	—	—	—	—	4	1	4	—	2	—	26	6	—
Rotherhithe .....	67	6	19	—	162	—	2	—	40	2	65	—	50	16	405	24	—
St. George's, Southwark .....	144	7	—	—	—	—	1	—	1	1	—	—	60	14	198	22	—
Wandsworth .....	45	6	4	—	29	3	—	—	8	2	52	9	22	9	160	27	—
Cork .....	10	—	—	—	14	—	—	—	132	92	26	4	2	—	184	95	—
Newcastle-on-Tyne .....	5	2	—	—	2	—	—	—	4	3	—	—	2	—	11	5	—
Northumberland .....	58	7	20	—	109	1	6	2	—	—	17	—	56	10	266	20	—
South Shields .....	26	12	6	2	4	—	—	—	—	—	9	1	10	3	55	18	—
The Strand .....	24	3	3	—	18	—	—	—	17	3	2	—	—	—	64	3	—
Beverley .....	4	2	28	—	98	7	—	—	30	1	66	2	18	2	244	14	—
Bolton .....	54	25	17	1	26	5	9	—	24	8	27	3	13	—	170	51	—
E. SERGEANT .....	104	21	40	—	230	12	1	—	55	24	11	2	14	1	455	61	—
J. SHEA .....	185	32	7	3	22	1	—	—	9	5	4	—	2	1	187	46	—
Reading .....	100	7	55	5	540	72	4	—	95	20	16	—	4	—	814	104	—
A. W. SMITH .....	8	4	—	—	2	—	—	—	—	—	3	—	—	—	7	—	—
Rye .....	35	16	1	—	48	8	22	8	18	14	12	—	14	—	165	31	—
Bedfordshire .....	51	16	3	1	45	3	11	—	—	—	—	—	10	10	120	30	—
Reigate .....	3	3	—	—	—	—	—	—	—	—	—	—	—	—	4	3	—
St. Pancras .....	26	5	13	12	23	9	11	2	19	4	4	2	11	7	107	—	—
Surrey .....	14	7	2	—	—	—	—	—	2	—	—	—	—	—	6	—	—
Bristol .....	26	6	—	—	—	—	—	—	—	—	—	—	—	—	14	7	—
Somersetshire .....	2	—	2	—	—	—	—	—	3	—	—	—	—	—	26	6	—
Norfolk .....	49	9	12	4	44	4	—	—	20	6	13	8	10	—	20	—	—
Yarmouth .....	14	8	25	1	21	—	10	1	8	6	1	—	25	—	50	31	—
Cardiff .....	23	4	24	2	56	2	—	—	16	2	8	—	17	1	123	10	—
Hackney .....	16	6	15	—	24	—	5	1	17	4	6	—	10	—	144	13	—
Ayr .....	3171	829	681	85	2987	389	403	96	1331	626	1042	71	818	177	11943	2871	—
Glasgow .....	26	5	13	12	23	9	11	2	19	4	4	2	11	7	107	—	—
Johnstone .....	14	7	2	—	—	—	—	—	2	—	—	—	—	—	6	—	—
Kilmarnock .....	26	6	—	—	—	—	—	—	—	—	—	—	—	—	14	7	—
Lanark .....	2	—	—	—	—	—	—	—	—	—	—	—	—	—	7	—	—
Rutherglen .....	49	9	12	4	44	4	—	—	8	6	13	8	10	—	20	—	—
Sutherlandshire .....	14	8	25	1	21	—	10	1	16	2	8	—	25	—	50	31	—
St. Marybone .....	18	6	25	1	21	—	10	1	16	2	8	—	17	1	123	10	—
Colchester and E. Suffolk .....	23	4	24	2	56	2	—	—	14	4	10	—	10	—	144	13	—
Greenwich and Deptford .....	16	6	15	—	24	—	5	1	17	4	6	—	10	—	93	11	—
Plumstead .....	3171	829	681	85	2987	389	403	96	1331	626	1042	71	818	177	11943	2871	—
Woolwich .....																	

1 water very dangerous.  
10 peas contained copper.  
Sundries all waters; 14 impure.  
Adulterated sundries all green peas and beans.

9 peas were all coppered.

2 quarters only.  
Drugs were all cream of tartar.

Sundries were all impure pump waters, and pumps subsequently closed.  
A whisky was 22 over proof.

3 samples were 1, 7 and 10 over proof.  
3 quarters only.



On account of the great irregularities in the amounts of chlorate in the urine and also on account of the fact, that though six doses were measured out to the patient, yet chlorate was only found on six instead of on seven or eight days, I thought I had good reason to place but little reliance on the above series, and I felt certain that if accurate results were to be obtained, I must make *myself* the vehicle of the chlorate. I determined at the same time to ascertain the rate at which the excretion of the chlorate takes place.

II. SERIES. I took exactly 2 grms. of pure and dry chlorate, and separately collected and analysed every batch of urine passed. Every analysis was made twice, the average being taken for calculation. Already 1 hour 30 minutes after the taking of the dose I found 0.3446 gm.  $\text{K Cl O}_3$ , or 17.23 per cent. of the dose in the urine. After another 2 hours, 0.4724 grms. or another 23.62 per cent. were found. In the third batch, passed 2 hours later, 0.3217  $\text{K Cl O}_3$  or 16.08 per cent. of a dose were contained. In the fourth, passed after another 2 hours 55 minutes, I found 0.2182 gm.  $\text{K Cl O}_3$ , or 10.91 per cent. Next morning, 20 hours 25 minutes after the commencement of the experiment, 0.3002 gm.  $\text{K Cl O}_3$  were found, or 15.01 of a dose. In the sixth sample, in which, owing to an accident, I unfortunately could only make one, and that one a very doubtful analysis, passed 9 hours 15 minutes after the last sample, 0.2196 gm.  $\text{K Cl O}_3$  were contained, equal to 10.98 per cent. The seventh sample was free from chlorate.

Altogether, therefore, of 2 grms. of chlorate taken 1.8764 gm., or 93.82 per cent. had passed through the kidneys.

The rate of excretion, calculated per hour, was therefore as follows:—

1st experiment.—Per hour for 1½ hours ..	...	11.49 per cent.
2nd " " " 2 " ..	...	11.81 "
3rd " " " 2 " ..	...	8.04 "
4th " " " 2 " 55 minutes		3.74 "
5th " " " 12 " ..	...	1.25 "
6th " " " 9 " 15 minutes		1.18 "

The latter figure is, I believe, a little too high. 2 grms., though a somewhat large dose, is rather a small quantity, considering that it has to be determined in a very large bulk of fluid. The results must therefore necessarily be a little doubtful. Yet it is satisfactory, to get out of the whole body 1.8764 grms., with the loss of no more than 0.12 gm.

III. SERIES. I therefore took, within 2 hours or so, 8 grms. of pure chlorate of potash, and carefully collected all urine passed for nearly 3 days, namely, until a qualitative test for chlorate gave a negative result. The amount collected was nearly 4 litres. I mixed the different portions and made up with distilled water to 4000 c.c. From 40 c.c. the chlorides were removed as described in an earlier part of this paper, and the chlorate reduced with zinc and sulphuric acid; 0.0884 grms.  $\text{AgCl}$  were obtained. A second experiment also yielded 0.0884  $\text{AgCl}$ , corresponding to 0.07552 gm.  $\text{K Cl O}_3$ , or 7.552 in the total volume. 94.40 per cent. of the chlorate taken have therefore been excreted by the kidneys in an unaltered state.

Whether the remaining six per cent. were decomposed in the body—were evacuated with the feces, or were only very gradually and imperceptibly eliminated, I am unable to decide. My impression is that they were *not* decomposed, because if such reduction

took place, it ought to have been proportionately much greater in the case of the small dose than in the large dose taken.

The saliva turns intensely acid whilst chlorate remains in the system. The acidity is, however, *not* due to free hydrochloric acid.

Urine containing chlorate remains free from smell for a considerable period, although bacteria develop very plentifully in it. This fact bears out a statement of Boyle and Headland in their *Materia Medica*, p. 96, namely, that chlorate was "supposed to counteract putrescence of the fluids in scarlatina, typhus, cholera, &c."

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### ON THE DETERMINATION OF SULPHURIC ACID IN URINE.

By E. BAUMANN.

*Translated from the Zeitschrift für Physiologische Chemie, vol. 1, page 7.*

I HAVE already called attention to the occurrence and origin of numerous compounds found in the animal body, which have the common property of being split up into sulphuric acid and aromatic compounds on treatment with mineral acids.

They originate in the animal body from preformed sulphuric acid, so that they must not be looked upon as a separation of the sulphur but of the sulphuric acid.

The method which has been usually adopted for the determination of the ever-present (in normal urine) sulphuric ethers, viz., precipitation of the hydrochloric acidified urine with barium chloride, does not give correct information respecting the amount of sulphates present, and it is necessary to apply a correction to the statements hitherto made as to the amount of sulphuric acid in urine.

Having produced several of the above-named substances in a pure condition, and after their properties and chemical constitution are well known, I do not consider it superfluous to fix upon a simple method of determining the sulphuric acid and the copulated sulphuric acid in urine.

None of the copulated sulphates hitherto found in urine are decomposed by gently heating with dilute acetic acid for one hour; but they are entirely split up when warmed for a few minutes with the smallest quantity of hydrochloric acid, or if left for some hours without warming; therefore the salts present, as sulphates in urine, can only be determined by acidifying with acetic acid.

25 or 50 c.c. urine are treated with acetic acid, an equal volume of water is added, together with an excess of barium chloride. The whole is heated in a water bath until precipitation is complete and the supernatant liquid clear. This takes about half to three-quarters of an hour. The filtered precipitate gives the amount of sulphuric acid present as salts.

The filtrate is treated with dilute hydrochloric acid and warmed until the precipitate, which is formed, has completely separated. (I have formerly left it to stand for one hour in a warm place, in order to ensure decomposition of the copulated sulphates.) This second precipitate contains, along with barium sulphate, a brown resinous substance, of which the greater portion can be removed by washing with hot alcohol. From the weight of this second precipitate the amount of copulated sulphuric acid can be calculated.

## A DANGEROUS COSMETIC.

BY CHARLES H. PIESSE, F.C.S.

I RECENTLY had submitted to me for analysis a small quantity of a white substance, in the condition of a magma, and I was informed in reference to it that it was used by an American lady as a face cosmetic. The lady, unable to purchase the preparation in London, desired to have some manufactured especially. The result of my examination showed that the substance consisted wholly of *calomel*, the wetness of the magma being due simply to water.

It is needless to add that on my representations the persons to whom the manufacture had been entrusted declined to go any further in the matter, while the existence of such a cosmetic in the American market is another instance of the 'cuteness of the Yankee,—regardless of consequences.

## BUTTER ANALYSIS.

BY F. P. PERKINS, Public Analyst for Exeter.

I HAVE lately been making experiments with butter fat, and I find that the volatile acids may be estimated very fairly in the following way. I give the "modus operandi" in full. From 3 to 4 grammes of the purified fat are taken, saponified in the usual way and allowed to cool, dilute sulphuric acid is then added until the insoluble acids rise to the surface, the flask is allowed to stand for a time and the liquid when clear is passed through a weighed filter paper, warm water is poured into the flask, a rotatory motion is given, and the layer of acids, broken up into a thousand globules, well washed. Allowed again to cool the wash water is passed through the filter, this operation is repeated many times, using altogether about 300 or 400 c.c. of water. The insoluble acids are then brought on the filter, washed with warm water, dried at 110 C. and weighed. The filtrate containing the volatile acids is made up to 500 c.c. In 100 c.c. the acidity is determined with decinormal K Ho, another 100 c.c. are boiled until reduced in bulk to 10 c.c., water is added and the acidity again taken. By subtracting the figures of the second experiment from those of the first, and multiplying by 5, an estimate is obtained, expressed in cubic centimetres of K Ho of the acidity due to volatile acids. All that is now required is to translate this into Butyric acid and to calculate the percentage from the amount of butter used.

The following table shews the degree of accuracy with which the process can be worked :

- Exp. 1. 4.387 grammes of butter fat taken. Solution of volatile acids made up to 500 c.c. Acidity due to volatile acids = 34.7 c.c. of decinormal sol. of soda = 6.9 p.c. butyric acid.
- Exp. 2. 2.47 grammes of the same butter fat taken. 86.72 p.c. of insoluble acids obtained. Solution of volatile acids made up to 500 c.c. Acidity due to volatile acids = 19.5 c.c. of decinormal solution of soda = 6.9 p.c. butyric acid.
- Exp. 3. 3.004 grammes of butter fat taken, giving 86.58 p.c. of insol. acids. Solution of volatile acids made up to 500 c.c. Acidity due to volatile acids = 21.9 c.c. of decinormal sol. of potash = 6.4 p.c. butyric acid.
- Exp. 4. Another portion of the same sol. Acidity due to volatile acids = 20.8 decinormal sol. of potash = 6.1 p.c. butyric acid.
- Exp. 5. 2.3 grammes of beef fat taken. Filtrate from insol. acids made up to 500 c.c. Acidity due to volatile acids = 4.4 c.c. decinormal sol. of potash = 1.6 butyric acid.

The butter used in these experiments was pure Devonshire.

It appears to me that thus simply butter may be shown to be adulterated or not, if the volatile acids do not come up to a fixed standard,



## REVIEWS.

The London Water Supply, by Dr. Meymott Tidy\*.

An Examination of the Figures and Statements published as the Results of the Analyses of Professor Frankland on the London Water Supply in 1876 and 1877, by Ω†.

Dr. Tidy's volume is not merely his annual report to the Society of Medical Officers of Health, but it is a most elaborate and carefully prepared tabulated statement of the results of the monthly analyses of the London Waters, made by Dr. Letheby and Dr. Tidy, during the last ten years, together with many valuable remarks on the sources of supply of the different companies, and the variations in the character of the Waters.

The main object which the author has had in view has been to furnish a comprehensive book of reference, to enable a fair judgment to be formed on the schemes now before Parliament, for changing the character of the Water Supply of London. With this end in view, he very rightly denounces the extravagant pictures of river pollution, which are from time to time drawn, and endeavours to reduce the whole matter to a more common sense point of view.

As far as his book goes, we think he has acquitted himself well of his task. We wish there had been more information on some points. The microscopical examination of a water is often of such paramount importance that a column in every analysis may be justly devoted to it, and the physical characteristics alone are sometimes enough to condemn a water; but in this book the information on both is deficient. With these exceptions the book merits full circulation, and better still, full consideration by those who are proposing fresh expenditure.

Omega's pamphlet is of a different style, although written ostensibly for the purpose of giving information in reference to the same question. Some three-fourths of it consists of reprints and abstracts of Dr. Frankland's "figures and statements," in reference to the London Water Supply. Naturally the author starts by referring to the sensational paragraphs, which describe the London Supply as "diluted sewage," &c., &c. He then goes on to enquire how it was, that if, as Dr. Frankland states, the Thames was in December, 1876, and January, 1877, "laden with organic matters of the most objectionable origin, which carried down to the intakes of the Metropolitan Water Companies, passed through the filters and were distributed to the consumers," the worst water distributed by any of the Thames Companies during the last two years, contained only one part of organic impurity in 175,000 parts of water.

Further pungent criticisms of the same kind follow. The pamphlet is carefully and cleverly written.

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Mr. R. Edge, Manchester, writes us a long letter (for which we regret that we have not space) pointing out the extent to which milkmen are in the hands of farmers, and suggesting that additional power should be given to inspectors to take samples from the farmers' churns, without the intervention of the milkmen in the matter. Why do not the Manchester milkmen form an association for looking after the farmers, as their London *confrères* have done?

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Mr. W. G. Crook has been appointed public analyst for Norwich.

Mr. James Napier has been appointed public analyst for West Suffolk.

Dr. T. S. Robson has been appointed public analyst for Hartlepool.

Mr. M. O. Hehner, has been appointed public analyst for Ryde.

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\* Churchill.

† Simpkin.

## COMPOSITION OF THE ASH OF CANE SUGAR.

An analysis, by Dr. Wallace, of the ash of sugar obtained from canes grown near the sea-coast in Demerara, has recently been published. The following were the results obtained:—

	Per cent.
Potash	= 29.10
Soda	= 1.94
Lime	= 15.10
Magnesia	= 3.76
Sulphuric anhydride	= 23.75
Phosphoric acid	= 5.59
Chlorine	= 4.15
Carbonic acid	= 4.06
Peroxide of iron	= 0.55
Alumina	= 0.65
Silica	= 12.38
	101.03
Deduct oxygen = chlorine	0.93
	100.10

## ANALYSTS' REPORTS.

Mr. Wigner reports to the Plinmstead Board as follows:

"The adulterated samples this (March) quarter are of an unusually serious character. The statement in the newspapers that the recent outbreak of scarlet fever was suspected to be due to the milk supply led me to take samples from every milkman in the district, and the result is that among 16 samples of milk I found 5 samples were genuine, 1 sample was of very poor quality and in all probability slightly watered, 1 sample was skimmed, 5 samples had respectively 6 per cent., 10 per cent., 20 per cent., 25 per cent. and 45 per cent. of added water; 2 samples were obtained from cows which had calved so recently that the milk was unfit for food, and 2 samples were obtained from a diseased cow or cows. I obtained also 7 samples of butter and no less than four of these were adulterated with 25 per cent., 70 per cent., 75 per cent., and 80 per cent. respectively of foreign fats.

Therefore as regards milk and butter my present report is the most unsatisfactory I have made for some time. It is right that I should point out that the watering of milk is very likely to cause it to become injurious to health, because the contaminated water so often used for this fraud frequently contains the germs of disease, being itself little better than diluted sewage. As to milk from diseased cows I need not say more than that I consider it far more likely to produce illness than diseased meat, because while meat is consumed mainly by adults, milk is the food of invalids and children."

GLASGOW TOWN COUNCIL AND THE SALE OF FOOD AND DRUGS ACT.—The Clerk and Sanitary Inspector reported to the Health Committee on the 11th inst., that, in respect of the decision of the Court of Justiciary in the Appeal, *Davidson v. Macleod*, and the opinions expressed by the Judges therein, Section 6 of the Sale of Foods and of Drugs Act, 1875, which prohibits the sale, to the prejudice of the purchaser, of articles of food and of drugs which are not of the nature, substance, and quality demanded, is practically inoperative. The committee agreed to recommend that in the circumstances it be remitted to the Parliamentary Bills Committee to take such steps as may be deemed expedient, with a view to such an alteration and amendment on the law being made as will enable the authorities to take action for the suppression of adulteration of articles of food and drink. Bailie Ure, in moving the adoption of the minute, asked that the matter of the Sale of Food and Drugs Act be remitted to the Parliamentary Bills Committee with a view to their taking some action, as in the meantime their officers could do nothing. Some suggestion, he thought, should be made to Government to do something in regard to the question.—*Glasgow Herald*.

## LAW REPORTS.

At the Borough Police-court, Salford, before Sir John Iles Mantell, Mary Moss, grocer and provision dealer, carrying on business at 75, Ordsall-lane, Salford, was summoned for selling adulterated butter. The Town Clerk (Mr. C. Moorhouse) appeared for the prosecution, and Mr. J. B. Edge, barrister, for the defence. The Town Clerk said that the inspector went to the defendant's shop on February 18, and asked Mrs. Moss for a pound and a half of butter. He asked for that which was in the shop and marked 10d. per lb. The inspector was supplied, and paid 1s. 3d. He told the defendant that he had purchased the butter for the purpose of being analysed, and divided the sample in the usual way. On the butter being analysed, it was found to be mixed with common fat, and was, in fact, what was commonly called 'butterine.' There was no ticket or mark upon the butter, except the ticket, "10d. per lb." Mr. J. Carter Bell, public analyst for Salford, said he received from the inspector the sample of butter he

purchased, and on analysing it found it contained 80 per cent. of foreign fat. It was, in fact, butterine of the ordinary class. Butterine is made from animal fat—such as beef fat and mutton fat. Sir John: Then adulterated butter is not butterine? Witness: They mix a little butter with it. Sir John: Is there any prescribed limit when it is called butter and when it is called “butterine”? Witness: Not that I know of. I should not look upon, say 20 per cent. of foreign fat as butterine. Sir John: To say that the article sold was “to the prejudice of the buyer,” it must be proved that he was supplied with a worse class of butter than he asked for, and that it was deleterious. Witness: Butterine is not deleterious. Mr. Edge: Have you read the opinion of Mr. Estcourt, the public analyst for the city of Manchester, on butter and butterine? Witness: No. Mr. Edge: Then I will read it to you. In a lecture delivered at the Broughton College on December 14 last, Mr. Estcourt said:—“He regarded the introduction of butterine as a great boon to the working classes, it having to some extent prevented an increase in the price of butter; and he was of opinion that if the prejudice against imitation could be removed it would be largely used, as it was preferable to two-thirds of the salt butter sold.” Witness had not heard of that before. He had heard that animal fat is used by the working-classes in lieu of butter, and he thought there was nothing prejudicial to health in butterine. Sir John Mantell asked the Town Clerk if he thought it necessary to put in evidence as to the price of butter. They all knew that pure butter could not be bought at 10d. per lb. The Town Clerk: I think not. Sir John: Then I think the case cannot go further. I am convinced that the article was not adulterated. It was sold as butterine, not as butter. It is quite true that it was not sold as pure butter, and the price of pure butter was not paid for it.

**HEAVY PENALTY FOR ADULTERATING GIN.**—William Clement, of the Saracen's Head, Broad-street, Bath, was summoned for selling, on the 27th Feb., to Inspector Montague, three quarters of gin, not of the nature, substance, and quality demanded. Mr. H. R. Hodson, barrister, instructed by Mr. F. H. Moger, clerk to the Urban Sanitary Authority, appeared to prosecute, and Mr. J. K. Bartrum was for the defendant. Mr. Hodson having opened the case, called Inspector Montague, who deposed to purchasing the gin. He asked the barmaid if it was the best gin, and she replied “Yes.” He paid 5d. a quarter for the gin, being 1s. 3d. for the whole. This was the usual price. He offered to divide the gin but it was refused, and he then took it to Mr. Gatehouse, subsequently receiving a certificate of analysis from him. The certificate of the analyst stated the gin to be 46 per cent. under proof, and that it contained 29 per cent. of added water. The percentage of alcohol was by weight 24, water 76. Solids per cent., 0.062. Witness heard that 17 per cent. under proof was the standard for best gin, and 22 under proof for second quality. It was served from a quart bottle. Had paid the same price for gin at Mr. Carter's bar, which was only 22 per cent. under proof. Had also bought gin at the same price of Mr. Worthy Baker, of Walcott-street, which was 23 under proof. In addressing the Bench, Mr. Bartrum said he should show that the cost price of the gin was 12s. per gallon, and it was retailed at nearly the same price. It was therefore absurd to suppose it was precisely the same. He was told there was one instance in which it was retailed at 22 per cent. under proof, viz., by Mr. Cater. They knew that Mr. Cater conducted his business in a very handsome manner, and this was one of the instances in which the public were well served by him. But because Mr. Cater made so small a profit upon gin they must not place his gigantic business on a par with Mr. Clements. Gin never was sent out by the merchants of greater strength than 17 under proof. He ventured to say that no publican in Bath—excepting Mr. Cater, who was a glorious exception—retailed gin of a greater strength than 38 per cent. under proof. That was the strength Mr. Clement sold his at, but unknown to him this had been made 8 per cent. more than that under proof. The defendant was then sworn, and said he gave 12s. per gallon for gin (Burnett's), and after blending it sold it at 4s. per gallon profit. He added a quart of water to a gallon of gin. After consulting together in private the chairman said the Bench had considered the circumstances, and in the interest of the public, felt it their duty to impose a severe sentence. They ordered defendant to pay a fine of £10 and the costs, including counsel's fee, which was fixed at two guineas.

**SUNDAY MILK.**—John W. Hunt, of 46, King Street, Woolwich, was summoned by order of the Local Board of Health for selling adulterated milk. Mr. Farnfield appeared to prosecute. Mr. Carty, inspector, said that on Sunday morning, the 3rd of March, he sent a lad, to buy milk. The analyst certified it to contain 14 per cent. of water. Defendant said he bought the milk from Mr. Sanders, who purchased it from London on account of being extra busy. It was the Sunday before Shrove Tuesday.

Mrs. Sanders said it was bought in London on Saturday night. Fined 20s. John Fisher, of 2, Upper Woodland Terrace, Charlton, was similarly charged. Mr. Whale defended. Mr. J. Carty, inspector, said defendant was a cowkeeper. On Sunday morning, the 3rd. inst., he requested a lad to purchase milk from defendant in Prospect Row. The lad asked for a pint and a half, and paid 3d. The analyst's certificate showed the milk to contain not less than 18 per cent. of added water. On a previous occasion defendant's milk had been found genuine, but that milk was not bought on Sunday. The Board had ordered witness to purchase samples on Sunday in consequence of complaints. Mr. Whale raised a technical objection, that the person who bought the milk did not inform the vendor that it was for analysis. Mr. Slade over-ruled the objection. Mr. Whale urged in mitigation that defendant bought the milk at East Greenwich. Defendant swore to this, and said the Charlton inspector had frequently before taken samples of his milk. Mr. Slade fined the defendant 20s. George Piper, of 21, Prospect Place, was summoned for a similar offence. Mr. Carty said defendant was a milk-seller. On the 3rd. inst. he sent a lad in for milk, which was reported by the analyst to contain 25 per cent. of water. Defendant said he sold the milk as he bought it. Mr. Carty said the defendant had an inscription on his house "Pure milk sold here, 4d. a quart." Mrs. Saunders said she got the milk from London. Defendant said it would have taken him a week to ascertain if the milk were pure. Mrs. Sanders said this milk was bought from a different person to that supplied to Hunt. This being a first offence, the penalty of 20s. was imposed in this case also, Mr. Slade remarking that as dealers could protect themselves by taking a written guarantee from the persons who supplied them, they would be more seriously dealt with in future.—*Kentish Independent*.

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#### NOTES OF THE MONTH.

THE better the day the better the deed is evidently what the Woolwich milkmen act even if they do not think it. For some time past the Inspector has been pretty vigilant, but the milkmen have been more so. A recent Sunday morning, however, found the official at his work, and the unfortunate purveyors of Simpson and Milk not being forewarned were not forwarned. Summary convictions, with a promise of heavier penalties in future, will perhaps sharpen the edges of their conscience a little.

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It is said that when a parish beadle is to be appointed canvassing is permitted, but we have heard lately of some cases of canvassing for public analysts' appointments even before they were vacant. This, mind, is not merely the case of a private letter to a friend, or a quiet word in the ear, but house to house canvassing. We can hardly help doubting the fitness of a man for the position if he has to resort to such expedients.

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Another idea, or rather a modification of an old idea is brought forward to try and settle the milk question. Milk is to be sold at so much per cent. of solids not fat, or in other words every 1 per cent. of solids not fat is to represent a money value of say  $\frac{1}{4}$ d. per quart. This would introduce a nice little novelty into analytical work.

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We publish the first part of our annual table of Analysts' Returns. We expect to have a few more to publish next month to complete it. We shall be greatly obliged if any analysts who have hitherto overlooked the matter will forward us their returns before the 20th inst.

We are almost tempted to immortalize the name of a public analyst, who has already rendered himself pretty prominent, by pointing out that he is the only analyst in the kingdom who has refused—*distinctly refused*—aye, and even discourteously refused to send us the copies of his returns. But we will have pity. Probably if they were worth printing he would have sent them.

What can the Salford Magistrate be thinking of? A dealer was summoned for selling butterine as butter, and he dismissed the case. So far, perhaps, the proceeding was not very peculiar, but the reason he gave is. He appears to think that because no man could expect to buy genuine butter at 10d. per lb., therefore, if a grocer sells an inspector so-called butter at that price, no fraud is committed. This is another decision to be kept on record against the day when the Sale of Food and Drugs Act will be amended.

### RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1877. No.	Name of Patentee.	Title of Patent.	Price.
2768	E. C. Prentice ... ..	Treatment of Gun Cotton ... ..	2d.
2801	P. P. E. M. Koch ... ..	Preservation of Food, &c. ... ..	6d.
2842	R. W. Wallace and C. F. Claus ... ..	Utilizing Gas Liquor in Manufacture of Carbonate of Potash ... ..	4d.
2882	W. J. Bonser ... ..	Preserving Meat, &c. ... ..	4d.
2922	G. Underwood ... ..	Treatment of Iron Ores ... ..	2d.
2924	H. W. Walker and T. L. Patterson	Apparatus for Refining Sugar ... ..	6d.
2992	J. Mason ... ..	Production of Sulphuric Acid ... ..	2d.
2993	Ditto ... ..	Treatment of Residues from Production of Sulphuric Acid	2d.
2999	J. H. Johnson ... ..	Treatment of Amylaceous Substances ... ..	6d.
3032	W. R. Lake ... ..	Manufacture of Caustic Alkalies and their Carbonates and Chlorine, &c. ... ..	4d.
3096	G. Fournier ... ..	Manufacture of Agents for Purification of Sewage ... ..	4d.
3115	F. Wirth ... ..	Manufacture of Tartaric Acid from Wine Residues ... ..	4d.
3151	J. Frost ... ..	Treating the Residuum in Sewage Purification... ..	8d.
3174	J. Riley ... ..	Manufacture of Salt Cake Alkalkine Carbonates, &c. ... ..	2d.
3203	J. Mason ... ..	Treating Residues from Production of Sulphuric Acid ... ..	4d.
3289	J. Stenhouse ... ..	Manufacture of Explosive Compounds ... ..	4d.
3311	W. Marriott ... ..	Purifying Gas ... ..	4d.

### BOOKS, &c., RECEIVED.

The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Medical Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Country Brewers' Gazette.

# THE ANALYST.

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## WATER ANALYSIS.

WE have before drawn attention to the question of the analysis of water by public analysts. There is no doubt that water ought in the ordinary course to form a fairly remunerative part of an analyst's practice, and that the office of public analyst should secure for a competent man an increase in the number of samples of water submitted to him. But we regret to have to point out once more that a number of Public Analysts appear to be analysing waters as if they were included under the Sale of Food and Drugs Act. We thought some time ago it was enough merely to draw attention to the second section of that Act; that section enacts that the term "food shall include every article used for food or drink by man OTHER THAN DRUGS OR WATER." There are no other words in the Act which in any way qualify or limit the definition here given, and it is perfectly clear that all public analysts are entitled to charge for samples of water as if they were independent or private samples instead of analysing them as part of their official duties as public analysts. Some few may consider that this is a matter which concerns themselves only, but it does not appear so to us. On the contrary it is tolerably notorious that because in some districts samples of water are taken as if they were samples of food, analysts in other districts are expected to do work which the Act never intended to be given to them at unremunerative rates. We do trust that in future we shall not hear of any samples of water being analysed except for separate fees on a fair scale.

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## SOCIETY OF PUBLIC ANALYSTS.

As the Meeting of this Society is held on the day we go to press we are compelled to hold over our Report of the Meeting until our next number, but we publish one or two papers which are to be read before the Society on that occasion.

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## THE AMENDMENT OF THE SALE OF FOOD AND DRUGS ACT.

BY A. WYNTER BLYTH.

*Read before the Society of Public Analysts, on the 20th March, 1878.*

IN this short paper I am going to strictly confine my remarks to a proposition or suggestion substituting a peculiar system of reference from one analyst to another, instead of the present Court of Appeal in Somerset House. That the present system is in the highest degree unsatisfactory, not alone food analysts but the general public are quite united in agreeing, and without attempting to prove what requires no proof, I may shortly state that in nine cases out of ten it is, as has been frequently pointed out, a reference from a higher to a lower authority. If, for example, Dr. Dupré, whose experience in the analysis of wine must be very great, should certify to the sophistication of a given sample, his decision is liable to be reversed by chemists, who have never by publication, or in any other manner, proved that they possess any special practice in, or knowledge of, that particular subject. Such a case would be somewhat analogous to the

decision of a judge, versed in criminal law, being referred to a solicitor in Government pay. If, however, experience had in any way justified the objectionable clause in the Sale of Food and Drugs Act, the anomaly, though still existing, would not have been worth notice; but experience more and more serves to strengthen the suspicions that secret methods infallibly excite, and the vague reticence and inconsistency of the Government certificates confuse the magistracy, perplex the analyst, and provoke at once the gratitude and contempt of the guilty tradesman. Opinions may differ as to the necessity of appeal at all, although there can be no difference as to the undesirability of continuing the present system.

Allowing, however, that in the nearly 16,000 analyses of food which appear to be made yearly a few mistakes are possible, it may be freely conceded that any suggestion which would protect a really honest trader from the accident of a false accusation on the one hand, and on the other support the food analyst in the conscientious discharge of what is often an unpleasant duty, should be considered.

The aim of appeal is the protection of the innocent, not the double conviction of the fraudulent; and it is self-evident that the best protection of the former is to take every precaution that the accusation is well founded, and to render it almost impossible for any analyst, even should it happen that he is hopelessly unfit for his post, to give an untrue certificate, for it must be remembered that in the case of an accusation, subsequently shown to be unfounded, the injury lies in the accusation itself, and cannot be wiped away from record or memory; nor can you ensure that each living soul, who has heard or read the original charge, shall also hear or read the subsequent justification, and even if that could be done, how often it happens that the former is spirited and sharp, the latter dull.

My proposal is this:—

*The analysis of all adulterated samples, by two independent analysts, the local analyst and a referee.*

No charge heard, or summons granted unless supported by a joint certificate.

This scheme is neither wild nor visionary. It would require a system of referees, which might follow the registration divisions, viz., one or more for the Midland Counties, one or more for the Northern, for the South Western, &c., &c., the Metropolis and certain large towns being, of course, treated separately. The referees would naturally be appointed from the Society of Food Analysts, or at all events no referee who had not paid attention to the subject could be considered a desirable appointment.

The details of the system would be something like the following:—There would be, say referees, A, B, C, D, for the Northern, Midland, South Western, and Eastern Counties, and taking the district A there would be analysts d, e, f. Either of the latter receives from their inspectors a certain number of samples; a few of these are found adulterated. The local analyst immediately forwards to A his sample, stating, if necessary, the processes he has employed and his conclusions. He also sends notice to the person who submitted to him the sample requesting him to forward his sample to the referee. If the conclusions of the latter are pretty well identical with the former, the referee merely countersigns the certificate; if he differs entirely, a certificate would be merely given that there is a difference of opinion with regard to the sample in question, and then, of course, no action could be taken.

If the referees A, B, C, D, are themselves in practice as food analysts, A's samples

would go to B, B's to C, and C's to D, or otherwise as the Local Government Board might direct.

The expense of the double analysis should, in every instance, where a conviction is obtained, be deemed part of the costs—the few cases in which a difference of opinion would exist, would have to be paid by Government.

There should be no jealousy with regard to the appointment of the referees; they would probably be selected by the Local Government Board; and there should, on the part of the referees, be no assumption of superiority or precedence over their brother analysts.

The only real objection to the scheme that I see is the possible protection and perpetuation of incompetence, as we all know several so-called analysts have disappeared, having been compelled to resign their posts, and one can readily see that a competent referee would protect a very ignorant man from the ordeal of cross-examination in a public court.

This is not, however, an insuperable difficulty, for I apprehend that all the certificates, both of conviction and of difference, could be transmitted to the Local Government Board, and that thus an analyst, unfit for his post, would be quickly discovered and dismissed.

We can, on very few questions, hold the same opinions, but should a majority of the food analysts agree with me as to the desirability and expediency of this scheme, I trust they will lose no time in trying to get it embodied in any amended act.

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ON DISEASED MILK.

By C. HEISCH, F.C.S.

*Read before the Society of Public Analysts, on 1st May, 1878.*

THE question of milk from diseased cows having been recently, for the second time, brought under my notice, both by the cases of Mr. Wigner, at Plumstead, and one sample received by myself from Hampstead, I am induced to lay before the society the details, not so much of the recent case (of which, beyond the microscopical appearances, I know nothing), as of two which came to me some time since, of which, through the courtesy of the owner of the cows, I got a more than usually complete history, though some points were not as clear as could have been wished; nevertheless, some features of the case were so peculiar and of such interest as to be worthy of note. First, with respect to the recent case. The milk presented no peculiar appearance; the cream rose in the ordinary way, and had the ordinary colour. On examining a drop under the microscope I found numerous bodies similar to those described by Mr. Wynter Blyth, in his paper read before the Society and published in its *Proceedings*\* (which, for convenience, I shall speak of as Blyth's bodies), pus corpuscles, blood corpuscles, and pieces of skin strongly tinged with blood. Chemical analysis showed little peculiarity.

Total Solids	...	...	...	...	...	...	...	...	...	11.32
Solids not Fat	...	...	...	...	...	...	...	...	...	8.65
Fat	...	...	...	...	...	...	...	...	...	2.67
Ash	...	...	...	...	...	...	...	...	...	.65

Cream 10 per cent. by volume.

Of this case I have no further history, the Vestry not yet having made up its mind about prosecuting

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\* See vol. 1, p. 239.



On January 17th, 1876, I received from a private client two samples of milk and one of cream, with the intimation that all the members of the family who used the milk had been ill, and it was believed the illness was caused by the milk. The cream was from a mixture of the milk of both the cows, which had yielded the samples of milk.

No 1 gave the following results :—

Total Solids	...	...	...	...	...	...	...	...	13.97
Solids not Fat	...	...	...	...	...	...	...	...	9.61
Fat	...	...	...	...	...	...	...	...	4.35
Ash	...	...	...	...	...	...	...	...	.71

Cream 12 per cent. by volume.

Examined under the microscope, showed many Blyth's bodies larger than those mentioned in his paper; blood corpuscles and unmistakable blood bands in the green, when viewed in the spectroscope. All the foreign bodies rose to the surface with the cream, leaving the milk free.

No. 2 gave :—

Total solids	...	...	...	...	...	...	...	...	10.54
Solids not fat	...	...	...	...	...	...	...	...	9.64
Fat	...	...	...	...	...	...	...	...	.90
Ash	...	...	...	...	...	...	...	...	.60

Microscope showed colostrum, or a body closely resembling it; blood corpuscles and blood bands in spectroscope.

No. 3. The cream had a peculiar reddish colour, and showed all the above appearances in a marked degree. I subsequently received the following particulars from the gentleman who owned the cows :—

Both cows had foot and mouth disease, not severely, in July, and to all appearance quite recovered; both were in calf. No. 2, a young cow, calved in August; the family being from home, all her cream was made into butter, and sent to them; the skim milk being used by the servants. No ill-effects were produced. The butter milk was given to the pigs; as they had been suffering from foot and mouth disease, no particular notice was taken of its effect. Cow No. 1, an old one, calved on December 24th; her milk was not used till January 11th. Two days after, the children and nurses using the new milk, and those members of the family who used cream, were attacked with symptoms strongly resembling severe influenza, were very feverish and suffered from great soreness of the inside of the mouth, throat, and tongue, which were covered with small pustules. The servants, who took only the skim milk, were unaffected. One child, who for two days refused everything but water, got pretty well rid of her symptoms, but they returned as soon as she began to use the milk. The use of the milk was then given up, and all bad symptoms disappeared. The samples of milk were then sent to me, and the results of the examination were as above given. The reason both milks were sent, though no mischief had been traced to No. 2, was that the milk of the two cows had been mixed before using.

On 24th January I received two more samples of milk from the same cows, which gave the following results :—

No. 1.—

Total solids	...	...	...	...	...	...	...	...	17.77
Solids not fat	...	...	...	...	...	...	...	...	9.60
Fat	...	...	...	...	...	...	...	...	8.17
Ash	...	...	...	...	...	...	...	...	.68

The cream was very thick, of a slightly reddish colour. The microscope showed a

few of Blyth's bodies, not so many as on the 17th, and the blyth's bands were scarcely visible. The skim milk as before was quite free from abnormal substances.

No. 2.—

Total solids	...	...	...	...	...	...	...	...	...	12.86
Solids not fat	...	...	...	...	...	...	...	...	...	7.82
Fat...	...	...	...	...	...	...	...	...	...	5.04
Ash...	...	...	...	...	...	...	...	...	...	.82

Microscope showed colostrum-like bodies and casts of the mammary glands, and blood bands were visible in spectroscopie.

The remarkable change in the character of this milk leads to the idea that first runnings had been sent in one case and last in the other, but the appearance of colostrum, or a body so like it as to be undistinguishable from it, so long after calving is very remarkable. On February 1st I heard from the owner that they were again using the milk with no bad results. The case of cow No. 1, to which alone mischief was traced with anything like clearness, seems to be one of those in which disease after it has disappeared in a pregnant animal re-appears in some form after confinement, sometimes the young animal being affected, and sometimes, as in this case, the milk; but such a case raises the somewhat difficult question how far a milkman can be held responsible for selling milk containing all these abnormal constituents, and capable of creating so much mischief, if the cow from which it is obtained is apparently in perfect health? It would seem as if no milk from a cow which has been ill during pregnancy ought to be sold till it has been examined and found free from abnormal constituents. In both these cases *all* the abnormal constituents rose with the cream, which was not the case either with the sample recently sent from Hampstead or with Mr. Wigner's samples.

#### ON SOME RECENT CASES OF DISEASED MILK.

By G. W. WIGNER, F.C.S.

*Read before the Society of Public Analysts, on the 1st May, 1878.*

I HAVE recently had some samples of diseased milk brought to me officially by the inspectors of one of my districts, and they present such features of interest, not only chemically and microscopically, but in view of the fact that for the third time the magistrate has convicted where diseased milk has been sold, that for the general information of others I give the characteristics of the milk in question.

The immediate cause which led to their being brought to me was that an outbreak of fever had occurred almost simultaneously through a considerable portion of Lee, Kidbrook, and Blackheath, and consequently, as the outbreak was supposed to be due to the milk, I directed the inspectors to bring me samples from every milkman supplying those districts. The first of the diseased samples was received by me on the 19th March; its colour had a decided tinge of blood, which was visible even through the tinted glass of the common medicine bottle in which it was contained. The portion I poured into the cream tube had a blood or orange wine tint, and the cream which rose in the tube showed this peculiar colour still more markedly. As soon as the inspector brought the sample I called his attention to its peculiar tint, but he had received no information from the vendor which threw any light on the matter.

I commenced the microscopical examination almost immediately, and found that the

sample showed a very large number of pus corpuscles very different in their appearance from the true fat corpuscles of milk, and the addition of a minute drop of ether to the milk on the slide brought up the tristellate nucleus very distinctly in many of them. In some parts of the slide there was a distinct reddish colouration, which, however, was not uniformly spread over the whole field. Nearly every field contained a considerable number of pieces of epithelial matter and other animal debris, mostly tinged at the edges with a blood colour. The micro-spectroscope showed blood bands plainly when any of these blood tinged pieces of epithelial matter were in focus, but when the field was shut down by a diaphragm so as not to include any of the streaked pieces it was not possible to detect the blood bands. Blood discs could be seen in some few places, sometimes singly but mostly arranged in groups like clotted blood. In other parts of the slides, but irregularly distributed, were a considerable number of the peculiar bodies described by Mr. Wynter Blyth, in *The proceedings of the Society of Public Analysts*,\* as being found in milk yielded by cows suffering from foot and mouth disease; some of these bodies were scimitar shaped, and others more closely resembled the appearance which would be produced by the coalescence of five or six fat globules in an almost straight line, the division between the globules being almost entirely obliterated.

On the second day the physical characteristics of the milk as distinguished from the microscopical were still more indicative of peculiarity. The residue of the sample remaining in the bottle had not curdled in the ordinary way in which milk curdles when it turns sour, but had partially solidified much in the same way as ordinary colostrum milk solidifies when it is boiled—viz., to a consistency closely resembling that of ordinary blancmange in hot weather. This blancmange adhered with some little force to the sides of the bottle, and when the latter was shaken so as to detach the blancmange the glass was left quite clean, while the milk itself moved about in the bottle, still retaining its semi-fluid condition. The cream had, of course, to some extent risen to the top of the bottle, and was of an orange colour, while the colour of the lower part of the milk was very little changed. In the cream tube the top surface of the cream had by this time (*i.e.*, after 24 hours) assumed an unusual appearance, being mottled in colour and corrugated, resembling more closely the crust of a Stilton cheese than any other common object with which I can compare it. The microscope still showed many of Blyth's bodies although not so many as on the previous day; many colourless blood corpuscles were visible, and by using a  $\frac{1}{4}$ -inch objective and B eyepiece it was easy to count a considerable number of coloured ones. The pieces of skin, which were stained with blood, were as visible as before, and the colour did not appear to have altered in intensity. When a small portion of the cream alone was taken out on the point of a stirring rod it was found that the abnormal characteristics of the milk were exaggerated in the cream—*i.e.*, there was a larger proportion of the foreign bodies than was present in the whole milk sample, evidently showing that there was a tendency in the cream on rising to entangle with it the pus and blood corpuscles.

On the third day there was a still further change in the appearance of the cream tube, for the top of the cream was covered with a peculiar and (to me) unknown fungus, although the tube had been standing side by side with seven other samples of the same date, none of which presented that appearance. The lower part of the milk in the tube was breaking up in a manner which as far as I can judge at present is perfectly characteristic

\* See Vol. 1, page 239.

of diseased milk. Instead of curdling to an irregular mass, or instead of the separation of the whey taking place up to a certain level in the tube, the whey had separated in peculiar streaks, running in a vertical or almost vertical direction up and down the tube, these streaks being from  $\frac{1}{8}$  to  $\frac{1}{4}$  inch wide, and in some cases as much as 3 inches long. The whey viewed in these streaks against the background of curd in the tube had a tint resembling Irish whisky. On this day I examined 10 or 12 slides but I could not succeed in detecting more than 3 or 4 of Blyth's bodies. Here then we have a tolerably convincing proof that whatever these bodies may be they disappear either by becoming transparent or by breaking up as the milk decomposes. Some of the pus and blood corpuscles were still visible, but the number of the former was decidedly less, and some of them seemed to be bursting or else gradually becoming so transparent as to be invisible.

On the sixth day the sample was so much decomposed that if I had then examined it for the first time, although I should certainly have said that it presented some abnormal characteristics, I should have been unable to identify them in the way I have already described. In other words, for practical work the examination on this day would have been useless.

Having obtained such results as these I had no hesitation, notwithstanding that the chemical results were perfectly consistent with genuine milk, in certifying that the sample came wholly or in part from a diseased cow, and was therefore unfit for human food. I did not state that it was much more likely to be an admixture of the milk of a diseased cow with the milk of healthy cows, but still from the streaky condition of the milk and by the slides which I examined, I am inclined to that opinion.

The above results being so unsatisfactory I directed the Inspector on the 20th March—*i.e.*, one day after receiving the first sample—to procure another sample from the same vendor. I examined this sample in precisely the same way and with the same precautions, but the difference between the microscopical appearance of the two samples was very slight, the second one contained rather fewer pus and blood corpuscles, and I think there were also fewer of Blyth's bodies present, but in other respects the general characteristics of the samples were as nearly as possible the same. The milk in the cream tube had a little higher colour, perhaps more correctly described as a brighter colour. The chemical results of the second sample were slightly better, showing solids not fat 9.7 instead of 9.3.

Mr. Heisch examined both samples at my request within a very short time of their reception by me, in fact the second sample he examined as soon as I did, and his results fully confirmed my own.

Here, therefore, we have a clear case of diseased milk sold for ordinary consumption. The question now comes what was the character of the disease, and the evidence which was given on the hearing of the case threw some light on this, although unfortunately it did not fully identify the source from which the milk came; that is, although it was proved that it came from a dairy one cow in which was diseased, it was not proved whether the actual churn from which the sample was taken contained any of this diseased cow's milk. I, however, think the inference is clear that it did, and for these reasons—My first sample was purchased by the inspector on the morning of the 19th March; on the evening of the 20th, finding that the milk was abnormal, I wrote to the inspector for a second sample. On the same day—the 20th—one of the defendant's cows

presented signs of illness, and his attention was drawn to it. On the 21st the Inspector received my letter requesting a second sample, but he had not time to procure it that day. On that day (the 21st) the defendant came to the conclusion that the cow was suffering from lung disease, and sent for a veterinary surgeon. On the morning of the 22nd, according to the evidence, the cow had very nearly "gone off" milk. The Inspector bought another sample that day which was characterised by the defendant's wife as being streaky, and after the bottle was filled the defendant's wife said it "must have had blood in it"; consequently the Inspector emptied the bottle and took another sample from the same churn. Later on the same day (the 22nd) the veterinary surgeon came and saw the cow, which he said was suffering from pleuro-pneumonia, and it was consequently killed.

The evidence, therefore, that the milk which I pronounced diseased came from this cow is purely circumstantial, but the chain of circumstances is so complete that I think there is no fair reason to doubt that it was so.

In considering, however, the results I obtained, and my reasons for saying that I thought the sample injurious to health, two or three other points must be borne in mind. My reason for classing it as an injurious sample was that I believe the presence of pus or blood corpuscles, or of any abnormal ingredients of this kind in milk must, to some extent, be liable to produce gastric irritation, and therefore to prove injurious to health; but, on the other hand, it must be pointed out that the outbreak of fever which led to the examinations of these milks was not due to the milk from this particular diseased cow, as the fever had occurred some two or three weeks before the sale of this diseased milk, and I cannot find any evidence to prove, or to lead me to think, that the cow had been ill more than a few days. There were, however, clear proofs that there had been other cases of pleuro-pneumonia in cows in the same district, just about the time when the fever broke out. As there was no *post mortem* examination of the cow, it is not possible to say whether the pleuro-pneumonia was complicated by any disease of the udder or not, but the defendant did not produce any evidence of disease or injury to any other cow, or of injury to the diseased cow.

One of the most important lessons to be derived from this case is the absolute necessity of making a microscopical examination of every sample of milk, and of doing so immediately the sample is received. The case should also serve as a hint to those who still believe that the determinations of the solids not fat and fat are all that is requisite, and that the use of the microscope is unnecessary. In this case, although fever had been spreading through the district in which this milk was being distributed, and although the milk was conclusively proved to have been diseased, yet the samples were of such a character as to satisfactorily pass an ordinary chemical analysis.

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#### THE BROMSGROVE MILK CASE.

WITH reference to this case, a report of which appeared in our March number, page 227, we reprint from the *Worcestershire Chronicle* the following report of Dr. Swete, presented to the Worcestershire Quarter Sessions:—

I have the honour to report to you that, during the last quarter, I have received for analysis 27 samples of food. Ten of these were milk, of which 2 were adulterated with water seriously, 1 to a very slight degree, and 7 were genuine; 4 of butter, which were genuine—1 sample had the low melting point and general appearance of butterine, but a complete analysis proved it to be genuine, 12 of bread, 9 genuine and 3 contained alum in small quantities, but insufficient to suppose a wilful adulteration. I have also received 5 samples of water, 4 were polluted and 1 wholesome. Some seeds and the body of a pigeon and

the crop of a bird were brought to me by the police for analysis, from Upton-on-Severn. I found that the birds had been poisoned by strychnine, and that the seeds were wheat, boiled with the seeds of *strychnos nux vomica*, containing the deadly poison of strychnine and mucine in large quantity. The person who exposed these seeds was fined for the offence. I append to my report the tabulated statement required by the Local Government Board.

In my last report I stated that I had received 6 samples of milk from Bromsgrove, of which 5 were adulterated and 1 (marked W) of excellent quality. I regret to state that in the case of Y. B. (Thomas Fisher) I was in error, and in justice to him and to myself think it right to lay before you the details of the case, and the way in which so lamentable an error occurred. The samples were sent to me by letter, and I need not say that it could make no difference to me whether the analysis showed them to be good or bad. If there was any difference it would be in favour of my reporting them as good, as I was informed in that case one vendor wished me to make a second analysis and give him a report for publication; so that I should have received another fee. The milks were all analysed at the same time, with the same care, and using the same ether, which I specially distilled the same day for the purpose. Yet W turned out to be good and the rest more or less bad. The care and the ether were clearly not at fault. That part of the analysis which was conducted in platinum vessels of known weight, and the weight of which hardly alters during a year, agreed with the results of the analyst for the defence and the chemists of Somerset House. The error, therefore, was traced to the porcelain dishes of various weights in which the fat was determined. The old plan used to be to use platinum dishes for this purpose, and to measure, not weigh, the milk. Finding this plan gave a disadvantage to the vendors of milk, I adopted that of weighing the milk and using porcelain dishes, and on tracing out the mistake, I found that it clearly arose from my assistant, when weighing the empty dishes, making an error in noting the weights, which of course invalidated all the results. I do not for a moment wish to shelter myself by an error of an assistant, but I can confidently state that the chemical part of the analysis, which I personally performed, was conducted with extreme care, and with the purest chemicals. I was myself anxious that the sample should be sent to Somerset House, as I was fully convinced of the honesty of my analysis. Afterwards, on re-analysing the milk, I found it to be pure, and that the analysis of the defence was correct. A sample of milk was also sent me, labelled "Bromsgrove," just before these cases were heard at Petty Sessions. This I certified as pure, and I found afterwards it had been taken from the dairy of one of the magistrates, and was notably sent to me as a test of my process of analysis of milk. After the decision of Somerset House, I received a request that I would declare the milk of a Mr. Whitehair also pure, and that I had made a similar error in his case. I replied, I could not do this, as I did not know which sample belonged to him, not having before heard his name; that as his sample was not challenged by the defence, the remainder had been destroyed, so that I could not re-analyse it, but I advised my explanation should be shown to the Court. I then received a legal notice that if I did not at once pay the costs and expenses of Mr. Fisher, nearly £20, I should be proceeded against in the County Court. I replied that I would pay no compensation on compulsion, as I was ready to defend any suit, and that as Somerset House had condemned the analyses of many very eminent public analysts, it would not be right of me to create such a precedent. Finding, however, that Mr. Fisher was a poor man, that he was fully satisfied with my explanation, and did not impute any incompetence to me, and that his solicitors expressed their satisfaction at the way in which I met the case, I sent him as compensation five guineas, which, with the guinea allowed him by the Magistrates and the certificate of Somerset House in his favour, will, I trust, prevent him from being injured either in pocket or reputation by so lamentable an error, which I deeply regret. I have since conducted, and shall continue to conduct, food analyses in duplicate, so that any laboratory error may at once be detected.

Sir Richard Harington (deputy chairman) said that notwithstanding the explanation that had been offered by Dr. Swete, this seemed to him to be a matter of very serious importance indeed, because if a mistake of this sort was committed on one occasion, it must necessarily tend to give excuse for controverting the accuracy of the analyst on future occasions. He therefore thought it became the duty of the Court to look with some care into the explanation that had been offered. When the case was before the Magistrates—[Sir Richard was on the Bench]—Dr. Swete's analysis was—solids not fat, 11.22; fat, 1.76; ash, .7. The defendant in answer to that called Dr. Bostock Hill, the public analyst of a neighbouring county, whose analysis was—solids not fat, 9.22; fat, 3.47; ash, .69. Upon that the third sample, which was kept under the provisions of the statute for that purpose, was sent to Somerset House, and the result of the analysis there was—solids not fat, 9; fat, 3.35; ash, .74. This was really more favourable to the vendor than his own witness's analysis was. It was not in his (the speaker's) recollection that anything was mentioned as to any part of this matter having been entrusted to an assistant. Dr. Swete was cross-examined on the various steps which he took in the course of the analysis, and though no question was put to him which required a categorical answer, whether he employed an assistant or not, he did not remember any mention being made that an assistant had anything to do with the matter. Dr. Swete was then confident that his analysis was correct. It would be observed that there were two errors in Dr. Swete's analysis as compared with the other two—the solids not fat were about two per cent. more, as compared

with the other two analyses, and the fat about the same quantity less. How that was explainable by a mistake in weighing the porcelain dishes only he (the speaker) did not understand.

Mr. Curtler said it was extraordinary that the explanation was not forthcoming until after the analysis at Somerset House; this explanation ought to have taken place when the case was before the Magistrates at Bromsgrove. Dr. Swete's certificate was taken to be conclusive evidence in cases like that under discussion, but he (Mr. Curtler) wanted to know whether any Magistrate in the county would now convict on his certificate. If not, the Act of Parliament would be a dead letter. He did not think that the Court, acting as the trustees of the public, had any right to accept Dr. Swete's explanation. He thought there should be an inquiry to ascertain whether Dr. Swete was a skilled man or not.

Dr. Swete, who desired to give an explanation, said, in reference to the Bromsgrove case, that he took every possible precaution, as he thought, but unfortunately did make the error. He did not keep an assistant, but a friend was staying with him just before Christmas, when the sample of milk came in, and his friend, finding he (Dr. Swete) was very busy, offered to weigh the dishes for him and write the weights down. Whether he mistook a 3 for a 5, or how it was, he could not say. Dr. Swete explained how the analysis was conducted, and said he could not declare his error to the Court because he had not then discovered it. When he found out his error he wrote to the analyst engaged by the defendant, and told him how wrong he (Dr. Swete) was, and begged him to show the letter to Sir Richard Harington at the Court.

The Chairman asked why Dr. Swete did not make the explanation which he had made to-day before the magistrates at Bromsgrove when the case was decided.

Dr. Swete replied that he was not cited to attend, and he did not consider he had any right to appear there. In reply to Sir R. Harington, he added that he said nothing, when cross-examined, about employing an assistant, because he then hardly knew it himself. It was only when he came to look through the thing, and his books, that he found how the mistake occurred. Then he remembered that a relative was staying with him and assisted him.

After a consultation with the magistrates,

The Chairman (Earl Dudley) addressing Dr. Swete, said that a more grievous mistake than he had admitted could not have been made. He (the Chairman) thought it quite sufficient for Dr. Swete to have appeared in Court and made the remarks that he had done, and to have been called upon to listen to the observations that had been made. He did not think, at the present moment, that any further action should be taken; what the future might suggest to any magistrate he did not pretend to say—as he was now addressing Dr. Swete he did not think it requisite to do so; but, at the same time, he should not be performing his duty if he did not say that the position in which Dr. Swete had placed himself—inasmuch as the duty was always an invidious one, and one which must always call down upon him a great deal of hostility—was a very awkward one, by the fact that an error had been committed which he himself had been constrained to allow.

Dr. Swete said he would take care that no assistant was employed in future, and as he intended to execute all analyses in duplicate any error would be at once discovered.

The Chairman said that if an error had been committed—and a very grievous one, it might be—he did not think that any other course could be pursued than that it should be fully admitted, with an expression of regret and a promise that, as far as a man could possibly carry out a promise of that sort, it should not be repeated. Any such repetition would be looked upon as a very serious calamity.

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## REMARKS ON THE WORK DONE BY PUBLIC ANALYSTS DURING 1877 UNDER THE SALE OF FOOD AND DRUGS ACT.

BY G. W. WIGNER, F.C.S.

*Read before the Society of Public Analysts, on the 1st May, 1878.*

I AM very glad to be able to lay before the Society this evening these returns of the work done officially by our members and a few other gentlemen who are not members, but who have kindly forwarded to me their lists. Part of these returns were published in a tabulated form in the April number of THE ANALYST, and the remainder will appear in the forthcoming number, together with the remarks I shall make upon them this evening.

The first point, of course, which attracts attention is as to how the general percentage of adulteration stands as compared with previous years. During the time of the

**TABULATED STATEMENT SHOWING THE WORK DONE BY PUBLIC ANALYSTS, UNDER THE SALE OF FOOD AND DRUGS' ACT, DURING THE YEAR 1877.**

*Compiled specially for THE ANALYST.*

(CONTINUED FROM THE APRIL NUMBER.)

ANALYST FOR		Milk, Butter-milk and Cream.		Butter.		Groceries.		Drugs, &c.		Wine, Spirits, and Beer.		Bread and Flour.		Sundries.		TOTAL.		REMARKS.	
		No. Analysed.	No. Adulterated.	No. Analysed.	No. Adulterated.	No. Analysed.	No. Adulterated.	No. Analysed.	No. Adulterated.	No. Analysed.	No. Adulterated.	No. Analysed.	No. Adulterated.	No. Analysed.	No. Adulterated.	No. Analysed.	No. Adulterated.		
C. A. CAMERON	Carlow (County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	1	All waters.
"	Cavan	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	—	
"	Clare	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	81	9	
"	Down	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	74	12	Only 12 articles of food were examined, and all were adulterated; the rest were waters.
"	Drogheda (Town)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	84	7	
"	Dublin (City)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1769	89	
"	" (County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	300	69	
"	Fermanagh (County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	Both waters
"	Galway (City and County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18	4	
"	Kerry (County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16	1	
"	Kildare	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	33	1	
"	Kilkenny (City and County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21	2	
"	Leitrim (County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	
"	Limerick (City)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21	4	
"	" (County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	51	7	
"	Mayo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18	3	
"	Meath	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	48	7	
"	Queen's	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25	1	
"	Roscommon	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16	1	
"	Sligo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	3	
"	Tipperary	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	74	11	
"	Waterford (City)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—	All waters.
"	" (County)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	27	—	
"	Westmeath	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	—	All waters.
"	Wexford	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19	3	
"	Wicklow	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14	3	
C. ESTCOURT	Macclesfield	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	2	
"	Oldham	35	9	—	—	6	—	—	—	20	8	20	—	—	—	—	81	17	
A. BOSTOCK HILL	Stratford-upon-Avon	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	0	
F. P. PERKINS	Exeter	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	
Totals brought forward from Table in last number		43	9	—	—	6	—	—	—	20	8	25	2	—	—	—	2842	248	
		3171	829	681	85	2987	389	403	96	1331	626	1042	71	818	177	—	11943	2371	
		3214	838	681	85	2993	389	403	96	1351	634	1067	73	818	177	—	14785	2619	

N.B.—No other particulars are given as to Dr. Cameron's list, except that it includes 377 waters.



*Lancet* commission 65 per cent. of the samples were found to be adulterated, while when the 1872 Act was in force 26 per cent. were adulterated. During the years 1875-76, according to our returns, the adulterated samples had decreased to 18·10 per cent., while the present returns show that the percentage has decreased again to 17·71 per cent., or ·39 per cent. less than previously. This is a change for the better, although a small one, as showing adulteration to be still on the decrease, but this slight decrease may also be taken to indicate that the fines imposed are in most cases insufficient to repress adulteration; while, looking at it from another point of view, it may be considered satisfactory, inasmuch as a gradually-increased amount of work having been done, and a larger number of fresh districts having been brought under the influence of the Act, fresh hotbeds of adulteration, so to speak, have been opened up. The increase in the number of samples analysed is very striking. During the two years ending December, 1876, the total number of articles examined in 103 districts was 15,989 samples, while our returns this year, from 127 districts, show a total of 14,785 samples, or a little more than 1,000 less than in the two previous years. The labour entailed upon individual analysts in preparing these returns is so great that, gladly as I know they are welcomed by others, I can scarcely wonder that in a few cases they are deficient in some of the details it was thought desirable to set out in the table. Owing to this fact the percentages of adulteration of each individual article may differ very slightly from the real fact, but as, out of nearly 15,000 samples, we have full particulars of about 12,000, the error is a trifling one.

Calculating each article or class of article separately, and omitting Dr. Cameron's and Mr. Horsley's figures, because they give no details, I find that the number of samples purchased, and the percentages of them found adulterated, are as follows:—

	Purchased.				Adulterated.	
Milk ... ..	3,214	...	...	...	26·07	per cent.
Butter ... ..	681	...	...	...	12·48	"
Groceries ... ..	2,993	...	...	...	13·00	"
Drugs ... ..	403	...	...	...	23·82	"
Wines, Spirits, &c. ...	1,351	...	...	...	47·00	"
Bread and Flour...	1,067	...	...	...	6·84	"
Sundries ... ..	818	...	...	...	21·63	"

A glance at the above figures will show that milk has lost the worst position which it occupied last year, and that its place has been taken by wines and spirits, in which the amount of adulteration is nearly equal to half the samples purchased. In both these cases the adulterant may, in nearly every instance, be assumed to be the same, namely, added water, but, in one view of the matter, the offence is greater when water is added to a valuable liquid than when it is added to a liquid of comparatively small intrinsic value.

From another point of view, I find that the adulterated samples alone may be divided as follows:—

Milk ... ..	...	...	...	...	36·6	per cent.
Butter ... ..	...	...	...	...	3·7	"
Groceries ... ..	...	...	...	...	17·1	"
Drugs ... ..	...	...	...	...	4·2	"
Wine and Spirits	...	...	...	...	27·6	"
Bread and Flour	...	...	...	...	3·1	"
Sundries ... ..	...	...	...	...	7·7	"
					100·0	

In this case again the milkman and the grocer show an improvement upon the last returns. The percentage of adulterated milk has decreased from 51·22 to 36·6, and the percentage of groceries and butter from 29·1 to 26·8.

THE ANALYST.

Drugs appear worse than before, as may be expected, when it is seen that out of the 403 purchased 96 were adulterated; and yet, notwithstanding this state of things, I do not at present call to mind a single case in which the Pharmaceutical Society has, during the past year, instituted a prosecution for the sale of adulterated drugs.

Bread and flour have a slightly larger percentage than previously, but the principal increase is in the case of wines, spirits, and beer, where, instead of the 6·04 per cent. which appeared last year, we now have 27·6 per cent. There is, however, in my opinion, no doubt that a great deal of this increase is more apparent than real. Prior to the date of the last returns it is doubtful whether an analyst would have been justified in certifying diluted spirits to be adulterated, but the decisions which, from time to time, have been reported in THE ANALYST have shown, with approximate accuracy, what the standard of spirits was expected by magistrates to be, and therefore many samples, which would previously have been passed as satisfactory, have been condemned.

We may also look at these returns in another light, and notice what the percentage of adulterated samples is on the total number purchased. Omitting Dr. Cameron's and Mr. Horsley's figures as before, I find that 11,430 samples were purchased, and out of these the adulterated samples were as follows :—

Milk ... ..	7·33 per cent.
Butter... ..	·73 „
Groceries ... ..	3·70 „
Drugs ... ..	·83 „
Wines and Spirits ... ..	5·54 „
Bread and Flour ... ..	·64 „
Sundries ... ..	1·55 „

So far then for the general features of the returns, and now in a few words I will consider the special ones. The first thing which strikes the eye is the vastly different proportions between the number of samples analysed in different districts. Thus for instance we find Somersetshire with 814 samples, Surrey with 455, Stafford with 667, and Cornwall with 28, while Norfolk figures with a grand total of 7 samples. In this last case it really seems wonderful that notwithstanding Mr. Sutton's well-known standing his inspectors should not have taken more samples to him or that it should have been considered unnecessary to have more than that number examined. In Mile End Old Town, where according to the previous returns 1 in 72 samples was adulterated, the authorities appear to consider that enough has been done, and therefore during the past year no samples at all were purchased. Hampstead previously showed 1 in every 59 to be adulterated, it now shows 7 in 62, which approaches a little more to the average proportion. At Hackney we had before 9 in 214, we now find (omitting 10 waters, all of which were condemned,) 20 in 110—in the latter case it is clear there has been some improvement in the mode of purchasing samples, perhaps instead of inspectors in uniform procuring them unknown persons have been employed.

Scotland, again, appears in a very unfavourable position, the number of samples analysed being only about 350, while Ireland, on the other hand, shows a very large total, mainly as the result of Dr. Cameron's 2748 samples.

Looking at the returns as a whole I think they bear out the statements which have been so often made, that the Act needs to be made compulsory, and that the samples should be purchased by unknown persons, and not by well-known officials. Viewing the matter in a broad light it seems an almost incredible thing that in a country like England one-fifth of the samples purchased by officials are found to be adulterated within the meaning of the Act. Surely if one-fifth are found adulterated when purchased in this way the percentage of adulterated articles obtained by private purchasers must be very much larger.

It seems to me very important that this tabulated statement should be brought under the notice of the Local Government Board as early as possible, as naturally their returns cannot yet be made up so completely.

## INSTITUTE OF CHEMISTRY.

### INAUGURAL DINNER.

(By your own Telephone.)—From the *Chemist and Druggist*.

AMONGST the many varied and highly important capacities in which I have been employed, I can recall no instance where my services have been called into requisition for a more laudable purpose, or with a view to such interesting results, as on the occasion that I had the honour of placing myself at your disposal to report the proceedings of the Institute of Chemistry of Great Britain and Ireland, at its inaugural dinner. This eminent Association, true to its praiseworthy resolve to shroud its proceedings in mystery, and its members in seclusion, had determined, as most of your readers will be aware, to exclude from its festive board, with the utmost rigour and impartiality, every species of representatives of the Press. But, sir, when, in the historic tones of Mr. James G. Bennett, you commanded me to "go and find Franklin," I did not, as most of the members of the "Institute" would probably suppose, immediately dash away to the Admiralty and buy the *Pandora*, nor telegraph to the Montserret Company for six million pipes of lime juice, and then frantically appeal through the second column of the *Times* for information as to the whereabouts of Sir George Nares. No, sir; for as the pensive gloaming gathered round the last hours of that day in the calendar, marked by so many sad experiences and chastened reflections, snugly sheltered beneath the arm of my great protector, Mr. Graham Bell, I was reposing in the bar parlour of the "Burlington Arms," whilst my noble guardian was cajoling a wily waiter into permitting him to view the feast, at which the sons of alchemy were soon to congregate. Once within the banqueting chamber it was but the work of a few moments for my good genius to secure me a safe retreat immediately beneath the president's dinner napkin. From this ambush, unseen and unsuspected by the guests, I was soon busily at work. For once the veil of secrecy was rent; a "chiel" had crept in within the mystical doors of the "Institute," diamond had cut diamond, and your readers are enabled to participate in the events of that festive night from the moment when the chairman's first burst of rhetoric sent my diaphragm vibrating away at the rate of six hundred million pulses per second (Benson's time), until the last faint strains of that classic ode, "We won't go home till morning" were being gently wafted down the areas of Piccadilly.

The inaugural dinner of the members of the Institute of Chemistry of Great Britain and Ireland was held on the evening of April 1, at the Burlington Arms, Piccadilly, W., the President, Dr. E. Frankland, occupying the chair.

The band of the Canterbury company was in attendance, and by its high-class and patriotic music, contributed much to the enjoyment of the evening. The cloth having been removed, the Chairman rose and said:—

Gentlemen,—The first duty which I have the honour to perform to-night is to propose the toast of "The Queen." It was my hope that one member, at least, of the Royal Family would have been graciously pleased to join us at our inaugural dinner. Our Council addressed, as you may be aware, a letter to His Royal Highness the Prince of Wales acquainting him with the important nature of this meeting, and suggesting that His Royal Highness would be adding another to the many deeds of glory which have marked his career, by associating his name on this occasion with the peers of the realm of chemistry. (Loud applause.) His Royal Highness, however, very gracefully replied that, much as he appreciated the proffered honour, and constantly as the welfare of our Institute was "uppermost in his mind," he must abstain from taking part in gatherings of this kind during the season of Lent.

(The company here joined in singing the "Te Deum.")

The Chairman then said: I must next ask you to drink to "The Army, Navy, and Reserve Forces." Such a toast, at such a period as the present, needs, I am sure, no words from me. It is true that we have neither the Duke of Cambridge nor Admiral Hornby at our table; but, gentlemen, I venture to say, that when the history of our first campaign comes to be written, the fame of Professor Abel will outvie that of Wellington or Nelson. (Cheers)

Professor Abel, in a humorous speech, briefly responded. His name, he said, was a misnomer. From his proficiency in the art of knowing how to destroy his fellow-creatures on the most extensive scale, his godparents would have been better advised had they given him the name of "Cain." He also desired to point out that the gentleman on his right (Mr. Gore) was more at home on the field of glory than he was.

Mr. George Gore, F.R.S., at the request of the president, then sang with great effect the new national anthem, "Here stands a Post."

The Chairman: It is with unbounded pleasure that I now rise to ask you to fill your glasses in honour of the toast of the evening, which I need hardly explain is "Prosperity to the Institute of Chemistry." (Vociferous cheering.) Gentlemen, I consider that the present occasion offers a fitting opportunity for a few remarks from myself with relation to the formation of this Institute. (Hear, hear.) We are, all of us, I fear, but too well aware that, outside our own favoured circle, there exists an ill-disguised feeling of envy and discontent. A lying spirit is abroad, whispering uncharitable things of the philanthropic project upon which we are engaged, and attributing other than the most disinterested motives to our laborious efforts to float this Institute successfully. (Cries of shame.) Now, gentlemen, let me remind you how this association originated. In September last I received a communication from the Board of Trade, intimating its desire to form a company for the protection of the interests and the advancement of the position of the consulting and analytical chemists of Great Britain and Ireland, and requesting my advice and active assistance in carrying out the proposal. Well, gentlemen, for a long time I was sorely puzzled as to the course it would be best to take. I could see that, for any society of the kind to be successful, it must be, in the first place, exclusive, and in the second, that its members must be bound together by some common tie. At length, gentlemen, a happy idea seized me. (Cheers.) By means of two thousand post cards I communicated with every member of the Chemical Society for the purpose of ascertaining the number and names of those chemists who employed the organic carbon and nitrogen process for the examination of potable waters. I received a courteous reply to each of my applications, and had the satisfaction to find that no less than sixteen professional chemists were in the habit of using the process referred to. Need I say that these sixteen gentlemen, with myself, were immediately registered by the Board of Trade as a limited liability company "to promote the Advancement of the Profession of Chemistry and to maintain the Profession of the Consulting and Analytical Chemist on a sound and satisfactory basis." (Great cheering.)

The toast having been duly honoured,

Professor Redwood, in response to loud calls, sang, with telling effect, a song which he had composed for the occasion. The first verse ran;—

Come chemical lads, take leave of your "fads,"  
And away to the Institute hie,  
For every care will vanish there  
While Frankland's standing by,  
And Carteighe shall have his Way,  
And Smith will find his Brown;  
And puff it, puff it, puff it, puff it,  
Puff it up and down.

The Secretary (Mr. C. E. Groves), said that after the able and exhaustive speech of their President, he need not himself enter into any details respecting the reasons which led to the formation of the Institute. He desired, however, to offer a few remarks in reference to the malicious observations which were from time to time being made out-of-doors regarding the strict secrecy which the directors of their company maintained on all matters connected with its constitution, and its objects. He would in the first place remind them that every member of the Council had pledged himself by a most solemn oath not to divulge the motives which had induced him to join the Institute, and ever to preserve in public the most abject silence as to the policy and intentions of the executive. It needed but a slight acquaintance with history for them to perceive what an immense power was wielded in the political world by secret societies, and it was something akin to that authority for which they were craving. It would, of course, be necessary that members should have some means of identifying each other, and it had been suggested that, in masonic fashion, some sign, such as placing the fore-finger upon one side of the nose would be a convenient emblem of recognition. But after much deliberation they had decided that in future every member should, on admission, be branded with the initials M.I.C.E.\* (Member of the Institute of Chemistry, England). He might add that Mr. Fletcher, of Warrington, was manufacturing for them a very powerful hot blast blow-pipe for the purpose. (Loud applause.)

Mr. Michael Carteighe, as one of the promoters of their Institute, in a speech which showed great mastery of detail, pointed out some additional qualifications which candidates for fellowship would in future be required to possess. They would have to produce a certificate of vaccination, countersigned by not less than three magistrates, and, amongst other things, give satisfactory evidence that they habitually consumed not less than three bottles of fluid magnesia per week.

Mr. C. T. Kingzett insisted that it should be a *sine quâ non* that candidates should also be prepared to prove that they were immediately before admission, thoroughly disinfected with "Sanitas."

Dr. C. R. Alder Wright was sure that no candidate was fit for election who had not published an original memoir upon the Aconite Alkaloids and their Derivates.

Professor Atfield, in a most pathetic speech, then proposed the last toast, "Absent Friends." There were many faces, the Professor remarked, whom they would have welcomed at their table, but who had not yet been brought to see the inestimable blessings which the Institute was prepared to convey. His heart ached to recognise as a friend the "Credulous chemist," and as for Dr. Muter, he could assure them he yearned to clasp him in a fond embrace. He would conclude by calling upon their President to respond to the toast.

The Chairman appropriately replied, and to the great delight of the company, sang to the accompaniment of the band, a touching melody, commencing—

"O Wanklyn, we have missed you."

After joining in the Evening Hymn, the company separated.

## LAW REPORTS.

**DISEASED MILK.**—A case under the Sale of Food and Drugs Act, of a somewhat different nature to those of late heard in the Greenwich district, came before Mr. Slade, on Tuesday. George Pring, cowkeeper, of Lee, appeared to answer two summonses against him, the first for selling milk with which there was a mixture of pus and blood, and the second for selling as milk an article not of the substance demanded.

Mr. Biron, barrister, appeared to prosecute on behalf of the Plumstead District Board of Works; Mr. C. J. Carttar was for the defendant. The first summons was taken under section 3rd of the Act, and the second under the 6th, but in regard to the former, the summons was subsequently amended. If the case had been proved under that section defendant would have been liable to a penalty not exceeding £50. The purchase of two lots of milk, the first on the 19th of March and the second on the 21st, was deposed to by Mr. R. J. Baker, an inspector under the Plumstead Board, and Mr. Wigner, Public Analyst, certified that it consisted wholly or in part of milk which had been obtained from a diseased cow, and that the milk had in consequence of the cow's disease become mixed and coloured with pus and blood corpuscles, so as to be utterly unfit for human food. Mr. Wigner stated in his evidence that he had examined the sample chemically, but had not found it either watered or skimmed, but as the sample when delivered to him had an unnatural red colour he thought it best to examine it at once microscopically, and on doing so he found a number of pus corpuscles and colourless blood corpuscles, a few coloured blood corpuscles, a large number of pieces of skin of epithelial matter, probably derived from the mammary glands, and a number of peculiar bodies, unnamed, but which are never found in ordinary milk. He also detected blood bands by the spectroscope. The cream of the milk was of an orange yellow colour, and speedily became covered with a growth of mould or fungus. Mr. Heisch gave corroborative evidence and Dr. Burton, medical officer of health for Lee and Kidbrooke, confirmed their testimony.

Mr. Carttar called evidence to prove that immediately the defendant ascertained that one of the cows was attacked with disease he sent for Mr. Indersoll, the veterinary officer, at Lewisham, who had the animal slaughtered, and that all the other cows were then and now healthy. Mr. Indersoll said they were a very good shed of cows, and some of them superior. As a rule when a cow was suffering from *pleuro pneumonia*, the disease the one in question was labouring under, it did not give milk. The evidence as to the second summons showed that there was not quite so much impurity in the milk as in the first case. Mr. Balguy said the colouring of the milk as shown must have taken place in the body of the cow. Mr. Carttar said that was no fault of the defendant's and it was not even suggested that water had been added to it afterwards. Mr. Biron said he was not prepared to prove that the defendant had caused the mixture to be made.

Mr. Balguy said in his opinion the defendant was guilty of not having exercised sufficient caution in examining the milk, and there was a case under the 6th section of the Act. He was not satisfied that either the defendant or his wife wilfully sold such milk. He must impose a punishment which would act as a warning to other cowkeepers. Defendant must pay a fine of 20s. on the first summons and £10 on the second, with costs of the summonses.

**JAMES GOBEY**, milk dealer, also of Lee, appeared to two summonses charging him with selling milk not of the substance demanded. Mr. Baker proved the purchase. The analyst was of opinion that the milk was from a cow that had recently calved or had an external wound on her udder. There was no water added. Mr. Daniel Phillips, farmer and cowkeeper, said he never had a cow milked until the fourth meal after calving. Mr. Fowler, cowkeeper, of Deptford, said sometimes one cow would tread on the udder of another, which would injure the milk. He believed that in the case of Mr. Pring the evil was owing to a diseased udder.

Mr. Balguy inflicted a fine of 20s. and 2s. costs in each case.

**SINGULAR CHARGE OF STEALING MILK.**—William Rockett, 35, was charged with stealing three gallons of milk, the property of his master, Lawrence Watson, on the 26th of February.—Mr. Smith prosecuted, and in opening the case said the prisoner was indicted for stealing three gallons of milk, but that was merely a nominal quantity, and the jury might possibly come to the conclusion that the quantity was less, but if they thought he had stolen any at all they could, of course, find him guilty. The circumstances of the case were rather peculiar and very important, both from a public point of view and also so far as the prosecutor was concerned. He resided at Middlesborough, but had agencies in Hull and several other large towns for the sale of the produce of his dairies. He also obtained good milk wherever he could, and, therefore, the case was important because it was necessary that the prosecutor should maintain his reputation for selling good milk. It appeared that he received several complaints as to the quality of milk sold in Hull, and he sent down an individual to find out who was practising the deception. The result of the investigation was that the police were communicated with, and on the 26th February the prisoner was watched after receiving the milk at the railway-station. He went home, and there he was seen to empty liquid of some kind into his can, and subsequently he added more. Samples were obtained after each adulteration, and on analysis were each found to contain a large proportion of water. The prisoner received pure milk, and returned a quantity adulterated with water, and it was the difference between what was received and returned that he was charged with stealing.—Mr. James Baynes, Jun., borough analyst, deposed to analysing the three samples of milk produced. The first sample taken at the railway-station only just came within the lowest limits of pure milk, and there was probably three or four per cent. of added water; No. 2 contained an additional  $8\frac{1}{2}$  parts; and No. 3  $28\frac{1}{2}$  parts of water.—There was really no defence, the prisoner acknowledging that he had adulterated the milk with water. The jury found the prisoner guilty. The prosecutor strongly recommending him to the merciful consideration of the Court.—Four months' hard labour.—*Eastern Morning News.*

## NOTES OF THE MONTH.

It is a trite saying that in the best regulated families accidents will occur, but we wish for the credit of analysts generally that such mistakes in weighing as that to which Dr. Swete, of Worcester, has fallen a victim, were impossible. One great error seems to have been permitting a visitor to assist in his laboratory with official samples. We have always held that in such a laboratory no person should ever be permitted to be present in the room devoted to official work, except the analyst himself and his properly-paid and qualified assistants.

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In another part we print the report of Dr. Swete, extracted from the *Worcestershire Chronicle*, so that analysts may have the opportunity of fully considering his defence. There is one point which we confess we do not exactly understand, and we suggest that in his own interest Dr. Swete should give some further explanations. He is reported to say:—"The old plan was to use platinum dishes, and to measure, not weigh, the milk. Finding that this plan gave a disadvantage to the vendors of milk, I adopted that of weighing the milk, and using porcelain dishes." How it is possible that such a disadvantage could occur we freely confess that we are not chemists enough to see, as it appears to be all the other way so far as the measuring is concerned. If a man takes, say 10 c.c. of milk as being 10 grammes, he really uses  $10 \times 1.030 = 10.3$  grammes of milk, and therefore his resulting solids must be in proportion too high, and consequently in direct favour of the vendor; so in giving up measuring for weighing he apparently does exactly the contrary of what he intends. Again, the use of porcelain instead of platinum may be a measure of economy, but it certainly is not one of increased accuracy. Surely on this point the report has been incorrectly reported, or else specific gravity is not very clearly understood in some parts of the realm.

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What a dreadfully benighted county Dorset must be, seeing that, according to a statement at the Quarter Session, it contains no analytical chemist, qualified, according to the Sale of Food and Drugs Act, to accept the office of analyst for the county! What a glorious chance for some of the "Peers of the chemical realm" who have been engaged in hatching the Institute, or some of the young lambs who have been secretly chosen into that happy fold. But tell it not in Gath, an awful idea is abroad that unfortunately the Local Government Board does not yet accept membership of the Institute as a qualification!

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Whether telephones sometimes get a "little too much" when attending a dinner or not is as yet an undecided point, but the private one belonging to the *Chemist and Druggist* is a most amusing piece of apparatus. We reprint one of its reports for the entertainment of our readers, as being, perhaps, the nicest little piece of fun that the chemical world has had the chance of enjoying for some time. The poor Institute has had to stand a good deal, but to laugh at it in such a manner is really too bad, seeing that everybody has a right to make himself as ridiculous as he likes in this free country, even to the extent of dubbing himself and his friends chemists by limited liability.

Talking about the Institute, we were struck by a very deep allusion to *paraffins* in a letter by Dr. Attfield to a contemporary. There was evidently some awful meaning underlying it, and people have been going about and wondering mightily. Would it be too much to ask the learned Professor to explain the meaning, and so relieve the minds of those who, like ourselves, sit humbly at his feet ready to pick up and devour the crumbs from his intellectual table. We are, however, quite ready to agree with him that there are certainly chemists and chemists; and, furthermore, we say that the true sign of a really eminent chemist is an absence of jealousy, and a desire to keep in the background until forced forward, in spite of himself, by the greatness of his scientific work.

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The great event of last month has been the election of Council at the Chemical Society. The scene at the meeting, when the alternative list was denounced was one of the most exciting that has been witnessed in the Society. We must say candidly that the issue of the alternative list was a great mistake. If any member or members desired to object to the nomination of the Council, they should have headed and printed their list so as to distinctly show that it was in opposition, and accompanied it with a circular stating their views. Even had no fault been committed in this respect the opposition was ill-judged, because the Chemical Society includes specially votaries of every branch of the science, and there can be no question of Mr. Carteighe's eminence in the particular line of pharmaceutical chemistry which he has chosen. We are the more entitled to unhesitatingly state this view, as we objected to his being on the Council of the Institute on the ground that if such an association was required it should be purely composed of analytical as distinguished from pharmaceutical chemists. Our opposition was theoretical and not personal, and we are pleased to see the right man when in the right place.

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The latest piece of dirt is thus thrown by an obscure trade organ *apropos* of gin adulteration. "Recent decisions show that we ought to have the thing more clearly defined. At present the game seems being kept alive by an arrangement between the informer and the analyst, the latter of whom appears to get his fees whether the defendant is guilty or not." Suppose, for an instant, that the analyst only got fees when he had given a certificate under which a man was found guilty, what would the trade journals then say about a direct premium for prosecution? Having a bad case and abusing the opposing attorney is a very old affair, but if the abuse is to have any weight it must be something less senseless and absurd than the above. Surely the organ in question cannot have a very exalted opinion of the intellectual and reasoning powers of those whose interests (?) it professes to guard.

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Dr. W. Morgan, Public Analyst for Swansea, has been appointed Public Analyst for Brecon.

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#### THE ADULTERATION OF VIOLET POWDER WITH ARSENIC.

CORRESPONDENTS in the *Lancet* having called attention to this somewhat extraordinary mode of adulteration, we have thought it our duty to institute a full inquiry into the matter; samples of violet powder have been obtained from various parts of the country, and we shall publish the results of our analyses in our next number.

## ORGANIC MATERIA MEDICA.\*

As the above book is the work of one of the Editors of this Journal, it would be obviously unbecoming in us to insert any review of it. We therefore content ourselves with saying that it has been entirely rewritten, and is carefully and completely indexed. As to all other points we must leave our readers to form their opinions, either from reviews in other journals or from the book itself.

## RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1876. No.	Name of Patentee.	Title of Patent.	Price.
4553	H. Augustin (Schering's Patent)	Manufacture of Salicylic Acid	8d.
1877.			
3159	J. H. Johnson	Converting Hydrocarbons into Gas	6d.
3229	D. Machnic and W. Gentles	Manufacture of Sulphuric Acid	2d.
3323	C. Humfrey	Treating Phosphates for the Elimination of Alumina therefrom	4d.
3331	H. Garth and J. Ostler	Extracting Alcohol and Acetic Acid from Locust Beans	4d.
3387	E. P. Alexander	Manufacture of Sulphate of Alumina	2d.
3395	B. B. Standen	Treating Sewage, &c.	6d.
3429	M. J. Roberts	Lubricating Machinery	6d.
3439	J. H. and T. Butterfield	Steam Engine Lubricators	6d.
3145	F. J. Evans and W. T. Sugg	Manufacture of Coal Gas	6d.
3160	J. A. Ditch	Composition for Coating Substances to be used in lieu of Slate	2d.
3547	J. H. Johnson	Manufacture of Chloride of Lime	2d.
3571	J. Gray	Treating and Utilizing Sewage, &c.	4d.
3980	J. Von Quaglio	Purifying Coal Gas	4d.
1878.			
162	W. R. Lake	Producing and Applying Magneto Electricity	6d.

WANTED, AN ANALYST.—It was stated at the Dorset Quarter Sessions lately that it had been ascertained there was no analytical chemist in the county, qualified according to the Sale of Food Act, and who was willing to accept the office of analyst for the county. The committee appointed on the subject reported that any further search for an analyst be postponed until the October Quarter Sessions, because the appointment is to vest in the new County Government Board, as proposed by the Bill now before Parliament, and by that time the Court will be better informed on the matter. The report was adopted. — *Grocer*.

At the moment of going to press we deeply regret to learn that, on the 29th inst., Mr. William Baker, of Sheffield, fell over the banisters of his club and sustained very serious injuries. His forehead was fractured and the brain protruded; the bones of his nose were broken, and he was otherwise badly injured. He is in a very critical condition, but we are glad to hear there is a ray of hope of his recovery.

## BOOKS, &amp;c., RECEIVED.

The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Medical Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Country Brewers' Gazette; Sanitary Reform, by Kenneth Macleod; A Manual of Microscopic Mounting, by J. H. Martin.

\* Second Edition.—SIMPKIN & MARSHALL, Stationers' Hall Court, London.



# THE ANALYST.

## SOCIETY OF PUBLIC ANALYSTS.

A GENERAL MEETING of this Society was held on the 1st May, 1878, the president Dr. Dupré, F.R.S., in the chair.

The minutes of the previous meeting were read and confirmed.

Dr. Muter and Mr. Hehner were appointed scrutineers to examine the voting papers, and reported that Mr. Robt. E. Owen, of Beaumaris, had been elected a member.

Mr. J. W. Montgomery, of Whitehaven, public analyst for Cumberland, was proposed for election as a member, and Mr. E. G. Clayton, assistant to Dr. Bernays, as an associate; they will be balloted for at the next meeting.

The Secretary read a paper by Dr. Campbell Brown, "On the Composition of Honey."

Mr. Wigner read a paper "On some recent cases of Diseased Milk," and

Mr. Heisch also read a paper "On Diseased Milk."

Dr. Muter read a short note "On Milk Preservation."

Dr. Dupré read a paper "On two analyses of Water drawn from the same well."

Mr. Wigner read a paper "On the work done by Public Analysts during 1877, under the Sale of Food and Drugs Act."

The next Meeting of the Society will take place at Burlington House, on Wednesday, the 19th June, at eight o'clock.

This meeting has been postponed from the 5th June on account of special business likely to come forward.

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## ON TWO ANALYSES OF WATER DRAWN FROM THE SAME WELL.

By A. DUPRE', Ph.D. F.R.S.

*Read before the Society of Public Analysts on 1st May, 1878.*

A SHORT time since I received from Mr. R. Field, the well-known sanitary engineer, two samples of water for examination. Both samples were drawn from wells situated close to the dwelling house which they supplied, at front and back respectively. Finding one of these waters to be very decidedly the best, I recommended that this only should be used for all culinary and other purposes. In reply to my report I was informed that the water I had recommended could not be used owing to the bad smell it evolved on boiling. or in the boiler, and that probably some mistake had been made in marking the samples. Accordingly I had a second sample of water from the well I had recommended forwarded to me, of which I need here only say that it proved conclusively that no mistake had been made the first time. When, however, I took about two pints of this water and raised it nearly to boiling it evolved, more particularly on shaking, a very offensive smell. Testing the smell of the water in my usual way, *i.e.*, by heating about five ounces of it to a temperature of 100° F., shaking up briskly in a wide mouthed bottle, and at once applying the nose, I still failed to detect any smell. No trace of sulphuretted hydrogen was present.

Here then was a water clearly unfit for domestic use, which analysis had nevertheless, as the figures given below will show, pronounced pure. This result puzzled Mr. Field not a little, the more so as he considered the whole surroundings of the well as exceedingly unfavourable. The case was also extremely unsatisfactory to myself, as

in the face of my analysis, confirmed by the second sample, I could not do otherwise than pronounce the water to be pure, barring the offensive smell evolved on boiling.

A few days later Mr. Field, who had meanwhile again visited and carefully inspected the place, an inspection which confirmed all his previous misgivings, informed me that the house to which the well in question belonged had not been inhabited for some months past, and that during such time little or no water had been drawn from the well. I therefore requested to be furnished with a third sample from the same well, which was, however, to be taken only after the well had been as far as possible pumped dry and then been allowed to refill itself. The analysis of this water, also given below, shows a considerable degree of pollution, and indeed proves the water to be unfit for domestic use. The offensive smell evolved on boiling was however, if anything, rather less marked in this than in the previous sample. How then is this striking difference in the character of the water drawn from the same well to be accounted for? It is, of course, well known that even very foul water left to itself, in tanks or barrels, becomes purified and fit for drinking in process of time, and I suppose that something similar had taken place in this case. The water, left undisturbed in the well for months, had undergone a gradual process of purification, aided perhaps by vegetation or by dilution with rain-water. Similar cases have, I believe, been observed by others, but I venture nevertheless to bring it before you as it emphasises far more strongly than any case I am acquainted with the absolute necessity of having a considerable quantity of water drawn from a well before the sample is taken for analysis. Had the water in the present case not possessed this, so to speak, accidental and minor character of smell, the well would have been considered good in spite of its surroundings and the misgivings of the engineer, and serious mischief might have resulted.

In conclusion, I may state that the well in question has a depth of seventeen feet with about eight feet of water. The upper part, down to within about half a foot of the water level, passes through vegetable mould, sand and gravel, the remainder is in the chalk. The well was closed in by a brick vault. The chalk in the neighbourhood of the well is penetrated by innumerable rootlets, and when broken up gives out a very offensive smell. Round these rootlets, many of which are decaying, the chalk is coloured black by sulphide of iron. A cesspool, now about to be filled in, is situated at a distance of about seven yards from the well, and a brick drain runs at about the same distance past the well, which latter I need scarcely add will also be filled up.

	First Sample.	Last Sample.
Appearance	clear	...
Colour	pale greenish	...
Taste	tasteless	...
Smell	inodorous*	...
Deposit	none	...
Nitrous Acid	none	...
Phosphoric Acid	very strong trace	...
Hardness before boiling,	27·0 degrees (Clark)	...
"    after	9·5	...
Oxygen absorbed from permanganate	0·014	0·035
	Grains per gallon.	
Total dry residue	37·80	...
Consisting of	{ volatile matter      1·40 }	...
	{ fixed salts        36·40 }	...
Chlorine	2·24	3·29
Nitric Acid (N <sub>2</sub> O <sub>5</sub> )	0·11	2·66
Ammonia	0·000	0·013
Albuminoid Ammonia	0·004	0·010

\* This refers to the usual mode of testing it.

ON THE COMPOSITION OF HONEY.

By J. CAMPBELL BROWN, D.Sc.

*Read before the Society of Public Analysts on 1st May, 1878.*

THERE are so few analyses of honey on record that it seems desirable to bring before this Society a selection of analyses of authentic examples of genuine honey with which commercial samples may be compared.

The only detailed analyses of honey with which I am acquainted are those published in Hassall's "Food and its Adulterations," 1876, p. 266. But as they do not give the proportions of the different kinds of glucose, but only the total glucose, and are accompanied by the extraordinary statement (p. 274) that starch sugar is the adulteration, which it is scarcely possible in many cases to detect, they will not be of much practical value to the members of this Society.

The analytical determinations which are useful in the analysis of honey are the following:—

1. Estimation of the water of solution expelled at a temperature slightly over 100° C.
2. Water of combination and other volatile matter expelled only at a higher temperature; this may be sometimes safely estimated by difference.
3. Insoluble matter; pollen, wax, &c.
4. Microscopical examination of the honey, and especially of the pollen.
5. Estimation of the ash, if necessary.
6. Qualitative examination of the ash when the quantity is great.
7. Estimation by the polariscope saccharimeter of the action of a solution of known strength on the polarised ray.
8. The same after inversion.
9. Estimation of the total glucose by standard solution of copper salt.
10. A similar estimation after inversion is often useful as a check.

The result of 7, 8, and 9 give, by an obvious calculation, the proportions of dextro- and laevo-glucose.

The proportion of cane sugar is calculated from 9 and 10, or may be deduced by means of Clerget's tables from 7 and 8.

I have never been able to satisfy myself of the occurrence of cane sugar in honey; and I am by no means sure that the figures representing cane sugar in the following analyses, and in those of Dr. Hassall, do not really represent experimental error; my figures for cane sugar are calculated from observed results in which a very small observational error would give a difference of 1 or 2 per cent.

RESULTS OF ANALYSES OF AUTHENTIC SPECIMENS OF GENUINE HONEY.

	English.	Welsh.	Nor-mandy.	German.	Greek.	Lisbon.	Jamalca.	Calif-ornia.	Mexican.
Water expelled at 100° .....	19·1	16·4	15·5	19·11	19·8	18·8	19·46	17·9	18·47
Water expelled at a much higher temperature and loss }	7·6	6·56	4·95	11·	7·8	6·66	7·58	8·13	10·03
Laevulose .....	36·6	37·2	36·88	33·14	40·	37·26	33·19	37·85	35·96
Dextrose ... ..	36·55	39·7	42·5	36·58	32·2	34·94	35·21	36·01	35·47
Cane sugar (?) .....	} doubt-ful.	none.	none.	none.	none.	1·2	2·2	none.	doubt-ful.
Wax, pollen, and insoluble matter .....	} good trace.	trace.	slight trace.	trace.	·05	1· nearly.	2·1	good trace.	trace.
Mineral matter.....	·15	·14	·17	·17	·15	·14	·26	·11	·07

The specific gravity of honey is about 1.41, but varies slightly with the proportion of water.

The proportions of water are higher than might have been expected, but I have confirmed some of the above results by a combustion with oxide of copper.

The rotation of a polarised ray, produced by a solution of 16.26 grammes crude honey in 100 c.c. water, is generally from  $-3^{\circ}.2$  to  $-5^{\circ}$  at  $60^{\circ}$  Fahr. The only one of the above samples which gave a higher rotation was the Greek honey, which gave nearly  $-5\frac{1}{3}^{\circ}$ . The rotation produced by a solution of the same weight of dried honey is generally not far from  $-4^{\circ}.8$ ; but some latitude must be allowed until a larger number of observations have been made.

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### EXPERIMENTS ON THE DETERMINATION OF THE FREE ACIDS OF VINEGAR.

BY ALFRED H. ALLEN AND R. BODMER.

*Read before the Society of Public Analysts, on the 20th March, 1878.*

WITH the view of ascertaining the extent to which the known methods of determining the acids of vinegar could be trusted, we have instituted a series of experiments on representative mixtures of known amounts of the constituents of vinegar.

As a starting point, we prepared a pure acetic acid by distilling the commercial acid after addition of a little soda.

The distillate had a density of 1.0396 at  $15^{\circ}$  C. According to Oudemann, this number corresponds to 28.67 per cent. of real acetic acid ( $C_2H_4O_2$ ), or, according to Mohr, to 29.5 per cent. The figures of the latter chemist's table of densities are only carried to three places of decimals.

Weighed (not measured) quantities of the above sample of acid were next titrated with decinormal caustic soda, using litmus as an indicator. The results shewed 28.54, 28.44, 28.49, and 28.59 per cent. of real acid, the average being 28.515. Another titration, in which a few drops of cupric sulphate were employed instead of litmus (a permanent turbidity being taken as the end of the reaction), gave 28.52 per cent. of acetic acid.\* It will be seen, therefore, that the two methods of titration gave extremely close results, and that the amount of acid calculated from the density (by Oudemann's table) was slightly higher than that found by titration. This result is in accordance with the general opinion that titration of acetic acid gives results slightly below the truth.

A dilute acid was next made by mixing a quantity of the above sample with nine times its *weight* of water. A portion of it was then titrated, (using litmus), when it gave 2.853 per cent. of acid,—almost exactly one-tenth of the original amount. On the other hand the density was 1.0040, which corresponds to 3.20 per cent. of acid according to Oudemann, or 3.0 according to Mohr. Hence, the two parts of Oudemann's density tables are inconsistent. The fact that the part of the table referring to 28 per cent. acid gives results agreeing fairly with the titration method, while that referring to 3 per cent. gives discordant results, shews pretty clearly the direction of the error. It is, of course, impossible to ascertain the cause of the discrepancy with certainty, but it is worth

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\* Another sample of acid gave 27.27 as the mean of three titrations in which the end of the reaction was indicated by litmus, and 27.25 as the mean of three in which  $CuSO_4$  was employed. Hence, if there be an error of deficiency introduced by the use of litmus, the same objection applies to sulphate of copper, and probably other indicators.

notice that if one *measure* of acid at 29 per cent. were diluted with nine *measures* of water, the dilute acid would really contain 3.004 per cent., instead of 2.9 per cent. as might often be assumed.

These considerations have no relation to, and are in no way affected by, the well-known abnormal density of strong acetic acid.

On the whole, we considered that the real amount of acetic acid in the sample was represented most accurately by the result of the titrations, and therefore in the following experiments the acid used is regarded as containing 28.52 per cent. of real acetic acid ( $C_2H_4O_2$ ). In all cases in which acetic acid was to be determined, a weighed (not a measured) quantity of the sample was employed.

A. The first process tried was the determination of free acetic acid in presence of free sulphuric acid, by adding excess of carbonate of barium, boiling well, filtering, and precipitating the barium from the filtrate by dilute sulphuric acid. The amount of  $BaSO_4$  found represents an equivalent amount of acetate of barium formed, and the weight multiplied by .515 gives the acetic acid.

	H $\bar{A}$ Taken.						H $\bar{A}$ Found.
Expt. 1.	.447	grms.	...	...	...	...	.456
Expt. 2.	.397	"	...	...	...	...	.406

These experiments shewed, as was to be expected, that free acetic could be readily determined in presence of sulphuric acid. Unfortunately the method is useless in presence of sulphates and many other salts.

B. In this case, the above method was modified so as to render it applicable to the analysis of acetates, and to free acetic acid in presence of sulphates. A known weight of the sample of acid was neutralized with standard soda, and standard sulphuric acid added in *twice* the quantity necessary for the conversion of the soda into  $NaHSO_4$ .

The liquid was then distilled nearly to dryness, water added, and the distillation repeated. The distillate was treated with  $BaCO_3$ , as in process A.

	H $\bar{A}$ Taken.						H $\bar{A}$ Found.
Expt. 3.	.548	grms.	...	...	...	...	.561
Expt. 4.	1.126	"	...	...	...	...	1.118

If sulphate of silver were added before distillation, the method would be equally accurate in presence of hydrochloric acid and chlorides. Phosphoric acid has sometimes been employed instead of sulphuric acid, and would, doubtless, be preferable in presence of sugar, &c.

C. The next process investigated was that for the determination of free sulphuric acid in vinegar, by precipitating the sulphates with alcohol.

An artificial vinegar was made by adding to dilute acetic acid some caramel, calcium sulphate, potassium sulphate, and a known quantity of standard sulphuric acid, in such quantity that the liquid contained about 6 per cent. of  $H\bar{A}$ , and 1 per cent. of  $H_2SO_4$ . 50 c.c. of the "vinegar" were evaporated to 10 c.c., and treated with 50 c.c. of rectified spirit. After standing, the precipitate was filtered off, washed with alcohol, and the filtrate diluted, the alcohol boiled off, and the free  $H_2SO_4$  precipitated with barium chloride. By this process we obtained these results:—

	$H_2SO_4$ Added.						$H_2SO_4$ Found.
Expt. 5.	.536	grms.	...	...	...	...	.535
Expt. 6.	.536	"	...	...	...	...	.538

Hence, it appears that, provided sufficient alcohol be added, a very exact separation of free from combined sulphuric acid, can be effected. No  $\text{KHSO}_4$  is formed.

A sample of commercial vinegar treated by the above method, showed no free sulphuric acid, whilst it contained sulphates corresponding to no less than .159 per cent. (= 111 grs. per gallon) of  $\text{H}_2\text{SO}_4$ . The same vinegar contained 63 grs. per gallon of chlorine. These results, given by vinegar of unknown origin, present a curious resemblance to those obtained by Letheby from the article manufactured by Messrs. Hill and Evans, of Worcester. These were:—

	$\text{H}_2\text{SO}_4$ (as sulphates.)	Cl.
In the Vinegar. ...	111 grs. per gallon....	50 grs. per gallon.
In the Water. ...	119 " " " ...	48 " " "

Two experiments were next tried by adding to 50 c.c. of the above sample of commercial vinegar a known amount of standard sulphuric acid, and proceeding as before.

Expt. 7. For 0.268 gm.,  $\text{H}_2\text{SO}_4$  added, .188 was obtained.

Expt. 8. " 0.268 " " .190 "

Hence, a considerable and nearly equal loss occurred in both cases, the mean being .079 grms. Of this, .062 is accounted for by the reaction of the sulphuric acid added, upon the chlorides present in the vinegar. The remaining .017 grms. probably reacted on acetates or phosphates. The conclusion to be drawn from the experiments is, that the alcohol method will shew the true amount of sulphuric acid *existing* free in the vinegar, but that will probably be less than the amount *added*. By adding sulphate of silver before concentrating, the result would indicate the total free mineral acid in terms of sulphuric acid. The process thus modified would be applicable to the determination of free hydrochloric acid.

D. We next examined the very convenient process of Mr. O. Hehner.\* This is based on the fact that, while acetates are converted into carbonates on ignition, and hence yield an alkaline ash, sulphates and chlorides suffer no similar change. Mr. Hehner further proceeds on the assumption that the presence of acetates in the vinegar is incompatible with that of free hydrochloric or sulphuric acid in the original vinegar, and hence any alkaline reaction of the ash of the vinegar, by proving the presence of an acetate, negatives the possibility of the presence of a free mineral acid.

It was to be expected that the evaporation to dryness and subsequent ignition of a solution containing acetic acid, free sulphuric acid, and a sulphate, would produce a non-alkaline ash, but the same result seemed by no means certain if a chloride were evaporated with a comparatively large quantity of acetic acid. In this case it was thought probable that the effect of *mass* would be observed, and that the large proportion of acetic acid would effect more or less decomposition of the chloride, with volatilization of hydrochloric acid and formation of an acetate.

To obtain information on this point we made the following experiments:—A solution of common salt, in which the chlorine had been determined by nitrate of silver, was evaporated with a large excess of acetic acid. In some cases the operation was concluded at dryness; in others the solid residue was ignited. In some cases burnt sugar was added. The chlorine in the residue was determined by nitrate of silver.

\* See ANALYST vol. 1, p. 195.

Expt. 9. .0504 grms. of Na Cl, evaporated to dryness with a large excess of acetic acid, gave a residue containing .0496 grms. of Na Cl. Loss .0006 grms.

Expt. 10. The same experiment repeated, gave absolutely the same amount of Na Cl before and after evaporation with acetic acid.

Expt. 11. The same operation, with subsequent careful ignition of the residue, showed a loss of .0012 grms. Na Cl.

Expt. 12. The same operation as in the last experiment, but with caramel added, shewed a loss of .0014 grms. Na Cl.

Expt. 13. Conditions the same. Loss = .0014 grms. Na Cl.

It appears from these experiments that the decomposition of the salt is practically *nil*, by mere evaporation, but that on ignition there is a loss of 2 to 3 per cent. of the total chlorine present. As there can be no free acetic acid present to account for this loss, it is probably due to unavoidable volatilization of the chloride, rather than to its decomposition.

On the other hand, when chloride of sodium solution was evaporated with tartaric acid, and the residue ignited, 36 out of 54 milligrammes of salt were decomposed, or  $\frac{2}{3}$  of the total quantity taken. We also evaporated common salt solution with excess of cream-of-tartar. By mere evaporation to dryness no decomposition of the chloride ensued. This result was to be expected, as even acid *sulphate* of potassium does not react on common salt at moderate temperatures. On *igniting* the evaporated mixture of sodium chloride and cream of tartar, slight decomposition occurred, in one experiment 3 milligrammes, and in another 4 milligrammes of common salt being decomposed, out of the 50 milligrammes added.

When a solution containing 50 milligrammes of sodium chloride was evaporated to dryness (but not ignited) with excess of citric acid, the residue gave a weight of AgCl corresponding to only .0367 grms. of Na Cl, shewing a loss of 24.6 per cent. of the common salt taken.

These experiments have a bearing on the method of Mr. W. C. Young for the determination of mineral acids in vinegar.\* His process consists in adding excess of Ba Cl<sub>2</sub> to a known measure of the vinegar. In a portion of this liquid the chlorine is determined. The rest is evaporated, ignited, and the chlorine determined in the ash. The difference represents the free mineral acid expressed in terms of Cl. Acid tartrate of potassium is, of course, a constituent of wine-vinegar, and its presence would cause the determination of mineral acid by the above method to be somewhat too low. The presence of free tartaric acid would quite invalidate the results.

As citric acid decomposes a chloride on evaporation of a solution containing it, it is clear that Mr. Young is in error in stating that his process "is of course applicable to lime-juice or lemon-juice."

Mr. Hehner's method of determining free mineral acids in vinegar, is dependent on the alkalinity of the ash of the vinegar as compared with the amount of alkali added to the original liquid. "If we add to a measured quantity of the vinegar a known and exactly measured volume of decinormal soda solution, somewhat more than would be necessary to neutralise the total amount of free mineral acid present, evaporate and incinerate, the alkalinity of the ash gives the measure of the quantity of the free sulphuric or hydrochloric acid." The author's test experiments are very satisfactory.

\* See ANALYST vol. 3, p. 163.

It is evident that the amount of alkali added must be sufficient to combine with the fixed organic acids present, in addition to the mineral acids.

If the amount of alkali employed be insufficient, it is necessary to recommence the experiment. For this reason, and from the desire to determine the free acetic and the mineral acid in the same portion of vinegar, we have made some experiments in which enough normal soda was employed to neutralize the whole of the acid, the subsequent manipulation being unchanged. As the amount of alkali used was about 20 times as great as that employed by Mr. Hehner, the tendency to a slight error in the titration was greatly increased, but the following results show that this modification of the process is capable of all desirable accuracy.

An artificial vinegar was made by mixing acetic acid, potassium sulphate, caramel, and a known amount of standard sulphuric acid. A slight excess of standard soda was added, the liquid evaporated, the residue ignited, the ash dissolved in excess of standard acid, and titrated back with alkali.

Expt. 18.	For	·2735	H <sub>2</sub> SO <sub>4</sub>	taken,	...	...	...	·2695	was found.
Expt. 19.	„	·2735	„	„	...	...	...	·2755	„

The commercial vinegar already mentioned as containing sulphates equivalent to 111 grains per gallon of sulphuric acid, in addition to 63 grains of chlorine, when examined by this process, showed a small *minus* quantity of free sulphuric acid\*—a result fully confirming the alcohol determination.

Another experiment was made by adding a definite amount of standard sulphuric acid to 50 c. c. of the above commercial vinegar, and then proceeding as before, when we obtained:—

	H <sub>2</sub> SO <sub>4</sub> Taken.				H <sub>2</sub> SO <sub>4</sub> Found.		
Expt. 21.	...	...	...	·1220	grms.	.. ·1157	grms.

Hence the process gives fairly accurate results in actual practice. As, however, a small error in the amount of alkali and acid used causes a sensible difference in the result, it is preferable to add (as recommended by Mr. Hehner) only a fraction of the total alkali which would be required for complete neutralization. Under these circumstances, decinormal solutions can be conveniently employed, and hence greater accuracy in the results obtained.

It will be observed that in Expt. 21 nearly the full amount of sulphuric acid added is accounted for. Of course the result is really a determination of the free mineral acids (actually *existing* in the vinegar) expressed in terms of sulphuric acid, for theoretical considerations and the results of experiments 7 and 8 (made on the same vinegar by the alcohol process) show that a considerable proportion of the free acid was hydrochloric acid. In short, Hehner's process determines the total amount of free mineral acid, while the alcohol process,—with the use of sulphate of silver if necessary—enables the relative proportions of the free mineral acids to be ascertained. Hehner's process is in our experience, decidedly the most convenient and accurate in general use, and furnishes a valuable solution of a somewhat difficult problem. R. Warrington has employed the same plan for the determination of free sulphuric acid in citric acid liquors, and the same principle has been frequently made use of.

\* A *minus* result is very common with vinegars containing no free mineral acid, and, when beyond the limits of experimental error, is clearly due to the presence of acetates or other organic salts (*e.g.* malates, lactates, tartrates.)



## REVIEW.

## MICROSCOPIC MOUNTING.\*

AFTER a careful perusal of Mr. Martin's manual of microscopic mounting we find therein points for both praise and disapprobation. As it is always most pleasant to be able to approve of any portion of a work, we do the praising first. It is an excellent gathering together of useful mounting formulæ, and gives a good description of manipulation, but there the praise must end, as the matter imported into the work on adulteration, &c., and the drawings illustrative thereof, do not partake of the useful nature of the portion already alluded to. Had the book been published simply as a collection of well-established formulæ for mounting liquids, with the directions for use, it would have been a most convenient work, but the "padding" in which the author seems to sometimes get out of his depth, spoils the book in its present form.

Let us justify these remarks by shortly glancing at a few matters. On page 2, *et seq.*, we are given a list of apparatus required, and are told that "the student must also add, buy, or make, as convenient to him, the following articles": Then follows a list, extending over two pages, of no less than 95 distinct articles (including chemicals), commencing with "an air pump," and ending with "pill-boxes, small pins, cardboard, &c., &c.," although what on earth the &c., &c., can stand for, we are at a loss to conceive, seeing that we find such sundries as "old knives" and "Liebig's extract of meat jars" already enumerated. We fear that if an ordinary knowledge of the microscope could not be got without procuring all this formidable list of articles, students would be much alarmed at the prospect. Again, on page 51, we have a drawing which is supposed to represent the method of making a bottle in which insects can be killed by the exhalation from laurel leaves, but the artist cannot have carried out the author's intention, as the quantity of leaves are so ridiculously minute that they would be quite inoperative. On page 27 we have an illustration of a retort with a flask-receiver, in a basin, presented as a specimen of "apparatus for making gases, distillation, &c.," but as there is no appliance for keeping the receiver cool, the latter process would be somewhat difficult. On page 161, we find that some granules, "by their globular character, are known to be wheat starch." Now, any microscopist knows that the special feature of the wheat granule is its flatness and want of globularity. Again, on page 175, when the author drops into chemistry, we find that the method of examining cayenne for the presence of vermilion and red lead, is to ignite it to ash on platinum foil, and test what remains on the foil for the metals. Now, we have always thought that vermilion was volatile by heat, and that an oxide of lead, mixed with organic matter, suffered reduction when heated, and then generally went right through the foil, but perhaps it is the residue on the ceiling of the room, or on the table, that the author meant to indicate.

It is, however, when we come to the drawings of food adulteration that the worst point of the book appears, because they are really so out of proportion that comparison is simply impossible. In plate 10 we have pepper, with the particles representing the starch drawn as an almost imperceptible powder, while in plate 11 rice starch is figured with a diameter of nearly a quarter of an inch in some

\* A Manual of Microscopic Mounting, by J. H. Martin. London: Churchill & Co.

granules, the former being stated to be magnified 50, and the latter 450 diameters. Now, rice starch being simply twice the size of pepper, it follows that the relation of the drawings should be as 1 to 10, whereas here they are as 1 to 50 nearly. When we say that, as to the rest of the drawings, they are made under such a low magnification as to be practically useless, even with the author's direction to examine them by a lens, and that wheat starch is shown in plate 11 covered with highly-marked perfect rings, while in plate 10 it appears exactly like oil drops, we have said enough.

In conclusion, we say, let Mr. Martin, in his next edition, cut out all his "adulteration" and "chemistry," and publish simply his really good collection of recipes and directions for mounting, and all will be well. We should also, in the interests of professional dignity, advise him to cut out the advertisement page in which he announces that "he has a great and varied experience, both in microscopy and chemistry, and can be consulted, &c." However great and varied Mr. Martin's experience may be, he should not be the one to announce it in this way.

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#### NOTE ON MILK "PRESERVATION."

By DR. J. MUTER.

*Read before the Society of Public Analysts, on 1st May, 1878.*

I HAVE, since the last meeting of the society, had in my hands some samples of a fluid sold for the "preservation" of milk. Its specific gravity is 1,055, and it contains:—

Borax	...	...	...	...	...	...	...	...	6.6
Potassium carbonate	...	...	...	...	...	...	...	...	1.7
Sugar	...	...	...	...	...	...	...	...	2.5
Water (ordinary London)	...	...	...	...	...	...	...	...	89.2
									100.0

It is not very carefully made, and is not always quite alike, but it is evident that under the name of "preservation," adulteration is clearly intended. The fluid is to be diluted with so much water, and then added; and it is plain that a considerable amount of water may thus be introduced, which would not be detectable by the ordinary "solids not fat" process. If milk adulteration advances in the scientific manner it has done lately, analysts will be obliged to make a full estimation of every constituent, instead of depending on the present process. It would be interesting to know the effect of continued small doses of borax upon infants living solely on such "milk."

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#### NOTE ON ALUM IN BREAD.

By A. WYNTER BLYTH, M.R.C.S.

*Read before the Society of Public Analysts, 20th March, 1878.*

I HAVE found a small percentage of alum in the crust of certain bread, and only the usual minute quantity in the crumb.

I understand from the trade that bakers use a strongly alumed flour technically called "cones." This flour is not made into bread, but is used as it were to *face* the loaves. I have not seen any mention of this in works I have access to.

The hint may be valuable to my brother analysts, as it points to the advisability of making a separate analysis of the crumb and crust.

## THE MILKMEN AND THEIR ANALYST.

THE *Dairyman* for May, in reporting the Annual Meeting of the Metropolitan Dairymen's Society, prints the report of the analyst to the society, which is as follows:—

DR. REDWOOD'S ANALYTICAL DEPARTMENT.

17, Bloomsbury Square, London, W.C.,

1st May, 1878.

DEAR SIR,—From May 31st, 1877, to April 30th, 1878, I received from members of the Metropolitan Dairymen's Society 428 samples of milk for analysis, of which 206 were unadulterated, the remainder consisting of 109 samples adulterated with less than 10 per cent. of water, 73 samples with more than 10 and less than 20 per cent. of water, 30 samples with more than 20 and less than 50 per cent. of water, 1 sample with more than 50 per cent. of water, and 9 samples which had been skimmed.

Yours truly,

T. REDWOOD.

To Fred. Morrison, Esq.

The accounts of the society, which are also published, only interest us by containing the following item :

“By Honorarium to Dr. Redwood for acting as Analyst, £5 5s.”

By the advertisement of the society which appears in another part of the same journal, it is stated that Dr. Redwood “is paid an honorarium by the society, and has agreed on payment of *two* shillings for each sample” (we presume of milk), “and on production of the card of membership, to send a certificate by post in about twenty-four hours after receiving the sample, which shall determine (*sic*) the specific gravity, total solids and fat, proportion of water, if any (*sic*) together with his opinion of the milk.” Perhaps it is hardly necessary to state that the word “two” is italicized in the original advertisement.

Dr. Redwood, therefore, having analysed 428 samples of milk, of which 222 (though they all we suppose came from milkmen, dairymen, or cowkeepers), were adulterated, received the sum of almost but not quite two shillings and three-pence per sample. We reprint this as it may perhaps be a guide to other analysts who may be in doubt as to the fee to be charged for milk analysis. We understand that many leading chemists in London and elsewhere are in the habit of charging one guinea per sample, and we can only express a hope that the Institute of Chemistry, of the council of which we are informed that Dr. Redwood is a member, will decide which of these two is the proper professional fee, and so prevent what appears to be such a serious discrepancy.

## CORRESPONDENCE.

[The Editors are not responsible for the opinions of their Correspondents.]

## THE SELBY FLOUR CASE.

TO THE EDITOR OF “THE ANALYST.”

SIR,—In March last I condemned a sample of flour for containing “about half the usual quantity of alum.” Before the case was heard at Selby, the defendant induced the magistrates to order a portion of the remaining part of the sample to be sent to Somerset House. The result was that the gentlemen occupying the position of chemists at Somerset House sent a certificate stating that they found the sample to contain an amount of alumina equivalent to 21 grains of ammonia-alum per 4lb. of the flour, that their experiments on pure flour had shewn an amount of alumina natural to flour varying from an equivalent of 2 to 10 grains of alum, and that, with regard to the excess of alumina found, “the results of their experiments did not enable them to affirm the existence of alum.”

This certificate is interesting to chemists, as throwing light on the views of the Inland Revenue Chemists on a subject on which they had hitherto been silent. In the sequel some further information was elicited. Mr. Bell received a subpoena to attend and explain himself, but sent his colleague, Mr. Bannister, instead. Mr. Bannister explained that the alumina had been determined by Dupré's method. The opinion that the excessive portion of alumina was not due to alum was based on an experiment made in some way with logwood, Mr. Bannister shewing a residue dried up at the bottom of a porcelain dish

in confirmation of his statement. It also appeared that some of the Somerset House Chemists had made a series of experiments with pure flours with and without the addition of alum.

On the other hand, I had found an amount of alumina corresponding to  $19\frac{1}{2}$  grains of alum per 4lb., a result with which the determination at Somerset House agreed well. But there was this difference. As stated in evidence. I had dissolved the ash in HCl, and filtered, before evaporation to dryness to separate silica. By proceeding thus, and omitting the fusion with alkaline carbonate, I believe I leave any silicate of alumina insoluble. I have repeatedly analysed flours and wheat by this method, and have never obtained more alumina in solution than corresponds to 3 grains of alum per 4lbs., although on fusing the insoluble matter with alkaline carbonate more alumina may be extracted. This view I expressed at a meeting of the Society of Public Analysts, an account of which appears on page 8, of vol. i., of the *Proceedings* but my observations are reported as if I were at the moment referring to Dr. Dupré's process, whereas, in quoting these figures, I was referring to a process which I have had in frequent use before and since, and in which the fusion is omitted. I fully believe that Dr. Dupré's method is the best for the estimation of the *total* alumina, but by using acid alone, followed by filtration, I think it is possible to discriminate between *added* and *natural* alumina, or between soluble and insoluble. Such a plan has the disadvantage that *incomplete* solution of the alumina of the alum may cause an error of deficiency.

In addition to the estimation of alumina I had observed the absence of excess of iron, and had determined the ash. I had also had a portion of the flour made into bread, and tested by the logwood and ammonia test. It was a weak point that I had not been present when the bread was made, but the servant who made it was present ready in Court to swear that she used yeast and water only. (The water is a pure moorland water, containing 5 or 6 grains per gallon of solid matter.) The result of my logwood test on the bread was the production of a distinct, but not very well developed, blue colour. That the Somerset House Chemists failed on the flour, I contend, is due to one of two things—either faulty manipulation and inexperience, or the occasional tendency of the test to fail when applied to flour. It has certainly failed in my hands, and Hassall condemns it on the same account. Hence, as the Somerset House Chemists fail to obtain the logwood reaction, and ignore the teachings of the alumina, any sample of bread or flour, however much alum it contains, is liable to get reported pure if referred to Somerset House.

As to the amount of alumina natural to wheat, Dr. Dupré, Dr. Muter, Dr. Stevenson, Mr. Wanklyn, Mr. Wigner, and others agree in finding a maximum even less than that of Somerset House, though, probably owing to differences of process, they found more than I have done. A Mr. Reynolds, a druggist, of Leeds, asserts that he found a considerable proportion of alumina in Egyptian wheat some fifteen years since. Without wasting time by criticising this statement, I may say that another recent case, in which a high amount of alumina was found, is undoubtedly to be explained by the process employed. Thus, if the calcium and magnesium phosphates are at once precipitated by soda, and the phosphate of aluminium merely recovered from the filtrate, the weight of the latter will be seriously in excess of the truth. If the analysis be conducted in that way the phosphate of aluminium ought always to be redissolved, and precipitated from a cold solution containing free acetic acid.

The result of the Selby flour case was that the magistrates dismissed the summons but allowed no costs. I may add that the same defendants were summoned for another sale of flour, in which I certified to 10 grains of alum per 4lbs., described this amount in my certificate as insignificant, and wrote a letter to the authorities stating that they must not prosecute, for though my own opinion was decided as to the presence of alum, the proportion was too small for a conviction. I presumed this recommendation had been acted on, until I was informed that the sample had been sent to Somerset House.

I write this letter chiefly with the view of raising a discussion on the detection of alum in flour and bread, especially with reference to the logwood test.

I am, &c.,

ALFRED H. ALLEN.

SHEFFIELD, *May*, 1878.

## THE BROMSGROVE MILK CASE.

TO THE EDITOR OF "THE ANALYST."

SIR,—I did not use porcelain dishes for "economy" as my report shows. I used platinum for total solids and ash, but porcelain for the determination of fat. The reason why I considered the use of platinum as an injury to the dealer was that the residue in platinum soon became very hard and dry, and I found I could obtain a larger percentage of fat by the more slow evaporation in porcelain dishes.

The whole matter has been a great grief to me, but I have the satisfaction of knowing that the publicity given to the case (which cannot but be of injury to myself) has completely exonerated the milkseller from blame.

My laboratory is detached from my house and under lock and key; and no one is permitted to be there except in my presence. My friend, who unfortunately made the mistake in the tare of the dish had assisted me some time before in an extensive series of milk analyses, and I thought him quite competent in the use of the balance.

I made two analyses which agreed with each other of the milk before I made my report, but unfortunately used the same tared dish.

Yours faithfully,

HORACE SWETE, M.D.,

Analyst, Worcestershire.

May 23rd, 1878.

## HOUSE OF COMMONS.

May 23rd, 1878.

### SALE OF FOOD AND DRUGS ACT IN SCOTLAND.

Mr. W. HOLMS asked the Lord Advocate if he was aware that by a recent decision of the High Court of Justiciary the Sale of Food and Drugs Act, 1875, had practically become inoperative in Scotland; and, if so, what steps he proposed to take to remedy that state of things.

The LORD ADVOCATE said his attention had been called to the decision in question. The result of that decision was rather too strongly put in the question. It only affected the sixth clause of the Act, but he admitted that it would have the practical effect of stopping those prosecutions. The Act, however, was one which applied to England as well as to Scotland, and the same point which had been decided by the High Court of Justiciary had been raised by an appeal from a decision of the magistrates of Sheffield. He understood that that appeal was now pending before the Courts in this country, and he thought it would be better before taking action in the matter to wait and see what the judgment in that case might be.—*Times*.

May 27th, 1878.

### SELLING SPIRITS UNDER PROOF.

Mr. SCLATER-BOOTH, in answer to Sir F. Perkins, who asked whether the attention of the Government had been directed to prosecutions which had been instituted against licensed victuallers for vending spirits of different degrees of strength under proof and the conflicting decisions of local justices on the point, said: The attention of the Government has, from time to time, been directed to the prosecutions which have been instituted against licensed victuallers for selling spirits of different degrees of strength under proof. The policy of the Sale of Food and Drugs Act was to leave it to the local tribunals to give decisions in accordance with the evidence in each case, and, in order to provide against the inconvenience which might result from varying views among the locally-appointed analysts, it was provided that the opinion of the Commissioners of Inland Revenue might be taken in disputed cases. I have no reason to doubt that in course of time, by this means, and by the decisions of the High Court of Justice on typical cases brought before them on appeal, greater uniformity of procedure will be arrived at. Meanwhile I may say that the statements and facts submitted to me tend to show that there is a natural process of deterioration in the strength of spirits by lapse of time, which should caution local authorities against the institution of proceedings in doubtful cases, and that there is a margin between the degree of about 17 per cent. under proof, which may be taken to be the figure at which spirits are delivered over to the licensed victuallers, and the point or points at which the Superior Courts have supported convictions within which at present some uncertainty must be admitted to exist. There are difficulties in the way of fixing a specific standard, and Parliament has not thought it proper to insert any such in the Act; but means are provided by which, in doubtful cases, retailers of these articles can protect themselves from prosecution, either by retailing under warranty or by labelling the article sold as of a particular degree of strength below proof.—*Times*.

## ANALYSTS' REPORTS.

MR. J. H. COLLINS, County Analyst for Cornwall, reports that in the quarter ended Lady-day he analysed six samples, including lard, bread, milk, gin, and beer. With the exception of two samples of gin, all were pure. The gin was diluted with water, one being  $27\frac{1}{2}$  per cent., and the other  $34\frac{1}{2}$  per cent. under proof; but he was not aware of any undeviating legal standard of strength for gin, and he could not say whether the legal or reasonable limits of dilution had been exceeded.

Mr. Blyth, County Analyst for Devon, in his quarterly report, presented at the Easter Sessions at Exeter, stated that during the quarter he had analysed five samples of beer, four of butter, two of tea, one of flour, one of pepper, one of gin, one of brandy, and four of milk. Three of these samples were adulterated—namely, two of the samples of milk had been watered, and from another a portion of the cream had been taken.

The report of Mr. W. W. Stoddart, County Analyst, to the Somerset Quarter Sessions, stated that he had made 273 analyses of food and drink, 270 of which had been submitted by the police authorities and three by the public themselves. Forty-one samples were found to be adulterated, and amongst these was one of "fictitious claret," which was evidently a most unwholesome beverage.

## LAW REPORTS.

HAMMERSMITH.—ADULTERATED BUTTER.—John Walker, a wholesale dealer, of the Goldhawk Road, Shepherd's Bush, was summoned for selling adulterated butter. Mr. Webb appeared for the defendant, who did not attend. Mr. Jones, clerk of the Fulham Board of Works, attended in support of the summons, and produced the certificate of the analyst, stating that the sample was composed of 75 parts of foreign fat. The inspector, who bought the butter, said he saw a tablet hanging in the shop stating in effect, that all butter sold there was pure. Mr. Webb produced a tablet which stated that all butter sold in the shop was not pure. The inspector said that was not the tablet he saw. Reference was then made to the wrapper of the butter, Mr. Webb stating that it bore a stamp notifying that the butter was a compound. The paper was inspected, but it was found not to bear a stamp. Mr. Webb said the defendant used a stamp of that kind. His neighbours sold the compound, and he was obliged to sell it. Mr. Bridge said it was a bad case, as the defendant was a wholesale dealer. He fined the defendant £15 and 12s. 6d. costs.

WANDSWORTH.—SHAM BUTTER.—Edward Gould, of Clapham Park Road, was summoned for selling to Samuel Hallen Smith, the inspector appointed by the Board of Works for the Wandsworth District under the Adulteration of Food Act, butter which was not of the nature and quality demanded. It was shown by the certificate of Dr. Muter, that the so-called butter was animal fat manipulated so as to resemble butter. Defendant was fined £10, and 12s. 6d. costs. George Nicholls, of Clapham Park Road, was summoned for a similar offence. The defendant, who said the stuff was not sold as butter, was fined £10 and 12s. 6d. costs, which he immediately paid.

GREENWICH.—ADULTERATED BUTTER.—Henry Alexander Thompson, of 457A, New Cross Road, Deptford, was summoned by the Greenwich District Board of Works, for selling an article of food, butter, which was found to be adulterated. Evidence was given, showing that Mr. Maslen, inspector of the Deptford district, purchased a half pound of butter marked at 1s. 4d. per pound. On paying for it he asked the manager, who served him, to divide the butter into three parts, as it was bought for analysis. A certificate was now produced, received from Mr. Wigner, which set forth that the article analysed contained more than 90 per cent. of foreign fat, and rather less than 10 per cent. of butter, which was not necessarily injurious to public health. The defendant's manager said he believed that on being asked to describe the butter sold he said it was not butter but "butterine." The inspector said that no such intimation was given, and the entry he had made in a book at the time showed that he (the manager) was reserved, and did not say anything. He added that subsequent to the analysis being made, in passing defendant's shop he told the manager the analysis was against the article, and "butterine" was then mentioned. Mr. Slade said the defendant had rendered himself liable to a penalty of £20. There would be a fine of 40s. and 2s. cost of summons.

MANCHESTER.—LARD APPEAL CASE.—An important case under the provisions of this Act was decided on Saturday last by the Lord Chief Baron and Baron Pollock. It was an appeal from the decision of the Manchester bench of magistrates, who declined to convict the respondent under the above Act for selling one pound of lard, which was found on analysis to contain 15 per cent. of water. The contention before the magistrate was that Hopley had sold Rook the lard in the same condition as he himself had bought it, and that under the 25th section of the Act he was entitled to an acquittal. The magistrates refusing to fix a fine, their decision was appealed against, hence the present trial. Both judges concurred in the following statement made by Baron Pollock:—"Is the thing sold prejudicial to the purchaser, and not of the nature demanded? I think both, though I do not mean that it is calculated to poison him, or interfere with his health." From this it follows that it is not necessary to prove that the adulteration is injurious to health, but simply that the article sold is "not of the nature demanded." The magistrates' decision was, therefore, reversed, and a fine inflicted.—*Medical Examiner.*

## THE ALLEGED ADULTERATION OF FLOUR AT SELBY.

THE adjourned hearing of summonses against Messrs. John Croysdale and Sons, flour millers, Whitley Bridge, near Pontefract, who also occupy flour stores at Selby, for having sold flour alleged to be adulterated with alum, took place at the Selby Petty Sessions yesterday, before Mr. B. Hemsworth (chairman), Mr. W. T. Smith, and Mr. J. Adams. The defendants were summoned on two separate informations under the Sale of Food and Drugs Act, 1875, for having sold flour mixed with alum, in one sample equal to 18 grains of alum to four pounds weight of flour, and in another sample to ten grains of alum to four pounds weight of flour. Superintendent Gill, the officer appointed under the Act, prosecuted; and Mr. Heaton Cadman, barrister (instructed by Messrs. Arundel and Son, Pontefract), appeared for the defendants. The case was reported in the *Mercury* when before the Court a week ago, and it may be remembered that a certificate from Mr. A. H. Allen, county analyst, was read, giving the result of his analyses of two samples of defendants' flour, as set forth in the informations. A report was also read from three of the analysts at Somerset House, giving the result of their analyses of the same samples, which was to the effect that the sample marked 29 contained alumina equivalent to 9-9-10ths grains of ammonia alum, and the sample marked 30 contained alumina equivalent to 21-1-10th grains of ammonia alum per four pounds of flour. Sample 29 according to their experience contained no more alum than was found in genuine flour, and with regard to the excess of alumina in number 30, the results of their experiments did not enable them to confirm that it existed in the flour in the form of alum. When the case was called on,

Mr. Cadman said that at the previous hearing of the case, in course of conversation with respect to the report from Somerset House, it was stated by one of the magistrates that if Mr. Allen's certificate had been sent to the analysts there they would have used the word alum distinctly instead of alumina. Mr. Smith remarked that what he said was that Mr. Allen's certificate had not been sent to the analysts at Somerset House, or they might have used another name. Mr. Cadman said that at any rate the gentlemen engaged in the prosecution of this case had not the common honesty to tell them that a copy of Mr. Allen's certificate had been sent to the authorities at Somerset House, and he now asked for the letter that was sent to be read. Mr. Hemsworth deprecated any imputation against the prosecution, as he was sure that Superintendent Gill had no feeling against the defendants. Mr. Cadman: I ask again, was a copy of Mr. Allen's certificate sent to Somerset House? Superintendent Gill: Undoubtedly, in accordance with a letter which I will read to you.

Mr. Cadman said that at the former hearing it was certainly the impression of the Bench that merely a sample of the flour was sent to London, with a request to the authorities there to make a report on it. Now it seemed that a sample had been sent, together with the report of Mr. Allen. The authorities at Somerset House were either to corroborate Mr. Allen's report or repudiate it, and they said, "The results of our experiments do not enable us to confirm that it (the alumina) exists in the form of alum." He wished to know whether a letter had been received from Somerset House since Monday last.

Superintendent Gill said that he had got a letter on the previous day. He explained that he had sent to Somerset House particulars of Mr. Allen's analysis, in accordance with a request from the analysts there. Since the last hearing he also sent a letter to Somerset House, to which he received the following reply:—

"With reference to the preceding letter, we have to state:—First. We are of opinion that the samples did not contain alum, and we intended this to be understood by the terms of our certificate. Second. Both samples were very limited in quantity, that marked No. 30 barely weighing five ounces. Although we were enabled, with the quantity at our disposal, to prove by duplicate experiments the presence of an excess of alumina in No. 30, and to satisfy ourselves of the absence of alum in both samples, it would have been more satisfactory to us to have had a larger quantity, that we might have been able to determine and state in our certificate in what form the excess of alumina existed in No. 30 flour.—(Signed), J. BELL, R. BANNISTER, and H. J. HELM."

Mr. Cadman said that the defendants had been brought into court to answer a charge of adulterating their flour with alum, and the analysts at Somerset House had certified that there was no alum present in it. That being so, was it necessary longer to take up the time of the Court? The defendants would not have been charged, but for a mistake on the part of Mr. Allen, and because of an inaccuracy in his tests of analysis. Mr. Smith thought they should hear further evidence. It seemed to him as if the analysts at Somerset House were persons who were not chemists, and were simply creating confusion. He thought, on the other hand, that Mr. Allen had given his evidence in a proper and straightforward manner.

The cross-examination of Mr. Allen, the analyst, by Mr. Cadman, was then resumed. He stated that he first tested the bread he had made from the sample of flour sent to him by the logwood test, which told him that there was something wrong with the flour. Having found this, he then ascertained the amount of alumina it contained by a process he had already described.

Mr. Cadman: To put it shortly, you found something wrong by one test; by another test you found what you call an excess of alumina, and then you put the two together and calculated alum. Is that so? Yes.

Mr. Cadman: Did you by any process you used find one speck or tittle of alum as alum? No, nor anybody else. Nobody ever found alum in bread as such.

Mr. Hemsworth : The analysts at Somerset House agree as to the alumina, but they don't say in what form it is. We want to know their opinion as to what that excess is. There is a property in the flour which ought not to be in it. Mr. Cadman : That excess of alumina might arise from the process of manufacture, and that being so, under the words of the section the defendants cannot be convicted. They had heard that Egyptian wheat was very dirty. Well, the defendants had special machinery for scrubbing and washing the wheat. They brushed it to take off every bit of clay, but if any specks remained it might be sufficient to account for the presence of alumina.

Mr. Richard Bannister, one of the analysts at Somerset House, was then called by Mr. Cadman, at the request of the Bench. His evidence was to the effect that the result of his and his colleagues' analysis of the flour was the same as Mr. Allen's, but they came to different conclusions as to the excess of alumina. Mr. Allen said it existed in the form of alum, but they found that it was not alum.

Mr. Hemsworth : Then what is it? I am sorry I cannot tell you.

But there is something in the flour that ought not to be? There is more alumina, but it may come from clay or dirt, or something which we are unable to say.

Mr. Allen, in answer to the Bench, said he still maintained his belief that there was alum present in the flour. At the same time Mr. Bannister was quite justified in what he had said, because he had failed to get the precise result which he (Mr. Allen) got. He had the authority of Dr. Hassall that the logwood test sometimes failed.

Mr. Bannister said that at the time they tested the samples sent to them they also tested 20 other samples of what they knew to be pure flour, and the result in all the cases was the same. They then added alum to some samples, and the test showed when the alum was present; so that he thought they were justified in concluding that the test was a good one.

After this evidence, the magistrates retired and consulted, and on their returning into court, Mr. Hemsworth said that they had thought the matter over, and found the evidence so conflicting that they had decided to dismiss the information.

Mr. Cadman said that had the bench not thought it right to dismiss the charge at that point, he would have called witnesses to prove that it was impossible for a miller to put alum into the flour. Mr. Hemsworth : Let's say no more about it. Mr. Cadman applied for costs, but the bench would make no order.—*Leeds Mercury*.

**ARSENIC IN VIOLET POWDER.**—At Epping Petty Sessions, on May 24th, Henry George King, wholesale chemist, of 14, Abbott Street, Kingsland Green, was charged with having killed one Eliza Sear, and also with having unlawfully sold and delivered to divers persons quantities of violet powder, containing large proportions of white arsenic and other ingredients, with the intent that it should be applied to the bodies of children of tender years. Mr. Poland opened the case on behalf of the Treasury, and John Nottage and Emma Grout, two grocers, were called to prove the wholesale purchase of violet powder, by them, from the defendant, and several women were called who proved having purchased packets of violet powder from these grocers, and using it to their children, several of whom died in consequence. Mrs. Sear lost two children, one in March, 1877, and another in February, 1878. Her evidence, as to the latter child, was that it was born on the 13th February, and on the day of its birth she sent to Miss Grout's shop for a packet of the powder, which was used, and the infant died on the 18th of the same month. It was a healthy child at birth, but its face turned very red, the skin broke out all over the face and neck, and the more the redness and soreness increased, the more the powder was used, in the belief that it would do good. Soon afterwards the lower parts turned black; this appearance rapidly extended to the body generally, and on the day of its death it gave out from the nose and mouth a "kind of black blood." Its agony was awful, and during the night before its death it screamed continuously.—The inquiry was adjourned till the 31st.

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#### NOTES OF THE MONTH.

THE writers in the *Daily News* and *Telegraph* having waxed eloquent over a description of the late slight accident at Messrs. Howard's works, the former authority ascribing it to "camphor pots" and the latter to "ether mills," the *Chemist and Druggist* slyly remarks that "such discoveries should qualify the sub-editors of these 'engines' for admission to the Institute of Chemistry, so evidently original and limited are their notions of every-day chemistry." Surely our friend does not insinuate, for a moment, that the great organic manufacturing chemistry, so highly appreciated in that learned society, leads, in many cases, to equally silly misnomers!



Our contemporary has also investigated the great arsenical violet powder scare, and finds that it is an oilshop-man, and not a chemist and druggist who is guilty; albeit the daily papers describe the manufacturer, who is now being prosecuted, as a wholesale druggist. But whoever may be to blame, will not our friend for once admit that analytical chemists have their use, and sometimes deserve a little less abuse than they get from the trade organs generally, seeing that, by the prompt intervention of the analyst, so dangerous an article has been detected and removed from the market?

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A newspaper report, which makes Mr. Jarman, of Huddersfield, say that .23 of a grain of metallic copper, per gallon, represents about 1-300th of a grain per half pint, has given occasion for another attack on the part of the press. Perhaps Mr. Jarman will send us a note stating what he really did say, and so take the sting out of the remarks made about him. The trade journals can, in one column, show the utter inability of ordinary reporters to deal with the most common chemical ideas, and yet they will, in another, eagerly accept as true, without enquiry, a report involving decimals, and on that seek to take away the character, for accuracy in calculation, of an analytical chemist. We should counsel Mr. Jarman if he has been, as we presume, misreported, to at once demand an apology for the paragraph.

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Once more an equality of results, so far as quantities are concerned, but a difference in their interpretation by a public analyst, and by the Somerset House Laboratory respectively. Mr. Allen, of Sheffield, a name well known for excellence in his profession, found a sample of flour which contained an amount of alumina calculating to 18 grains of ammonia-alum per 4 lbs. of flour. The sample having been sent to Somerset House, the chemists there (represented subsequently in the witness-box by Mr. Richard Bannister), found it to contain alumina which calculated to 21.1 grains ammonia-alum per 4 lbs. of flour. Of course, therefore, they confirmed Mr. Allen's certificate, say our readers. But, oh no, they knew better than that, so they went and tried the logwood test, and because it did not work, they found there was no alum. Asked in the witness-box: "Then what is it, Mr. Bannister?" The reply was: "I am sorry I cannot tell you." Here, then, is another secret out (purchased, it is true, at the cost of much annoyance to a worthy man, but Mr. Allen's shoulders are broad enough to bear that), and therefore no analyst must charge any sample with being adulterated by alum, even when he finds a good per centage of alumina, unless the logwood test works.

The only drawback is that one man may use the test on one portion of a sample, while another may try it on the duplicate, and where the first may get a result the second may not. This, however, is just the element of uncertainty which gives the test its value, and enables the second man to say: "I am the true great chemist, and I differ from the humbug who preceded me!" If the Somerset House Chemists would choose only reliable processes, and make them all public together, with the inferences to be drawn from them, their occupation, like Othello's, would be gone, and they would never have the chance of differing from anybody; but their processes and deduction would at once be subjected to public criticism. This, however, they refuse to do, and so analysts must continue to buy their knowledge of the methods and inferences approved by the excise chemists, at the cost of

defeat, without any appeal. We do not know whether there is a "*Baker*" as well as a "*Grocer*," and a "*Chemist and Druggist*" but we believe there is a "*Miller*," so let Mr. Allen stand clear for a visitation of the phials of wrath and logwood.

During the past month there have been four prosecutions in London, for selling oleomargarine or butterine for butter. In three cases the fines were from £10 to £15, and in the fourth 40s. It is, therefore, a much less offence to sell "bosh" in Greenwich, than in Wandsworth and Hammersmith.

When a milkman defrauds the public for years, by adding 30 per cent. of water, and at last gets caught, he suffers the famous 40s.; but let a farmer put in 14 per cent., and get prosecuted by the Dairymen's Association, he gets £10 and costs of counsel, &c. We would heartily endorse the latter decision, but for what reason is the ordinary defrauding milkman to get off with 40s.? Why, because it is only the silly British public, whom nobody cares for, that he swindles, and which has no trade organs to make an outcry when it suffers!

#### ADULTERATION IN CANADA.

WE have received a copy of the Inland Revenue Commissioner's Second Report on the adulteration of food. It appears to be a very exhaustive and complete document, and we observe that of the whole number of samples analysed more than half were adulterated. We shall refer more fully to the report in our next number.

#### RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1876. No.	Name of Patentee.	Title of Patent.	Price.
3469	J. L. Pulvermacher	Generating and Applying Electricity	10d.
3617	J. Imray	Bleaching and Cleansing Textile Vegetable Materials	2d.
3643	A. Fryer	Treating the Refuse of Towns	6d.
3742	T. Holliday	Dyeing Textile Fabrics	4d.
3743	J. H. Johnson	Magneto Electric Machines	6d.
3749	J. Schwartz	Manufacture of Sugar	2d.
3752	G. H. Carbutt	Decorticating and Cleaning Rice	6d.
3765	H. E. Newton	Refining Sugar	6d.
3805	J. Holden	Receptacles for Acids and Chemical Fluids	4d.
3817	J. Hammond	Purifying Coal Gas	4d.
3865	J. H. Johnson	Preparation and Treatment of Saccharate of Lime	6d.
3867	F. Wirth	Manufacture of Hydrated Peroxyde of Iron	6d.
4001	H. Meyer	Process of Manufacturing Sugar	6d.

#### BOOKS, &c., RECEIVED.

The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Medical Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Country Brewers' Gazette; Second Report on Food Adulteration in Canada; Report of St. Asaph Rural Sanitary Authority on Water Supplies, by J. Lloyd Roberts, M.B.

THE ACCIDENT TO MR. W. BAKER.—We are happy to be able to state that Mr. Baker is making satisfactory progress towards recovery from the effects of his recent accident, and it is hoped that in a month or so he may be able to return to his business, which, during his enforced absence, is being carried on by one of his late assistants.

# THE ANALYST.

JULY, 1878.

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## SOCIETY OF PUBLIC ANALYSTS.

A GENERAL MEETING of this Society was held on Wednesday, the 26th June, the President, Dr. Dupré, F.R.S., in the Chair. The Minutes of the previous Meeting were read and confirmed.

Mr. Hehner and Mr. Young were appointed Scrutineers to examine the voting papers, and reported that Mr. J. W. Montgomery, of Whitehaven, had been elected as a Member, and Mr. E. G. Clayton, assistant to Dr. Bernays, as an Associate.

The following gentlemen were proposed as Members: they will be balloted for at the next Meeting—Mr. R. McAlley, of Falkirk, Public Analyst for Falkirk and Stirling; Dr. Thomas Woods, of Parsonstown, Public Analyst for King's County; Mr. H. L. Greville, of Finsbury Park; Mr. W. McCowan, F.C.S., Public Analyst for Greenock; Mr. A. Ashby, M.B., F.R.C.S., Public Analyst for Grantham.

The Secretary read a paper by Mr. A. H. Allen "On the Assay of Carbolic Acid Powders."

Mr. W. C. Young read a paper "On the Detection of Alum in Flour."

Dr. Dupré also read a preliminary Note on the same subject.

Mr. Wigner read a "Preliminary Note on the Non-coagulable Nitrogen Compounds Present in the Cereals."

At the suggestion of Mr. Wigner, a vote of sympathy with the widow and family of the late Mr. Baker, of Sheffield, was unanimously passed.

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The next Meeting of the Society of Public Analysts will take place at Dublin, during the Meeting of the British Association. The time and place of meeting will be announced next month.

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### PRELIMINARY NOTE ON THE DETECTION OF ALUM IN FLOUR.

By A. DUPRÉ, Ph.D., F.R.S.

*Read before the Society of Public Analysts, on 26th June, 1878.*

I HAVE recently been induced again to take up certain experiments on this subject, which press of work obliged me to abandon several years ago, and although these recent experiments are far from complete, I venture to bring them before the Society in the hope of inducing some of our younger members to continue the work in the direction indicated.

There are three constituents in alum which might be made use of for estimating the amount of alum present in a mixture, viz., the potash, or ammonia as the case may be, the sulphuric acid, and the alumina. In the case of alum mixed with flour it will, however, at once be found that these three constituents are not by any means equally available for our purpose. Thus the amount of potash naturally present in wheat flour is so great as to entirely mask the small additional quantity contained in the alum which could reasonably be added to the flour. The potash, therefore, is, in this case, entirely

unavailable. The case, is, I am sorry to say, almost equally strong against the ammonia. I have made a number of experiments in which I endeavoured to separate the ammonia by distillation with various alkalies, carbonate of soda, lime, and magnesia, but in every case the proportion of ammonia obtained from, apparently, pure flour was so great that it masked the small additional quantity added in the alum. I next tried to separate the ammonia at lower temperatures, but with equally unsatisfactory results. Finally I simply extracted the flour with pure cold distilled water, filtered, and estimated the ammonia in the filtrate directly by Nessler's test (previously precipitating by pure caustic potash), but again found that the ammonia naturally present masked that added. The estimation of the sulphuric acid seems somewhat more promising, but here the difficulty in getting it into a solution available for quantitative estimation is so great that I have not as yet obtained any very satisfactory data. The cold aqueous solution of a flour is, in the first place, exceedingly difficult to obtain clear by filtration, and when obtained clear it becomes turbid again on standing, and almost refuses filtration, and every reagent added to it causes a precipitate. When this is again got rid of the turbidity reappears on standing, and as we cannot evaporate and ignite, owing to the danger of either forming sulphuric acid from sulphur compounds present, or of destroying it, the estimation of the sulphuric acid actually contained as such in the aqueous extract is thus at once tedious and very unsatisfactory. I have endeavoured to overcome this difficulty by dialysis, but with little or no result, as the organic matter causing the difficulty passes through the dialyser. Extracting the flour with various liquids other than water also led to no result. Nevertheless, I believe if a satisfactory method for the estimation of the sulphuric acid which can be obtained from a flour without incineration can be found, it will furnish a very valuable guide in judging of the freedom from alum, or otherwise, of any sample of wheat flour, and I hope some of our members may be induced to take this subject up.

We are thus, at present, reduced to the last constituent mentioned above, namely, the alumina, as a means for estimating the amount of alum which may have been added to a given sample of flour. Fortunately the alumina can not only be estimated with ease and exactness, but there can be no doubt that in really pure wheat flour the amount of alumina naturally present is but an insignificant quantity. There is, however, at least one compound of alumina which, when present in moderate proportion, cannot be looked upon as an adulteration, namely, the soil which may adhere to the grain and thus get mixed with the flour. It is sometimes affirmed that inasmuch as millstones are not only frequently repaired with a cement containing alum, but are also soaked in a solution of alum, small quantities of alum found in a flour might be derived from these sources. It can, of course, not be denied that minute traces of alum would thus get into the flour, but to suppose that any appreciable proportion could thus be introduced would seem to me utterly absurd. Thus 12.5 grains of alum in four pound of flour are equal to one pound per ton, and how often would a stone require repairing or soaking to give such a proportion of alum. This cause, as a possible explanation of the presence of alum may, I think, be safely dismissed, and we must return to the consideration of soil. For our purpose we may look upon soil as a silicate of alumina and iron in somewhat varying proportions, but always with a great preponderance of silica. Fortunately pure flour contains but a very small proportion of silica, and any, even slight, increase beyond this normal proportion would easily become apparent. It will however, no doubt, require a

considerable number of analyses to be made before we can fix the proportion between silica and alumina which will fairly represent the soil adhering to the grain.

When this is done we shall be able to estimate the possible amount of soil which could have been present, from the amount of silica found, with sufficient exactitude for practical purposes. I am now engaged in the analyses of a number of samples of flour with this object in view, and hope other Public Analysts will work in the same direction. In every sample we must thus estimate the silica, the alumina, and as oxide of iron is also a constant constituent of soils usually to the same extent as alumina, the oxide of iron also. When adopting the plan described by myself some years since for the estimation of alumina in bread, all these can readily be estimated in one analysis, almost without any additional trouble.

Finally, I have made some attempts, not without success, to separate the alum as such, and here I also hope that others will take up and continue the experiments. 100 grms. of flour are well shaken up with chloroform in a stoppered bottle (best with a funnel shaped bottom and a tap like a separating funnel) and allowed to stand at rest for 24 hours. At the end of that time all the flour floats at the surface of the chloroform, while a small amount of deposit will be found at the bottom containing the mineral impurities, and among them the alum. In the few experiments I have made, I had no difficulty in thus detecting an appreciable amount of alum in this deposit, when using a flour which I had carefully mixed with 15 grains of finely ground ammonia alum to the 4-lb. Should the same result be obtained by others, this method will, I believe, be the most satisfactory hitherto proposed for demonstrating the presence of alum in a flour, even to those who are not chemists. The chloroform I made use of, ordinary methylated, dissolved practically no ammonia alum.

Since the reading of this note I have been informed by Mr. O. Hehner that chloroform had previously been proposed for separating mineral impurities from flour (though not with a view to the detection of alum), but I have not been able as yet to obtain the original paper containing the proposal.

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#### NOTE ON THE ASSAY OF CARBOLIC ACID POWDERS.

By ALFRED H. ALLEN.

*Read before the Society of Public Analysts, on the 26th June, 1878.*

My attention has been recently directed to the composition and strength of Carbolie Acid Powders, and as the assay of such materials is occasionally needed, it may save other chemists some trouble if I place my own observations on record.

There is a common, but mistaken idea\* that carbolie acid powders are usually made by adding a certain proportion of crude carbolie acid to lime. This is an error, at least so far as the better known products are concerned. Thus, the basis of Calvert's Carbolie Powder is siliceous matter obtained as a residue from the manufacture of sulphate of Alumina, and several other makers employ a similar article.

The following analysis show the composition of the residue left on igniting

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\* The new *Chemistry applied to the Arts and Manufactures*, edited by C. Vincent, erroneously described these powders. Vol. 1, p. 612.

carbolic acid powders. A, is the residue from a canister of Calvert's powder; B, the residue from a powder prepared by another manufacturer:—

	A.	B.
Silica ... ..	67.4 per cent.	68.6 per cent.
Alumina ... ..	28.0 "	26.3 "
Oxide of Iron ... ..	traces.	traces. "
Lime ... ..	.8 "	1.3 "
Undetermined matter ... ..	3.8 "	3.8 "
	<u>100.0</u>	<u>100.0</u>

MacDougall's Disinfecting Powder is made by adding crude carbolic acid to the impure calcium sulphite, obtained by passing sulphurous acid gas over previously ignited limestone. The following analysis shows the composition of a sample of MacDougall's powder, after extraction of the carbolic acid by ether:—The extraction of the carbolic acid was probably incomplete as the analysis subsequently made shews free lime, and the powder was distinctly alkaline.

Silica ... ..	2.4 per cent.
Alumina... ..	3.4 "
Oxide of Iron ... ..	traces.
Lime ... ..	46.5 "
Magnesia ... ..	.3 "
Sulphurous Acid (SO <sub>2</sub> ) ... ..	7.5 "
Sulphuric Acid (SO <sub>3</sub> ) ... ..	29.2 "
Carbonic acid water and undetermined matter ... ..	10.7 "
	<u>100.0</u>

As the carbolic acid in the siliceous products is wholly in a free state it is readily extracted by ether, or other solvents. It is, however, difficult to drive off the solvent liquid afterwards without loss of some of the carbolic acid itself by volatilization. Thus a sample examined by this process gave about three per cent. less than the real amount of carbolic acid present. It is also inconvenient to apply the solution process to a sufficiently large amount of the sample to allow of an examination of the quality of the crude carbolic acid extracted. Processes for the determination of carbolic acid by conversion into tribromo-phenol or sulphocarbolic acid are unsuited for the assay of carbolic powders, as they ignore the presence of tar-oils, and give inaccurate results where applied, without correction, to mixtures containing cresylic acid.

On these accounts a more convenient process is that based on the distillation of the powder and collection of the carbolic acid, &c., volatilized. Such a process is thus described in the *Manufacturing Chemistry*, edited by Vincent (Vol. I. page 613), being apparently derived from a circular issued by the manufacturers of Calvert's Carbolic Acid Powder.

"Weigh 1,000 grains of the powder and place it in a small tubulated retort. Heat the retort gradually until the liquid distilled over ceases to drop (a brisk heat is required towards the end of the operation.)"

I find it desirable to agitate the contents of the retort once or twice towards the end of the process, as the powder is a very bad conductor. It is well to expose every portion of the powder in turn to an incipient red heat. I have tried passing a slow current of coal-gas through the retort throughout the operation, but the advantage is not worth the complication.

The carbolic acid vapour readily condenses, and is collected in or transferred to a graduated tube for measurement. The carbolic acid is covered by an aqueous layer from which its separation is facilitated by immersing the tube in warm water. From the

volume of the crude carbohc acid obtained, the per centage contained in the powder can at once be ascertained. Of course the weight of the liquid in grammes is about 1-20th greater than its measure in cubic centimetres, owing to its being slightly heavier than water.

Good Carbohc Powder should contain 12 or 15 per cent. of crude carbohc acid, and much that is sold does not assay half the above amount.

As an illustration of the accuracy of the process I may quote the following experiments:—

85 grammes of the siliceous residue obtained by igniting Calvert's Powder were intimately mixed with 15 c.c. of commercial liquid carbohc acid, the product placed in a retort and distilled. The distillate, exclusive of the aqueous layer, measured 14.2 c.c. Another experiment performed in exactly the same way, also gave 14.2 c.c. of carbohc acid. Hence the process errs on the side of deficiency by about 0.8 per cent., in a powder containing 15 per cent. This correction might be advantageously applied when accurate results are desired.

The distillation process is applicable to MacDougall's Disinfecting Powder, though the results are probably below the truth.

When applied to a powder made by adding carbohc acid to slaked lime the distillation process fails. Two experiments were made on mixtures of 45 grammes of slaked lime, and 8 c.c. of liquid carbohc acid. The process was continued for six hours, and the contents of the retort were very strongly heated. The distillation proceeded rapidly at first, but very slowly during the rest of the operation. In each case the oily portion of the distillate measured barely 5 c.c. In a similar experiment in which 15 c.c. of carbohc acid were used less than 10 were recovered. In another case in which 25 grammes of slaked lime and 5 c.c. of fused crystals of carbohc acid were distilled, only 3.3 c.c. were recovered. This experiment also showed that the distillate was no longer pure carbohc acid, being incompletely soluble in two volumes of 9 per cent. soda solution, and containing distinct traces of a body soluble in petroleum spirit. It is a curious fact that in the above experiments made by distilling carbohc acid with a large excess of slaked lime, the loss was constantly equal to about one-third of the carbohc acid taken, no matter how much that was. The fact is interesting and seems to indicate the occurrence of a definite reaction,\* which is the more strange, as previous observers have found that when carbohc acid is distilled with *quick-lime*, it passes over *unchanged*.

From these experiments it is evident that the distillation process is unsuited for the assay of carbohc acid powders made with lime. Such powders are of very little value for disinfecting purposes.

The "carbohc acid" used in the preparation of disinfecting powders is frequently largely adulterated. In addition to consisting in chief part of cresylic acid,† it is often mixed with a large percentage, and occasionally almost wholly consists, of worthless tar-oils. The plan usually adopted for the detection and separation of these impurities is based on their insolubility in caustic alkalies, and I have no better method to suggest, but the following hints are worth notice as the results of some careful experiments.

Cresylic acid is much less soluble than carbohc acid in weak alkaline liquids, and on

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\* I propose to examine the reaction more minutely at a future time.

† I think it convenient to speak of these bodies as carbohc and cresylic acids, though I am fully aware of the objections to these names.

addition of a large excess of the solvent is partially deposited. Hence its presence in carbolic acid may be detected, and the proportion perhaps approximately estimated by careful addition of weak solution of caustic soda, and comparison with standard samples of known composition. But one volume of carbolic or cresylic acid, or of any mixture of the two, is completely soluble at 15° C. in two volumes of a solution of pure caustic soda (free from alumina) containing 9 per cent. of NaHO. If weaker alkali be used, cresylic acid is liable to be left undissolved. Hence, if a sample of crude carbolic acid, such as is obtained by distillation of a disinfecting powder, be shaken in a graduated tube with twice its volume of soda solution of the above strength, all the carbolic and cresylic acids will be dissolved, while the worthless tar-oils will remain insoluble, and on standing will form an oily layer above or below the alkaline liquid according as the adulterant consists of light or heavy oil of tar.

This is the ordinary process of assaying the distillate from disinfecting powders, except that I recommend rather stronger alkali than is generally employed.

Hager describes the following modification. 5 c.c. of the sample are to be treated with 3 c.c. of a mixture (of equal volumes?) of rectified spirit and caustic potash solution containing 33 per cent. of KHO, and the whole shaken. Five c.c. of petroleum spirit are then added, and the mixture again well agitated. The amount of real carbolic acid in the sample is found by subtracting 3 c.c. (the volume of alcohol and alkali solution added) from the volume of the lower layer. I have carefully tried this process on purposely prepared mixtures of carbolic acid and tar-oil, and find that the proportion of carbolic acid is seriously over-estimated, probably on account of the alcohol employed. On the other hand, the use of petroleum spirit is a decided advantage, as it dissolves the tar-oil readily and greatly facilitates its separation from the alkaline liquid. Hence, after treating the sample in the manner previously described with two volumes of soda solution containing 9 per cent. NaHO, and noticing whether the oily layer floats or sinks, I add a volume of petroleum spirit equal to that of the sample under examination, and again shake. The oil is dissolved off the sides of the tube and forms with the petroleum spirit an upper layer, which separates quickly, and the volume of which can be read off with accuracy. Experiments on mixtures of known composition have given me by this modification very good results.

A useful comparative test of carbolic acid powders may be made in the following manner:—

Mix 25 grains of each powder with one ounce of flour, and then add gradually to each mixture 10 ounces of water. Mix well in the cold, then raise the liquids to the boiling point, and pour out each paste into a glass to set. Leave the pastes freely exposed to the air and the value of the powders as antiseptics will be indicated by the time which elapses before mildewing occurs, and the rate and manner in which it progresses.

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#### PRELIMINARY NOTE ON THE NON-COAGULABLE NITROGEN COMPOUNDS PRESENT IN THE CEREALS.

By G. W. WIGNER, F.C.S.

*Read before the Society of Public Analysts at Burlington House on 26th June, 1878.*

It has been pointed out by Church and others that the estimation of nitrogen for the purpose of calculating the albuminous matter present in vegetable products, is not



perfectly reliable as a true measure of the flesh formers or albuminous matters properly so-called.

All the cereals, as well as roots, contain a considerable proportion of nitrogen combined in other forms which are not capable of being coagulated by acid, and which, judging from inference, have very little flesh forming property. This non-coagulable nitrogenous matter exists mainly in the husks or bran of the cereals—the flour, when perfectly freed from husk, containing a comparatively small proportion of it. It is evident, therefore, that this may have led to some erroneous estimates of the relative feeding value of the whole meal, as compared with flour. It is quite clear that as regards whole meal, the nitrogen determination is not to be relied upon as giving an accurate estimate of the amount of flesh formers present.

I cannot at present specify the limits within which this determination may be trusted, although I have already made some 150 nitrogen determinations with this object, but the examinations already completed enable me to point out some facts of interest. Thus, I have taken some fifteen representative samples each, of Wheat, Barley, and Oats. These samples have been ground, and the nitrogen in the whole meal determined in the ordinary way by the soda lime process. Another portion of the whole meal has been treated with a solution of carbolic acid, faintly acidulated with say two or three drops of dilute nitric acid, and after warming, standing, and filtering, the insoluble residue has been washed on the filter with carbolic acid solution. Since the true albuminoids are coagulated by this process, the residue on the filter will contain them all, while the nitrogenous matters which are present in other forms, whether as nitrogen salts or alkaloids, will pass through with the filtrate.

In order to determine the true albuminoids, the residues left on the filter after this process have been dried and detached from the filter, and the filter itself carefully cut up into small fragments and mixed with the residue, and the whole burnt in the ordinary way in the combustion tube.

Treated by this process, I find that the average of the fifteen wheats show that 17.7 per cent. of the total nitrogen is present in such a form that it is not capable of being coagulated by carbolic acid—that 17.6 of the total nitrogen present in the oats is also in the same form, and that 14.7 per cent. of the total nitrogen present in the barleys is in the same form.

These, however, are only averages—there is considerable variation among the samples themselves. I find, for instance, in one sample of wheat that the proportion of nitrogen present as true albuminoids as distinct from that present in a non-coagulable form was 95 per cent. of the total, this being the maximum percentage which I have at present found. While the minimum proportion yet met with was 74 per cent. The maximum proportion which I have yet found in oats was nearly 93 per cent., and the minimum proportion 57 per cent. The maximum proportion which I have found in barley was nearly 95 per cent., and the minimum about 70 per cent. The sample of oats which showed the very low figure of 57 per cent., was one of the worst samples of its class which I ever saw—it consisted almost entirely of empty husks.

Assuming then, as I think I may fairly, that these samples were really representative ones, I conclude that the flesh formers present in the whole meal of the cereals have been over estimated to the extent of from 15 to 20 per cent., and that the residual nitrogen present in other forms is not equally valuable as a flesh forming constituent.

It becomes now of great importance to find in what state of combination this residual nitrogen does exist. There is, no doubt, that some of it is present as nitrates and nitrites; but at present I have not sufficient data to enable me to give the whole of the averages. I have obtained figures to show that the nitrogen in these two forms is part only of the residual quantity. Thus, for instance, in the case of barley, the largest proportion of nitrogen—in the form of nitrates and nitrites, as determined by the aluminium process which I have yet found—is .050 per cent. equal to .194 per cent. of nitric acid, and the lowest proportion yet obtained is .033, equal to 1.62 per cent. of nitric acid. In the first case the non-coagulated nitrogen was .140 per cent., and the proportion of it present as nitrates and nitrites was therefore 36 per cent. In the second case the non-coagulated nitrogen was .061 per cent., and the proportion of it present as nitrates and nitrites was 54 per cent.

In the wheat samples, as far as I have already finished them, I have found as a maximum .051 per cent. of nitrogen as nitrates and nitrites, and as a minimum .032 per cent. in the same forms. The samples contain respectively .101 per cent. and .120 per cent. of non-coagulable nitrogen. In these cases, therefore, the nitrogen present as nitrates and nitrites corresponds to 50 per cent. and 27 per cent. of the latter quantities.

In the case of another sample of wheat which contained .300 per cent. of nitrogen in non-coagulable forms, the nitrogen as nitrates and nitrites only amounted to .035 per cent., or less than 12 per cent. of that which is at present unaccounted for.

I am completing the examination of these samples in order to determine, not merely the average proportion of nitrates and nitrites, but also the form in which the other combined nitrogen is present.

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#### ADULTERATION IN CANADA.

WE have received from Mr. Girdwood, of Montreal, the official report of the Department of Inland Revenue for Canada, on the adulteration of food during the first part of the year 1877.

This report is in so many points instructive, not only as showing the extent to which adulteration prevails in Canada, but also as showing the methods of analysis which are adopted by the public analysts there, that we notice it at rather more length than usual.

It is one of the most exhaustive reports in its character that we ever recollect to have seen. It is quite evident that the authorities who are charged with the execution of the Adulteration Act in Canada are not disposed to allow the work which has been done by the analysts to be almost ignored—as is unfortunately the case in this country. It contains not only a general summary bearing the signature of Mr. A. Brunel, the Commissioner of Inland Revenue, but in addition verbatim copies of the reports of the analysts for each division, and tabulated statements of the results of every analysis, which, strange to say, are presented in tabular form, giving the percentage of each constituent, and also some 25 pages of carefully engraved copies of photographs received from our own Inland Revenue Authorities of articles used as adulterants of food and tobacco and of some of the genuine articles themselves. In its general character and the mode in which it has been compiled, the blue book is highly creditable to the department.

The first general feature observable is that the Canadian Government at any rate do not consider that the Adulteration Act is quite as limited in its character as the interpreters of our own Act in this country would seek to prove, inasmuch as Paris green, which is largely used for the purpose of destroying the Colorado beetle, forms a very large proportion of the number of samples examined, 50 out of the total of 488 being of this substance.

The report comprises separate statements from four different analysts, appointed for the districts of Toronto, Montreal, Quebec, and Halifax, and a list of the samples submitted by the 11 inspectors. We are not aware that any statement has hitherto been published of the names, &c., of the Canadian public analysts; we find that for the Toronto division the analyst is W. Hodgson Ellis; for the Montreal division, J. Baker Edwards, Ph.D. D.C.L. F.C.S.; for the Quebec division, F. A. H. La Rue, M.A. M.D.; and for the Halifax division, Robt. G. Fraser. The total number of samples submitted to these four analysts during the period embraced by the report was 488, of which 247, or a fraction over 50 per cent., were found to be adulterated. 50 of these samples were, as before mentioned, Paris green, and the other samples appear to have comprised a tolerably fair mixture of goods and condiments of all kinds, but if anything there is a leaning towards condiments rather than to articles which possess actual nutritive value. With this exception there is no fault to find with the selection. Thus far then the general result of the examination is somewhat akin to that which was found in England some 5 or 6 years ago, viz., that half the articles of food and drink sold were adulterated.

The general conclusions at which Mr. A. Brunel arrives are that a large proportion of the condiments submitted are adulterated, and to a very considerable extent, that coffee appears to be very largely adulterated, that nearly half the samples of butter were adulterated, and that the milk continues to be largely adulterated, while he adds that the experience now acquired in connection with the adulteration of this most important article of food is sufficient to justify the issue of specified instructions as to what should be considered as an adulteration within the meaning of the Act.

The representative of the Canadian Inland Revenue Department, acting we presume on behalf of the Department, has therefore adopted the principle which the Society of Public Analysts have been urging for the last three years, viz., that definite standards should be laid down and acted upon. In connection with this point it is of great importance to note that the standard for the analysis of milk, which has been adopted by the analysts in Canada and recognized in this Blue Book, is that fixed by the Society of Public Analysts; and that there are only one or two cases tabulated in which a milk, showing less than 9 per cent. of solids not fat, has not been returned as adulterated, and even when this has been the case, some explanation, such as the presence of an excessive proportion of fat is found in the report of the analyst. It may be fairly be assumed, therefore, that the Canadian analysts eventually found—as our own leading analysts did—that 9 per cent. of solids not fat, may fairly be taken as a percentage, which, while it does not fully protect the public, at any rate inflicts no injustice upon the vendors of milk.

The photographs of the adulterants, and some of the starches, presented to Canada by the English Inland Revenue Department, have been reproduced apparently by lithography and with considerable care and accuracy.

We pass now to the consideration of the individual reports of the analysts,

Mr. Ellis, of Toronto, appears to have examined twelve samples of tea, but unfortunately in no case were the alkaline and earthy salts present in the ash estimated. Some pains, however, were apparently taken to determine the estimation of theine present, which was found to vary from .38 to 2.31 per cent. The estimations would be of greater value if the report had stated by what process their theine was determined. Three of the samples were faced, but no other adulteration was detected. In reference to coffee, adulteration with roasted wheat, peas, and beans is reported in addition to the usual adulteration with chicory. Six samples of sugar were examined, four of which were of English make or refining, and from the figures of the analyses it is evident that they were all of extremely low quality, but no adulteration was detected. Three out of four samples of pepper were adulterated with wheat flour, while samples of cloves, allspice, and ginger were all found to contain wheat flour, Indian corn meal, or cayenne pepper. Canned and tinned fruit and vegetables were generally reported to be of good quality with the exception of Lima beans and French peas, both of which contained minute traces of copper. Out of eleven samples of milk, four were watered, five were deficient of cream, and only two were genuine. Twelve samples of butter were examined, but unfortunately the examination only went as far as the old process of determining the proportions of water, salt, and curds, no investigation as to the proportion of fatty acids was made. It may be of value, however, in some case in this country, to point out that the maximum percentage of water found was only 10.5 per cent., and the maximum percentage of salt 5.9 per cent. The minimum proportion of butter fat in a sample marked Salt Butter was 80.80 per cent. A considerable number of the samples of Paris Green, which, of course, ought to consist entirely of arseniate of copper, were adulterated with sulphate of baryta, the proportion sometimes reaching to 21 per cent.

Dr. Edwards, of Montreal, reports having examined eighty-five samples, of which fifty-eight were adulterated; he has, of course, met with the usual adulteration of skim milk, and states that the majority were so sophisticated. As to spices, he says that the husks of corn and various grains are freely mixed with them, together with such kinds of farina flour or ground rice as may best suit the texture or general appearance of the spice. At Montreal, according to Dr. Edwards, perfectly pure fresh butter is but seldom met with in the market; butterine appears to be largely sold, but not under its true name. One case of tinned vegetables had been coloured by copper. When referring to the samples of Paris Green submitted to him, he says that six out of twelve were more or less adulterated, and he draws special attention, and we think very wisely, to the dangerous results likely to occur to the water of streams used for drinking purposes by the continued application of arsenical dressings to fields which drain into them. He concludes by pointing out that sulphur and phosphorous carefully applied, might be more beneficial to the soil, and might be less injurious to the character of the water in the watercourses, while equally fatal to the insects it was sought to destroy.

Dr. La Rue, of Quebec, reports the analysis of twelve samples of butter, all of which were in his opinion pure, but unfortunately no determinations appear to have been made of the fatty acids or of the specific gravity; the melting point was determined, and it is stated that fusion commenced between 20° and 21° C., and was completed at 30° and 31° C. It is evident that these determinations of melting point have not been made with accuracy enough to enable them to be of any value for comparison with kindred

English butters. The only adulterated samples met with in this district, were five samples of Paris Green, adulterated with sulphate of baryta.

Mr. R. G. Fraser, the analyst for the Halifax division, reports the analysis of 72 samples, and says that the ground coffees were all mixed with peas or chicory in larger or smaller proportions, excepting one sample which was pure. Of six samples of pepper three were pure and three were adulterated with the husks of mustard seed and bread, the proportion of adulteration reaching in one case to 90 per cent. Perhaps the most interesting feature in Mr. Fraser's report is that having examined eight samples of milk he found that all were pure, a statement he was perfectly justified in making, for the average of the solids not fat amounted to 10.85 per cent., a pretty conclusive proof that the Canadian analysts have not erred on the side of injustice to the vendors in adopting the standard of 9 per cent. fixed by the Society of Public Analysts in this country.

A few samples were analysed of preparations of articles which appear to be included under the title of condiments, and we certainly think they deserve this title rather than that of drugs. One sample, called Campbell's quinine wine, was found to consist of sherry wine, tincture of orange peel, citric acid, sugar, and sulphate of quinine, the proportion of the latter being half a grain per fluid ounce, and the strength 64 under proof. Another sample, marked Lyman's quinine wine, contained only one third of a grain of sulphate of quinine per fluid ounce, and the alcoholic strength was 75 under proof, while the last sample mentioned in the list, and called Lewis's quinine port wine, is reported on as follows: "Consisting of inferior red wine (coloured with logwood), citric acid, sugar, tincture of gentian and orange, and traces of strychnia and brucia, and a small quantity of tincture of nux vomica," and it contained one third of a grain of sulphate of quinine per ounce, and the alcoholic strength was 68 under proof.

The tabulated statements at the end of the report are presented in a very valuable form, and we find there that some of the analyses have been carried to a much further extent than appears from the statements already commented upon. Thus we find that out of 49 samples of butter 10 were adulterated with foreign fats, the maximum proportion being 61 per cent. All these samples are in Dr. Edward's district, and we may fairly presume that if the fatty acid process had been applied to the samples in the other districts the result would have been almost identical.

Mr. Ellis found one sample of cocoa coloured with venetian red, and two samples of coffee containing roasted wheat in addition to peas and chicory. Mr. Ellis also had three samples of sugar, all obtained from the same vendor, and containing common salt in proportions varying from a mere trace to 10 per cent. From the fact that the one containing the largest proportion was taken from the top of a hogshead, and the one containing the smallest proportion from the bottom of the same hogshead, it seems tolerably clear that it was merely a sample of sugar which had been wetted with sea water in transit.

From what we have written it will be seen that although we cannot congratulate Canada on having attained as great a degree of general purity with regard to articles of food and drink as has been attained by the mother country, yet the Act so far has worked well and apparently done good service. If our own Government would follow the example set by the younger one, and publish in a blue book the names of the vendors of all those articles which were found to be adulterated, we should soon find that our percentage of adulteration would drop even lower than it has done.

## OBITUARY.

## MR. WILLIAM BAKER.

WHEN in our May number we referred to the terrible accident which had happened to this gentleman by which his skull was fractured, we stated that although he was in a very critical condition there was a ray of hope of his recovery, but the hope was in vain, for an abscess formed at the seat of the fracture, and after undergoing an operation for its removal, Mr. Baker became worse, and we regret to state died on the 6th June.

Mr. Baker was 48 years of age. The son of a gunmaker in London, he studied at the Royal School of Mines under Dr. Percy, with whom he ever since maintained the closest terms of intimacy and friendship. He also studied chemistry under Dr. Lyon Playfair, M.P. In 1854 he came to Sheffield, entering into the service of Messrs. Rawson, Barker and Co., Royd's Mill, as their analytical chemist and manager, and remained there fifteen or sixteen years. He then entered into practice on his own account as an analytical chemist. Soon afterwards he was appointed analytical chemist for the Upper Strafforth and Tickhill division, which appointment he held until recently; he was also the analyst for the boroughs of Rotherham and Barnsley. His work as an analytical chemist included an investigation into the vexed question of the presence of nitrogen in steel, which investigation he undertook in conjunction with Mr. Graham Stuart. More recently he carried out a series of very elaborate experiments with the view of endeavouring to remove phosphorous from iron and steel by the action of chlorine and other gases. An enthusiast in his profession, he was the author of several patents on matters more or less connected with chemistry, some of which are said to be of no small value. He was the first to notice the fact that what is known as the Pattinson process of purifying lead from silver also effected the removal of copper and other foreign substances; and by the application of this principle he succeeded in gradually increasing the quality and value of the red and white lead manufactured by Messrs. Rawson & Co. During the fifteen years he was with that firm he devoted special attention to lead, and many of the results of his observations and experiments are recorded in "Percy's Metallurgy." He was the lecturer on toxicology at the Sheffield School of Medicine; and at the Collegiate School, where he was immensely popular with the boys, he was, until very recently the chemical lecturer.

Mr. Baker was married, and leaves a widow and a son. The latter had but just entered his father's laboratory as a student. At the meeting of the Society of Public Analysts on the 26th June, a resolution of sympathy with Mrs. Baker, under these distressing circumstances, was unanimously passed and ordered to be forwarded to her.

## SNUFF ADULTERATION.

THE following general order has just been issued by the Board of Inland Revenue with reference to snuff, which will be studied not only by snufftakers, but by others; it raises the question as to what can be legally called adulteration, and that which is legal adulteration :—

"It is ordered that notice be taken of the recent change in the law relative to the manufacture of snuff, and that a copy of this order be given to every tobacco manufacturer and snuff miller. With a view to prevent the use of chromates and other salts of a poisonous quality the Act 41 and 42 Vict., cap. 16,

provides that on and after the 1st October next no salts or alkaline salts, except the carbonates, chlorides, and sulphates of potassium or sodium, and the carbonate of ammonium, shall be used in the manufacture of snuff, and if after the said day any snuff is found in the possession of or is sold by any manufacturer, dealer, or retailer, which after being dried at a temperature of 212° Fahrenheit is found to contain more than 26 per cent. of such salts, and inclusive of those naturally in the tobacco, such snuff is liable to forfeiture, and the trader incurs a penalty of £50. The attention of officers and of manufacturers is also called to the Act 30 and 31 Vict. cap. 90, by which the quantity of lime which may be added to snuff in the process of manufacture is limited to 1 per cent., and which further enacts that if any snuff in the possession of a manufacturer or dealer, after such snuff is dried at a temperature of 212° Fahrenheit, is found to contain more than 13 per cent. of lime or magnesia, or both, it is liable to forfeiture, and a penalty is incurred by the trader. The Board also desires to inform those manufacturers who require to use tonquin beans in scenting certain kinds of snuffs, that the proportion of beans which they may use for that purpose is strictly limited to 3 per cent., and that any snuff kept or sold by any manufacturer or dealer found to contain beans in excess of this proportion will be seized as forfeited. The trader will also be liable to a penalty."

### ANALYSTS' REPORTS.

Dr. Albert J. Bernays, the Analyst for the Parish of Camberwell, has issued his quarterly report, in which he deals largely with the adulteration of beer, samples having been obtained from all the best breweries in the country, and he would now, as the result, be able to ascertain at once whether the article delivered was in an unadulterated state. He had also examined two brandies, one gin, and one whisky, and found they were of the proper alcoholic strength. Of home-made wines he had had submitted to him a sample of elder, black currant, two of orange, and two of ginger, upon which he made no further remark than that the quantity of sugar, especially in the orange and ginger wines, not only rendered them acescent, but tended to disguise their alcoholic contents so as to make them appear weak. Of five breads and six butters he had nothing to report but that they were within the standard of Somerset House. Twenty milks had been analysed, six of them in duplicate on account of their suspicious character, but he had only furnished two certificates for prosecution. No. 202 contained 28 per cent., and 205 9 per cent. of added water. Another sample furnished a curious example of the ignorant manner in which milk was dispensed, for it contained 65 per cent. of cream, and 22 per cent. of solids. He had examined four specimens of confectionery, two of them illustrating some of the difficulties of the analyst, as the samples were mixed; one variety contained smalt or blue glass, but he had only one specimen. A very good sample of pickles concluded the articles, fifty-six in number, which he had analysed during the quarter, and on the whole undoubted progress had been made in the quality of all submitted.

Dr. Muter, the Analyst for Lambeth, presents for that important parish a highly satisfactory report, as sixty-nine articles of common consumption had been analysed during the quarter, but none of them were adulterated. The samples submitted for analysis included bread, butter, sugar, tea, coffee, pepper, mustard, &c.

In Bermondsey, Dr. Muter presents a similar result, with the exception of beer and milk, in which articles adulteration was found. At the Vestry meeting, Mr. Churchwarden Sheppard, in alluding to the flattering result to the tradesmen of the parish, said it was only fair that the ratepayers should know the honest shopkeepers as well as the dishonest, and he therefore moved that when the certificate was received from the analyst, the names of tradesmen from whom the samples were obtained should be read at the vestry meetings. Mr. J. A. Smith seconded the motion, and it was agreed to.

In Newington, the Vestry have not put the Adulteration Act in force, but their attention being drawn to its provisions by the Local Government Board, they have resolved to instruct the Sanitary Committee to employ a police-constable to obtain samples from the different tradesmen. This is the only parish which has employed the police to enforce the Act.

At Newport (Mon.) Town Council meeting the borough analyst's reports was presented. It showed that the inspector, Mr. E. H. Jones, had collected four samples of tea, four of mustard, four of pepper, and four of butter. Of these sixteen samples, fifteen were genuine, and one adulterated, viz., mustard, which was mixed with wheat flour and turmeric. The Mayor (Mr. Moses) and several Members of the Council said it was a highly satisfactory report.—*Grocer*.

Dr. Barclay, the Public Analyst for Chelsea, has just presented his quarterly report to the Vestry of that parish, in which he states that he has analysed a large quantity of articles, including coffee, mustard, pepper, jams, spirits, butter, lard, &c., the great majority of which he found to be pure. Butter in two cases, however, was found to contain 50 per cent. of foreign fat, and in one case the seller was successfully prosecuted. One sample of lime-juice cordial was simply lime-juice sweetened and diluted with water.

It contained no spirit, and less than one-fifth of citric acid, which occurred in lime-juice of average quality. Mr. Wheelhouse said it was most important that the attention of the analyst should be called to the quality of some of the jams sold to the poor. He was given to understand that large quantities of rotten figs were expressly imported to be used in the manufacture of "family jam." Would it not be well if their analyst looked after this article. Dr. Barclay promised that the inspector should have the necessary instructions in the matter. In reply to further questions, he stated that a large number of samples of beer and spirits had been analysed, and in no case had he found adulteration excepting occasionally the addition of a little water, and he did not think on that ground it was advisable to prosecute. The report was received.

At the Somerset Quarter Session, the County Analyst, Mr. Stoddart, reported that he had made during the quarter 273 analyses of food and drinks, 270 of which had been submitted by the police authorities and three by the public. Forty-one samples were found to be adulterated, and amongst these was one of "fictitious claret," which was evidently a most unwholesome beverage.

Dr. J. F. Hodges, analyst for the County of Antrim, in his report to the grand jury, states that he analysed during the quarter ending, March last, 91 samples, of which 34 were adulterated. The articles examined comprised 35 samples of sweet milk, 23 of butter milk, 9 of bread, 6 of oatmeal, 4 of tea, 5 of water, and 1 each of rice, lime juice, sugar, room paper, and flour.

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## LAW REPORTS.

**CONVICTION OF FARMERS FOR ADULTERATING MILK.**—Thomas Rose, a farmer, residing at Binfield, Berks, was summoned before Mr. Partridge by the Metropolitan Dairymen's Society for selling to Mr. John Jones, the Manager of the Surrey Farm Dairies, Renfrew Road, Kennington Lane, milk adulterated with 20 per cent. of water. Mr. Ricketts prosecuted on behalf of the Society, and said that the complainant carried on an extensive business at Kennington and Lambeth, and contracted with defendant for a regular supply of pure milk. For some time past the customers complained of the quality, and the consequence was that three churns were carefully watched, and found to be adulterated. He called Jones, who said he was the manager of the Surrey Farm Dairies in the Renfrew Road, Kennington Lane. He produced the contract with defendant for the supply of pure milk, to be delivered free at Waterloo terminus. In consequence of complaints he caused samples to be taken on the 20th of last month. William Hands, a guard in the Company's employ, proved the reception and delivery of three churns of milk at Waterloo terminus. They were locked up, and defendant was sent for. When he arrived the samples were taken. Alfred Parish, the inspector of the Association, said that on the morning of the 20th ultimo he saw the three churns locked up at the Waterloo terminus. They were opened, and samples taken from them. He offered the defendant some of them, and asked him to accompany him to Dr. Muter's, the analyst. He refused to go, and witness accordingly delivered the samples to Dr. Muter, and left them. He now produced certificates from the latter, showing that the milk was adulterated to the extent of 20 per cent. with water. Mr. Jones was recalled by Mr. Partridge, and said that one of their customers was fined at this court a few months ago, and complaints had reached him daily. The defendant said he could not account for the deficiency of the quality of the milk. His cows were in good condition. Mr. Partridge told him he was responsible for the condition of the milk. It was a very serious thing for Londoners to have adulterated milk sent from the country. Many of the dealers in London had been fined heavily, and most likely the offenders were persons like the defendant. He fined him £20, and £2 7s. 3d. costs.

Charles Leaver, farmer, Hazlewood Farm, Binfield, Berks, was summoned by the Society for a like offence. Witnesses proved the delivery of the milk at the country station, and its arrival at the Waterloo terminus, where Mr. Parish, the inspector, in the presence of defendant, took samples, and took one to Dr. Muter, whose certificate showed that it was adulterated to the extent of 14 per cent. with water. Mr. Partridge fined him £10, with £2 7s. 3d. costs.

**MILK ADULTERATION—A NOVEL POINT RAISED.**—In connection with some cases of milk adulteration heard at Crewe Petty Sessions last week, a novel point was raised. The magistrates had in three cases inflicted fines varying from 2s. 6d. and costs to 5s. and costs, when in a fourth case Mr. C. S. Brooke, the solicitor defending, pointed out that the certificate of Mr. Carter Bell, of Lower Broughton, Manchester, the analyst appointed by the county, said nothing as to any possible decomposition which might have occurred; but according to the Act, "in the case of a certificate regarding milk, butter, or any article liable to decomposition, the analyst shall specially report whether any change had taken place in the constitution of the article that would interfere with the analysis." The magistrates reconsidered their decision in the cases in which fines had been inflicted, and adjourned all the cases to decide upon the point of law.

**TEA ADULTERATION.**—At the Stockton Police Court, Henry Flint, auctioneer, was charged by Mr. J. M. Garry, inspector of foods, for selling tea which was not of the nature, quality, and substance of the



article demanded. The inspector stated that on the 16th of March last, owing to having several complaints made to him, he purchased a pound of tea which defendant was selling by auction in the Market Place for 10d. and 1d. duty. Defendant guaranteed the tea to be as good as that sold in the best shops in the town for 2s. and 3s. He divided it, and sent a portion to the county-analyst, Mr. Edger, of Newcastle, who certified it to contain 9 per cent. more mineral matter, principally magnetic oxide of iron and sand, than is found in genuine tea. The sample, he further stated, had a most nauseous taste, a fusty, disagreeable smell when infused—being, in fact, spoiled tea, and unfit for human food. Witness also tried to use some of the tea. Mr. Alderman Knowles: You deserved poisoning if you had. Mr. W. Churchill Tayler, who appeared on behalf of the defendant, said the tea was consigned to the defendant by a person named Ainsworth, who said he was not to sell it at less than 6d. per lb. Shortly after meeting Ainsworth at Stockton the tea arrived, and defendant sold it as he received it. Mr. Knowles said it was nothing but spoiled capers, which had been wet and dried again. Mr. Tayler admitted the sale of the tea, and also that it was unfit for food, but stated that had the defendant only received a warranty from Ainsworth he would not have been responsible, and would have complied with the Act of Parliament. He, however, received some twenty chests, and that left unsold he would destroy forthwith. After hearing the defendant's statement, which bore out that of his solicitor, the Bench imposed a penalty of £1 and costs.

**HEAVY FINES FOR MILK ADULTERATION IN IRELAND.**—At Castlereagh (County of Roscommon) Petty Sessions, 1st June, five contractors were prosecuted by the Guardians of the Union for having sold milk adulterated with water to the extent of (as certified by Dr. Cameron, county analyst) from 25 to 30 per cent. The magistrates convicted in each case. Martin Hanley, George Fitzpatrick, and Martin Cobill, whose milk contained 30 per cent. of added water, were each fined £20, and Martin Maguire and Patrick Brooks, whose milk contained 25 per cent. of added water, were mulcted in £10 each, being a total of £80. The magistrates ordered the fines to be allocated towards the expense of executing the Sale of Food and Drugs Act.

**GIN ADULTERATION—THE "PREJUDICE QUESTION."**—Philip Stiles, of the Grove Tavern, Bath, was summoned for selling gin not of the nature, substance and quality demanded. Mr. F. H. Moger conducted the prosecution, and Mr. F. S. Clark appeared for the defendant. The purchase of the gin in the usual way by Mr. H. G. Montagu, Inspector, having been proved, the analyst's certificate was put in, which showed the portion submitted to him to have contained 28.5 per cent. of added water, and to be 45.5 under proof. Mr. Montagu in cross-examination by Mr. Clark, said he purchased the gin with his own money, but should be recouped by the Sanitary Authority; he did not buy it for his own use. Mr. Clark: then as far as you are concerned you are not prejudiced by this gin being under proof. Mr. Clark, in addressing the Bench for the defendant, said he should in the first place call attention to the wording of the clause in the Act of Parliament under which this prosecution was instituted. The Act said no person shall sell to the prejudice of the purchaser any article of food, &c., which is not of the nature, substance and quality of the article demanded by the purchaser. Obviously Mr. Montagu had not been prejudiced by this gin. He bought it for the purpose of getting a case, and he got a case. Mr. Hammond: Still the public must be protected. Mr. Clark: The Court of Justiciary in Scotland, which was there the highest court, had ruled that a prosecution could not be sustained. There has been no case decided since the passing of the Food and Drugs Act, which overrules that decision of the High Court of Justiciary. I contend that the public officer is not authorised by the Act to institute a prosecution under this section. Mr. Moger addressing the Bench on the point raised, said the Scotch court took a different view from the English. The point was raised before Mr. Balguy, the police magistrate at Greenwich, who ruled against it. Mr. Clark: That was before the decision I have quoted. Mr. Moger, having quoted two decisions of English magistrates antagonistic to Mr. Clark's contention, the magistrates consulted Mr. Payne, their clerk, who said he thought the point a very strong one. Prior to the decision of the Court of Justiciary the point had not been raised in any of the superior courts, and he considered that the eminent counsel who had been engaged in various cases regarded the objection as untenable. The Home Secretary had been asked in Parliament whether he would take any steps in the matter, and he said that at present he had not thought it necessary, evidently meaning to leave the case to be argued. The magistrates retired to consider the question, and on returning into Court the Chairman said they ruled against Mr. Clark. Mr. Clark asked for a case for the Superior Court, which was granted. Their worships fined the defendant £10 and costs, with the alternative of a month's imprisonment.

**IMPORTANT DECISION AS TO THE PURCHASE OF SAMPLE FOR ANALYSIS.**—At the Chapel-en-le-Frith Petty Sessions, lately, Thomas Needham, landlord of the Bagshaw Arms Inn, Wormhill, was charged with selling a bottle of gin to Colonel Shortt, inspector under the Sale of Food and Drugs Act, which was not of the nature, substance, and quality of the article demanded by the purchaser. The Inspector said he visited the house on the 8th of May, and asked for a bottle of gin, for which he paid her 1s., and told her "it was purchased for the purpose of analysis," and offered to divide it into three parts, but she said it did not matter. The analyst's certificate stated that the sample contained 29.4 per cent. of real alcohol, corresponding to a strength of 37½ degrees under proof; spirits of this sort would result from a

dilution of four gallons of gin at 20 degrees under proof to upwards of five gallons by addition of water. The sample contains about 470 grains of sugar and extractive matter. No injurious addition of any sort was detected. Mr. Brown, of Stockport, submitted that according to the section of the Act of Parliament the Inspector was bound to have said to Mrs. Needham that the gin was purchased for the purpose of being analysed by the public analyst, and that he was bound to use the very words of the Act. He produced a copy of the last number of the *Law Times*, in which a portion of a report appeared of an appeal against a conviction for adulteration, in which Lord Chief Baron Kelly said the inspector was bound to use the very words of the Act, and that the appeal in that case must be allowed. Under these circumstances, the magistrates dismissed the case.

At Woolwich police court recently, Edmund Singleton, of 116, Sandy Hill Road, Plumstead, was summoned for selling adulterated butter. Mr. Farnfield, clerk to the board, prosecuted in each case. Mr. Peake defended in this, stating that the shop was managed by defendant's wife, who appeared. Mr. P. James, inspector for Plumstead district, said defendant was a general dealer. He went to his shop on the 5th of March, and asked for half a pound of butter. Mrs. Singleton said she would not sell it to him as butter, but that she would let him have it as she had got it. He paid 8d. for the half pound. There was no printed or written label on the paper. He told her it was for analysis, and sent one portion to the analyst, Mr. Wigner, who certified that the sample contained 30 per cent. of foreign fat. Mr. Farnfield read a portion of the Act, to show that it was necessary for a label to be on the paper to guard against the vendor admitting the adulteration to the inspector, and saying nothing to other people. Mr. Peake said people were very well satisfied with the mixture, which was not injurious to health. Pure butter could not be sold at the price. Mr. Slade fined the defendant 20s.

Henry Chilton, of 31, Harden's Manorway, was summoned for selling adulterated butter. Mr. James deposed to buying butter at defendant's shop and sending it to the analyst, who certified that it contained 75 per cent. of foreign fat. He paid 8d. for the half pound. Defendant's wife said it was just as she bought it.—Fined 20s.

William Mahany, of 45, Raglan Road, was summoned for selling adulterated milk. Mr. James said defendant was a milkseller. On the 19th of March witness was in Upper Earl Street, when he saw a female with milk cans. He got a boy to purchase milk, and he went to the woman for a pint. She served him, and witness, on receiving it, told her it was for analysis. She said she had no business to supply him, as the milk was intended for customers. The analyst certified that the sample contained 45 per cent. of added water, and the rest was milk of the poorest quality. Defendant said his wife had only a few quarts of milk for "exercise and pocket money." Defendant's wife said her husband had no interest in the milk she sold. If he borrowed a shilling from her he had to return it. Defendant said he had a mutual agreement with his wife. Mr. Farnfield said the husband's business could not be separated from the wife's. Defendant said he did not keep a shop. Mr. Slade said the husband and wife evidently had their business in common, and lived together. He fined him 20s.

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#### NOTES OF THE MONTH.

A few months ago some of the canny (!) Scotch Justices construed the Sale of Food and Drugs Act in such a way as to decide that an Inspector duly appointed under the Act, and purchasing under the direction of the authority by whom he was appointed, was not prejudiced by the sale to him of an adulterated article, and consequently they dismissed a case brought before them—and until this decision is upset on appeal we fear (notwithstanding the statements of the Home Secretary and Lord Advocate in Parliament) there is nothing to prevent the Act being valueless in Scotland.

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Some Yorkshire Justices have now shown *their* wisdom by laying down another *dictum*, which, if accepted by the other magistrates in the kingdom—a most unlikely thing, however—would increase the difficulty of obtaining convictions in England. In the case we refer to, a report of which is printed on another page, an Inspector under the Act purchased some gin, and after purchasing it told the vendor that "it was pur-

chased for the purpose of analysis." The defendant raised the technical objection that the inspector had *not used the very words of the Act*, and produced certain reports which had appeared in legal journals to prove that he was correct in his objection. The magistrates decided that the inspector *was bound to use the very words of the Act*, and to say to the vendor that "the sample was purchased for the purpose of being analysed by the public analyst," and they therefore dismissed the case. We should think that the publication of this prosecution, with the statement of the technical quibble by which the defendant avoided conviction, would probably do him nearly as much harm as if he had paid the penalty and so have done with the thing. As for the decision itself it only affords another instance of the necessity for amending the present Act in accordance with the experience of the past few years.

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There is a very neat little paragraph going the round of the papers, especially those which indulge in allusions to the amount of property left by deceased tradesmen and others, which has a certain amount of interest to analysts. A milkman—"a poor milkman," as one of the trade journals calls him—has recently died, and his personalty has been sworn under £30,000. We agree that this is a nice little sum for a milkman to leave, but what we wish to point out now is that if a milkman can make as much money as this, what possible need can there be for the existence of those so-called *dairymen* who sell nothing but milk and water.

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The General Order with reference to snuff issued by the Board of Inland Revenue, and reprinted on another page, prescribes the nature and to some extent the quantity of salts which may be added to tobacco for the purpose of manufacturing snuff, and it will doubtless be read with interest by those analysts who may occasionally have to advise tobacco manufacturers. It would be amusing if it were not unfortunate to note that the chemical advisers of the Government have once more shown their peculiar fitness for their position, inasmuch as they direct that the quantity of alkaline salts, including, among others, "carbonate of ammonia," shall be determined after the snuff has been "dried at a temperature of 212° Fahr." We think that any snuff manufacturer who chooses to mix smelling salts and powdered tobaccos in equal proportions will be perfectly safe so long as he insists on the snuff being *dried* in accordance with the regulation of the Inland Revenue Department before the estimation of his fraudulent addition is made. Still it is only just to warn him that he is now liable to another fearful penalty, for if the snuff be found to contain more than 3 per cent. of tonquin beans the snuff becomes liable to forfeiture and the manufacturer to a penalty. This is a serious matter indeed, for the estimation of a small percentage only of tonquin beans, even by an expert, may easily vary 2 or 3 per cent. from the truth.

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We are glad to notice that Mr. C. W. Heaton, the well known treasurer of the Society of Public Analysts, has been appointed Public Analyst for St. Martins *vice* Anderson. This appointment is far more satisfactory than several recent ones have been.

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Happy Isle of Man where all the cigars are composed entirely of tobacco, no spirits are supplied below 14·2 u.p., and the vendors of butterine do not sell it as butter. If

our tradesmen here would only all agree to act upon similar principles there would be an end of the necessity for public analysts appearing in police courts, a consummation which, in spite of the statements of the trade organs, we most sincerely wish for.

**MANX ADULTERATION ACT.**—The report of the inspector appointed under the Acts for the Prevention of Adulteration in the Isle of Man, for the year ending December 31st last, has just been issued. The total amount of cigars imported upon which duty was paid in the island was 1866 lbs., showing a decrease of 150 lbs. upon 1876. The cigars examined were all found to be composed entirely of tobacco. With regard to the spirits, the inspector reports that the average accustomed strength of the spirits sold in the island was 14.2 under proof. The result of the examination, the inspector states, compares favourably with previous years, as many of the samples were procured with a view to ascertain if any deleterious substance had been added to the spirits, but in no instance was any other adulteration found than water. With respect to milk only two samples were found adulterated. Some of the butter sold by retailers was not so satisfactory, but no prosecutions could be instituted, as the vendors had informed purchasers that they did not sell the article as butter.—*Grocer.*

### RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1876. No.	Name of Patentee.	Title of Patent.	Price.
3992	F. Wirth ... ..	Treating Ammoniacal Liquids ... ..	6d.
4021	H. Conradi ... ..	Manufacture of Sugar from Beetroot ... ..	6d.
4066	F. S. Newall ... ..	Manufacture of Soda and Potash ... ..	2d.
4094	M. Neustadt ... ..	Manufacture and Production of Salicylic Acid ... ..	6d.
4118	P. Spence ... ..	Treating Spent Oxide of Iron arising from the Manufacture of Gas	4d.
4134	B. J. B. Mills ... ..	Manufacture of Gas ... ..	4d.
4142	W. Thompson ... ..	Manufacture of White Lead ... ..	8d.
4144	E. W. Parnell ... ..	Manufacture of Caustic Alkalies ... ..	4d.
4168	H. Simon ... ..	Manufacture of Soft Soap ... ..	2d.
4159	J. H. Martin ... ..	Decorticating and Polishing Rice, &c....	6d.
4272	J. D. Ellis ... ..	Manufacture of Ferro Manganese and Speigel Eisen...	2d.
4275	F. W. Heinke ... ..	Producing Electric Light ... ..	2d.
4346	J. A. Stephan ... ..	Manufacture of Carburetted Hydrogen and Oxy-hydrogen Gases	4d.
4370	G. F. Cornelius ... ..	Treatment of Hydro-carbon Oils for the Manufacture of Gas, &c.	2d.
1878.			
243	C. D. Abel ... ..	Treatment of Residues from Aniline Red, &c. ... ..	4d.
828	Do. ... ..	Colouring Matters for Dyeing and Printing ... ..	4d.
730	A. Sauvée ... ..	Scouring, Bleaching, and Dyeing Materials or Fabrics ... ..	4d.

Mr. C. W. Heaton has been appointed Public Analyst for St. Martin's-le-Strand.

Mr. A. Ashby has been appointed public analyst for Grantham.

Mr. A. Wynter Blyth has been appointed public analyst for the Boroughs of Tiverton, Bideford, and South Molton.

Mr. W. F. Donkin has been appointed public analyst for Banbury.

Mr. R. Oxland has been appointed public analyst for Devonport.

### BOOKS, &c., RECEIVED.

The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Medical Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Country Brewers' Gazette; The Dairyman; Notes on Diet, by Sydney Gibbons, Melbourne.

# THE ANALYST.

AUGUST, 1878.

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## THE SALE OF FOOD AND DRUGS ACT AMENDMENT BILL, 1878.

A DECISION of the Lords' Justices on an appeal case in Scotland which we reported in our issue for February would, if it had been confirmed by the English judges, or by a higher court of appeal, have rendered the Sale of Food and Drugs' Act practically a dead letter. A glance at the analysts' reports which we publish monthly shows that, although the public expect to be protected from the sale of sophisticated articles as genuine ones, they will not take the trouble to purchase samples for analysis, and still more will not incur the expense of the analysis and the prosecution. This is not to be wondered at. Adulteration is unquestionably a gigantic fraud when viewed collectively, but when each single case is viewed separately the loss incurred by a single consumer is comparatively small, and it is unjust to throw on him the cost and loss of time incurred in a prosecution.

It is a remarkable and significant fact that more than half of the adulteration prosecutions are defended simply on technical quibbles. The solicitors for the defence virtually, if not in so many words, acknowledge the sophistication and then proceed to argue as to the details in which the Act passed for the prevention of this sophistication has not been complied with. It matters little to the defendants what the quibble may be, sometimes it takes the form of an inspector not being prejudiced by the purchase, sometimes the formula of words to be repeated by the inspector is alleged not to have been duly recited, sometimes the sample after division is stated not to have been properly sealed, and sometimes THE label has been forgotten; anyhow, the fact remains that technical objections are the favourite defence of the grocer, the druggist, and the publican.

Next in favour among the defences raised comes the appeal to Somerset House, and here we cannot really blame the vendors. Guilty although they may know themselves to be, it is only in human nature to appeal to the Inland Revenue chemists and see whether the watered milk from an entire dairy is really worse than that given by the poorest cow which could be found in Great Britain. The chance of success naturally may be and very often is enough to justify the appeal.

It is needless to say that all this wants altering, and that the only defences in such cases ought to be bonâ fide ones, instead of the palpable evasions of the Act in which the trade journals so much delight. Alterations in practice such as these, however, take time, and this month we have to notice merely the first instalment of a step in the right direction, a movement, however, which shows that the country—while fully recognising the right of every man to be considered innocent till he is found guilty—does not recognise the *arguments* ? of those journals which rejoice over a *victory* when a peccant grocer escapes conviction, because perforce the inspector did not personally use any of his adulterated coffee, and therefore was not prejudiced.

It is sad to see how low the standard of national morality has fallen when misdemeanants are allowed to evade the consequences of their faults in such a way, and a press, we had almost said an advertising press, can be found to support their misdemeanours. If a case is defended on its merits by all means let the benefit of every doubt be given to the accused, but if the case is defended on a technical quibble, justice demands that the benefit of the doubt, if any, should be given to the public, who have so long suffered from adulteration and fraud.

The Bill introduced by Mr. Anderson deals only with the prejudice to purchaser question. It is a Bill which ought to have been entirely unnecessary, and in our opinion it is so now. Why a Government Act passed only three years since, and which although fought most bitterly by the representatives of the adulterators, was carefully watched at every step by the present Government, should now need amendment, would be a mystery to all but those who recollect its original form. When the Bill of 1875 first appeared the words "usages of trade" cleverly, we might almost say scientifically introduced, were designed to cover old crimes, so that what had been, was to be—in other words, adulteration was to go on unrestricted until new skill could devise new modes of deceit, and then if detected the offender had a dozen loopholes out of which to escape. Fortunately the efforts made by those who wished to get what they paid for partially succeeded, and although the Bill was a compromise, it did put some restriction on adulteration, and the percentage of impure goods sold is now only about one half of what it was before adulteration, as defined by the Act of 1875, was a legal crime. Ever since that time the efforts of defendants have been directed to find flaws in the Act, or in other words, to find something which might be used to give a quasi legal sanction to fraud. To attain this end almost every one of the acting clauses of the Act has been tried, but beyond an occasional, and to our mind, erratic decision by some local magistrate, we are not aware that any evasion has been successful except in the Glasgow case.

Mr. Anderson's Bill is only intended to meet one of the points used as technical defences, but although this very point has been overruled many times both in London and the country, it is perhaps better that it should be set entirely at rest. The Bill, which we reprint on another page, contains only one acting clause, and that simply enacts what common sense would have thought was evident before, that an inspector who is really the agent, or, if it is preferred, the paid servant of the public, should, when he purchases on their behalf, be considered as prejudiced if the article is adulterated.

As we have before said, we do not think the Bill is necessary although other amendments of the Act may be, but we certainly do feel that it is a disgrace to English honour and English truth, that tradesmen guilty of fraud should protect themselves under such a subterfuge as this Bill seeks to remove, and we wonder that honest grocers, publicans and druggists do not protest against needing any such subterfuge to prove their integrity.

Meanwhile, a remedy is available. Let every Corporation, Board or Bench of Magistrates in the kingdom follow the example of the Plumstead Board of Works, and direct the inspectors to use, as food or drink, or otherwise as the case may be, a portion of every sample which they purchase. This will, no doubt, be a case of fighting the adulterators with their own weapon—sharp practice—but for once this is of little moment, so long as the public who are swindled and the honest tradesmen who are undersold, are protected.

## THE DETECTION OF ALUM IN FLOUR.

IF Messrs. F. M. & G. Rimmington, instead of sending their paper on the above subject to the *Pharmaceutical Journal*, had read it at one of the meetings of the Society of Public Analysts, they would not only have assisted the Society in the discharge of one of its main functions, viz., the improvement of our methods of food analysis, but they would also have had the personal advantage of hearing the remarks of some of their fellow-workers on the same subject.

They would thus have learnt, firstly, that whatever may have been their own practice, public analysts in general have *not* been in the habit of relying *solely* on the estimation of the alumina for the detection of alum in flour; secondly, that dialysis has already been tried for the purpose of separating the sulphuric acid of the alum from the flour to which that salt had been added, but that the process was found to offer no advantage to compensate for the time occupied. The chief obstacle opposed to the ready and accurate estimation of sulphuric acid in the aqueous or weak alcoholic solution of the flour is the presence of certain organic substances, and these dialyse with the sulphuric acid. Messrs. Rimmington do not appear to have discovered this fact. Thirdly, they would have learnt that flour has the power of abstracting alumina from a solution of alum; that, therefore, the alumina cannot be extracted by means of water from a flour to which alum has been added, and, therefore, of course it cannot be separated by dialysis.

The results they have obtained with the logwood test would, however, have been news to the Society, and could we only believe in their accuracy, would put an end to all further difficulty, except on the side of the bakers. The detection with certainty of 1-33rd of a grain of alum when added to 4lbs. of flour exceeds even our most sanguine expectations, and millers and bakers will have to take care in future to keep under this limit if they do not wish to bring themselves within the four corners of the Sale of Food and Drugs' Act.

## ON THE NITROGEN COMPOUNDS PRESENT IN THE CEREALS.

BY G. W. WIGNER, F.C.S.

[2nd Paper.]

IN the preliminary note on this subject, published in the ANALYST for July, I pointed out that the nitrogenous flesh-forming constituents present in wheat, oats, and barley had been over estimated, because nitrogen combined as nitric acid—nitrous acid and alkaloids, and probably nitrogen in other forms, existed in these grains in larger quantities than had been hitherto supposed, as had already been pointed out by Church to be the case in roots and many other vegetable products. The investigation is, of course, too lengthy to admit of rapid completion, but I purpose giving some more details as to the process adopted, and its results on a certain number of samples of wheat.

The mode in which I prepare the grain for analysis must necessarily give results slightly different from those which would be obtained from millers' flour and bran, because it is impracticable to grind or dress a small sample in the same perfect manner as a miller dresses his flour. In the miller's case the flour would, of course, be ground between stones and dressed through fine silks. In my case, owing to the limited quantity of each sample available, I am compelled to be satisfied with grinding and

dressing of a far less perfect character. The mode which I adopt is to grind the whole grain in a coffee mill, set to as fine a cut as possible, and then gently sift it through a sieve with 80 holes per linear inch, avoiding as far as possible any pressing or grinding action on the sieve. The first bran which does not pass through the sieve is ground down again in the coffee mill and sifted, and the residue is submitted to the operation once more. By this means by far the larger proportion of the flour is separated from the bran, but an unduly large proportion of the bran is so disintegrated by the grinding that it passes through what is the comparatively coarse sieve used. I have found it impracticable to "dress" the quantities available for analysis through silk, because the grinding could not be efficient enough to enable all the flour to pass through the silk sieve.

The net result of the operation is, therefore, that my flour contains too much bran, and my bran too much flour, or, in other words, the separation is not so complete as the miller would make. I do not think that this interferes sensibly with the comparative results.

The coagulation of the true albuminoids is carried out exactly as described by Church in the last edition of the "Laboratory Guide."\* 50 grains of the sample is ground in a warm porcelain mortar with enough warm saturated aqueous solution of carbolic acid to form a paste. Two or three drops of dilute acid are added to prevent the alkalies present from dissolving or holding in solution any of the coagulable matters, and the paste is then diluted with hot carbolic acid solution and filtered when cool. The residue on the filter is washed with carbolic acid solution of the same strength. By this treatment all the true albuminoids are coagulated and remain on the filter while any nitrogenous compound present either as nitrates or nitrites, or as alkaloids or gluten, passes through in the filtrate. The residue on the filter is washed down into the point as far as possible and the filter is then dried—the residue detached, and the filter itself finely shredded with scissors and ground to a powder, which is intimately mixed with the residue.

There is, of course, no difficulty in the process itself except its tedious character. The filtration will generally occupy 36 hours, and sometimes more, and the pulverising of the filter is an operation requiring much patience. My practice is to weigh the mixture of the insoluble residue and the pulverised filter, and to divide it into two portions for duplicate combustions if necessary.

As to the filtrate a portion may be taken for the determination of nitrogen as nitrates and nitrites, provided, of course, that nitric acid has not been used to acidify the paste with. As to the other nitrogenous constituents which are not coagulated, all I can say at present is that part is present as alkaloids, and, I believe, part also as gluten.

My experience of this process makes me quite satisfied with its results; with reasonable care there is no fear of error (as repeats give very closely accordant results), and there can, I think, hardly be two opinions as to the importance of the new data which are given for determining the true value of the nitrogenous ingredients in the cereal grains.

I pass now to a further consideration of the results obtained from some more experiments on wheat, I must leave the completion even of this series, and also the oats and barley for later papers.



I must premise that the samples which I examined were not *average* wheat, but, on the contrary, they were samples carefully selected by Professor Tanner, to whom I am much indebted in the matter, so as to give examples of every class of wheat, *i.e.* good, bad, and indifferent, special care being taken to select samples of wheat in which the conditions of soil, or climate, or seed were known and were different. It is naturally to be expected, therefore, that samples obtained under what, for the purposes of such an enquiry, must be considered as most exceptional circumstances, should give variable results, and should differ in the averages from the estimations previously made by those who worked on commercial samples only.

The following table shows the results obtained by the combustion of 15 samples of whole meal from wheats, together with the results obtained from the same samples, after treatment with carbolic acid as already described, and the ratio shown to exist between the true albuminoids and the albuminoids calculated from the total nitrogen found by the combustion process.

TABLE I.—WHEAT.

Nitrogenous matters present in the whole meal of 15 samples of Wheat compared with the coagulable nitrogenous matters.

Nitrogenous matters =  $N \times 6.33$ . All results in percentages.

MARK.	Nitrogenous matter in whole Meal.	Nitrogenous matter coagulated by carbolic acid.	Nitrogenous matter not coagulated.	Percentage of true gluten calculated on total nitrogenous matter.
A	11.54	10.14	1.40	37.9
B	9.14	7.39	1.75	80.9
C	8.53	7.89	0.64	92.5
D	9.41	8.65	0.76	91.9
E	9.52	6.27	3.25	65.9
F	10.66	8.15	2.51	76.4
G	9.40	7.89	1.51	83.9
H	9.28	7.52	1.76	81.0
J	9.53	7.02	2.51	73.7
K	9.15	7.27	1.88	79.4
L	9.15	6.77	2.38	74.0
M	11.28	10.15	1.13	90.0
N	8.03	7.65	.38	95.3
O	10.02	7.64	2.38	76.2
P	13.79	11.01	2.78	79.8

Of course the first point which attracts attention is the great differences between the samples, but this is due greatly to the fact that they are representative and not average ones. The differences between the total albuminoids are considerable, but the ratios of the differences in the non-coagulable albuminoid matters are far greater. It will be seen that the latter vary from 0.38 to 3.25, or from about 66 per cent. to about 95 per cent. of the albuminoid matters found by the original combustion. It is worth note that samples with the lowest total nitrogenous matter shows the largest percentage of albuminoids present in an uncoagulable form. There can be no doubt about the results for they were repeated and gave accordant figures, but they are none the less singular.

I pass now to the results obtained from the so-called bran, I say so-called, because, as I have before explained, the bran really contains some flour, and here we get the following very interesting results, which are tabulated in the same form as those obtained from the whole meal. The bran was obtained from the same samples of wheat.

TABLE II.—WHEAT.

Nitrogenous matter present in the bran of 15 samples of wheat compared with the coagulable nitrogenous matters.

Nitrogenous matters =  $N \times 6.33$ . All results in percentages.

MARK.	Nitrogenous matter in Bran.	Nitrogenous matter coagulated by carbolic acid.	Nitrogenous matter not coagulated.	Percentage of true gluten calculated on total nitrogenous matter.
A	13.42	5.69	7.73	42.4
B	13.60	8.10	5.50	59.6
C	11.77	...	*	...
D	8.67	3.54	5.13	40.8
E	7.43	5.69	1.74	76.6
F	9.33	8.10	1.23	86.8
G	10.57	9.49	1.08	89.8
H	11.01	7.72	3.29	70.1
J	11.65	10.25	1.40	88.0
K	10.05	6.46	3.59	64.3
L	11.24	7.46	3.78	66.4
M	10.76	8.48	2.28	78.8
N	8.23	6.71	1.52	81.5
O	9.24	4.81	4.43	52.1
P	15.66	8.73	6.93	55.7

Two points at once attract attention here—first the great difference between the coagulable and non-coagulable albuminoids, and secondly, the difference between this ratio and that found when the whole meal was similarly treated.

*(To be continued.)*

#### IMPORTANT STATEMENT BY MR. SCLATER-BOOTH.

THE ADULTERATION OF FOOD ACT.—At the Hampshire Quarter Sessions, held at Winchester, Mr. W. C. D. Esdaile asked the Right Hon. G. Sclater-Booth, M.P., President of the Local Government Board and Chairman of the County Finance Committee, whether his attention had been directed to a decision recently given in Westminster Hall on the adulteration of Foods Act, which in effect rendered that Act nugatory, and also whether he had considered the advisability of recommending that no further samples should be collected for analysis until some amendment of the law had been made or that decision reconsidered? Mr. Sclater-Booth replied that his attention had been directed to a decision in the High Court of England, and another in the Sessions Court of Scotland upon questions arising under the Adulteration of Foods Act, but he was hardly in a position to give a definite opinion on the subject, the papers having reached him only yesterday. So far, however, as he knew, it appeared that what Mr. Esdaile had called a decision of the High Court of Justice was in reality the arbitrary dictum of one learned judge, and until that had been appealed against it would not be right to assume that the Act of Parliament had broken down in one important particular. The Court in Scotland had come to a decision which was certainly surprising to him, and if the Courts of England should take the same view of the existing law it would probably be that an amended Act would be introduced at the joint instances either of himself or some one on his behalf and the Lord Advocate. He did not see that they were bound by the recent decision at Westminster, and he should not be disposed to put any restriction at present upon the collection of samples.

\* Spoilt in analysis.

## SALE OF FOOD AND DRUGS ACT (1875) AMENDMENT.

*A Bill to Amend the Sale of Food and Drugs Act, 1875.*

The following is the text of the "Sale of Food and Drugs Act Amendment Bill," just introduced into the House of Commons, by Mr. Anderson, Sir Wilfred Lawson, Mr. P. A. Taylor, and Mr. Whitewell:—

WHEREAS doubts have arisen as to the bearing of certain provisions in the Sale of Food and Drugs Act, 1875, through which doubts it has become impracticable to enforce portions of that Act in the interests of the public health.

Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1. This Act may be cited for all purposes as the Sale of Food and Drugs Act Amendment Act, 1878.

2. In any prosecution under Section 6 of the Sale of Food and Drugs Act, 1875, a sale of any article of food or any drug shall be held to have been made to the prejudice of the purchaser if such article of food or drug is not of the nature or substance or quality demanded, although such article of food or such drug may have been purchased for the purpose of analysis; and the seller shall be held to be guilty of an offence against the said Section if the article of food or the drug sold by him is proved to be not in all respects of the nature or substance or quality of the article demanded, and it shall be no defence to any such prosecution to allege that the purchaser, having bought only for analysis, was not prejudiced by such sale.

The Bill has since been read a second time, and Mr. Isaac has given notice of his intention to move as an amendment to change the word "or" occurring twice in the fifth line of the second clause, and printed in italics in the following, into "and," and to omit the whole of the latter part of the clause, also printed in italic.

Proposed Amendment of clause 2.

2. In any prosecution under section 6 of the Sale of Food and Drugs Act, 1875, a sale of any article of food or any drug shall be held to have been made to the prejudice of the purchaser if such article of food or drug is not of the nature *or* substance *or* quality demanded, although such article of food or such drug may have been purchased for the purpose of analysis; *and the seller shall be held to be guilty of an offence against the said section if the article of food or the drug sold by him is proved to be not in all respects of the nature or substance or quality of the article demanded, and it shall be no defence to any such prosecution to allege that the purchaser having bought only for analysis was not prejudiced by such sale.*

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 THE DETECTION OF ALUM IN FLOUR AND BREAD.

BY F. M. AND GEORGE RIMMINGTON.

*Abstracted from the Pharmaceutical Journal and Transactions.*

THE authors state that hitherto the detection of adulteration of flour and bread by the addition of alum has been entirely based upon the assumption that the alumina phosphate found above a certain percentage existed as a soluble salt of alumina, or, in fact, that an addition of alum had been intentionally made.

They first attempted the estimation of the sulphuric acid; the estimation of the ammonia or the potash appearing beyond the power of analysis. Three modes suggested themselves, viz., combustion, solution (elutriation), and dialysis. Combustion was a failure; solution, that is, by mixing a certain portion of flour with a diluted solution of alcohol and filtering out the solution and rendering it clear by boiling, or the addition of acetic acid, and precipitation by chloride of barium, proved much more practicable and satisfactory, and it is strong confirmatory evidence.

The authors next state that dialysis yielded results that have given strong hope that it is to be the process of the future.

Their mode of procedure is as follows:—Take 50 grams of flour and put into a litre flask 200 c.c. of rectified spirit and to this add the flour and agitate until a perfectly smooth mixture is effected, then add distilled water to make up the measure to one litre. This is allowed to stand with occasionally shaking for twenty or thirty minutes and then poured upon a large filter. Take any proportion of the filtrate and place it in a dialyser and allow it to dialyse twelve hours; at the expiration of that time pour out the dialysate into a beaker and put more water in the dialysing dish and continue the process for another twelve hours, and it may be repeated the third and fourth time until no trace of sulphuric acid is obtained. These solutions may be dealt with separately or collectively by evaporation to a small volume and the sulphuric acid precipitated by a barium salt, collected and weighed. Any salt of sulphuric acid that is present in the flour must make its appearance in the dialysate, and the only problem to settle will be its proportion to the alumina found by incineration. The dialysate may likewise be tested for alumina. Should the amount of sulphuric acid be small or insignificant, it must not be ascribed to alum, but to one of the constituents of the flour, and flour does contain a small quantity of this acid in some combination or other.

The authors find the logwood test most valuable and extremely delicate. They state that it is capable of detecting alum as distinctly as Marsh's test will detect arsenic, 1 part in 1,000,000. And further that there are several kinds of logwood in use, and some of these are useless for the purpose.

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#### ALUM IN BREAD.

From "*The Echo*."

SOME legislative action will have to be taken to control the vagaries of the "Great Unpaid" if the Adulteration Act is really to become a living law instead of an enactment to be evaded. The authorities who dismissed a clear case because the inspector failed to state in the exact words of the Act that he intended to have the articles analysed may be complimented on their sharpness, but scarcely on their intelligence. The Government analysts at Somerset House have done their best to render the Acts abortive; they could not have done more if their salaries had depended on the success of their opposition; and in a recent case of flour adulteration they shine with a remarkable brilliancy. It is a difficult thing to detect alum in bread, because the alum is changed in the chemical processes of fermentation and baking, and it is almost equally difficult to detect it in flour. The soil in which wheat is grown always contains alumina, the stones by which it is ground are repaired with cement containing that

substance, and no method has yet been devised for estimating the amount of added alum which would be deemed entirely satisfactory by the magistrates. The public analysts, however, have good reasons for believing that their analyses give correct results, but they are thwarted by the negative evidence given by the Government chemists, who persistently ignore their work and adhere to the old methods. It is quite time, both in the interests of the public and tradesmen themselves, that these burning questions should be settled. At present the Adulteration Act is little better than a *caput mortuum*, so far as preventing sophistication is concerned.

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## REVIEWS.

### INDUSTRIAL CHEMISTRY.\*

Of all the critics with whom we are acquainted, the Editor of the *Pharmaceutical Journal* is, as a general rule, the most exacting. In the criticisms published in that periodical the smallest slips are taken note of, and discoveries made since the work was in type are unhesitatingly pointed out as deficiencies. The mention of matters which in the hands of such a critic are "simply beyond criticism," become, when subsequently treated by a more humble authority, undesirable excrescences. All this would lead us to suppose that when the editor of that journal did speak in his private capacity, he would be strictly original, grammatical, and above all, down to the latest date with everything. But we are sorry to admit, after a careful perusal of this work, that we are reluctantly placed in the position of the old Scotch woman mentioned, we think, in Dean Ramsay's *Reminiscences*, who, while listening to the periods of a youthful preacher, remarked occasionally "that's Chalmers," or "that's Scott," but when he came to the end and gave the benediction, exclaimed "that's yoursel' noo." It is irritating to find that after reading pages evidencing the masterly hand of the original author, you suddenly meet with the "that's yoursel'" of the English editor.

A number of subjects have been added to the original, some without any apparent reason, as they are things supposed to be known to the most elementary student of chemistry. Anyone using such a book for information on the subject of chemistry as applied to manufactures, would be far beyond the necessity of requiring to be tutored in the mere rudiments of the science, such as are contained in the fourteen opening pages. Can it be possible that these were added to show what the editor really could do in chemical philosophy?

Why a few of the less interesting metals such as Titanium, Niobium, and an old explosive, Pyroxam, should be honoured with copious details, whilst such subjects as Dynamite, Gun Cotton, the Pierates, and the Fulminates are scarcely mentioned, is at first sight somewhat difficult to understand. We need not go far however, to discover that the German edition has been somewhat blindly followed, and this will account for the work not being up to so recent a date as might have been expected. Had the careful wording of that work been followed and actually translated, such a ridiculous expression as that regarding paper making would not have occurred. On page 624 of Dr. Paul's translation, the fibres specially prepared for paper manufacture are called

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\* *Industrial Chemistry*. A Manual for use in Technical Colleges and Schools, and for Manufacturers, &c. Based upon a translation, partly by Dr. T. D. Barry, of Stohmann and Engler's German edition of Payen's "Précis de Chimie Industrielle." Edited throughout and supplemented with chapters on the Chemistry of the Metals, &c., by P. H. Paul, Ph. D. Illustrated with 698 engravings on wood. London: Longmans, Green & Co. 1878.

"*surrogate*," while the original German of "*surrogate für die Lumpen*" simply means *substitute* for rags. It is surely a pity that the plain English was not adopted. To an Englishman the word *surrogate* is rather too suggestive of an unpleasant form of law.

The composition and translation are often rather weak; thus on page 314 the writer has such an affection for the word *glass* that he repeats it more than forty times in sixty-seven lines. In other parts of the book we are treated to such unmathematical expressions as the *diameter of rectangular bodies*, and we have such important pieces of information as "crude borax admits of being purified," and "kelp is the ash of *land* and marine plants." Nor is the acquaintance with modern commercial processes particularly extensive; the aniline dyes being honoured with scarcely more than a mere mention, and such subjects as anthracene and the other important derivatives of coal tar are dismissed with a few lines.

In the preface the author speaks as if the book were addressed not only to manufacturers, but also to the "general introduction of chemistry into schools." In our opinion the attempt to unite two such subjects is perfectly hopeless, and this may account for the manner in which many of the really useful portions of the work have been revised, in contradistinction to the part occupied on matters of interest only to the purely scientific student.

Much has doubtless been published since the last number of the German work in 1874, and it therefore behoves modern manufacturers to acquaint themselves with many processes which have no place in the present work. For instance no mention is made of the modern method of working nickel ores, or of ice-making by Carre's machine, or of kamptulicon, &c., and many other English manufacturing processes.

The book is clearly printed, but burdened by much unnecessary verbiage respecting history and modes of discovery, which have no interest to manufacturers, and the arrangement of the whole would, we think, have been much better if in a dictionary form.

We do not stoop to take advantage of the numerous misprints as subjects for criticism, but simply say that many of them are such as to induce a real misunderstanding of the context. The articles which have passed unscathed from the original are admirable, and we should say will be found of the greatest use to the technical students of such specialities.

It is to be hoped that the next edition will be edited with more care, and that much of the chemistry of the rarer substances will be expunged, and the commercial processes brought down closer to date. If this be done and the revision of the proof sheets be entrusted to a person who will more satisfactorily perform that duty, the book will be more worthy of Dr. Paul's reputation as an editor.

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#### AIDS TO CHEMISTRY.\*

By C. E. ARMAND TEMPLE, M.B., &c.

THIS is one of the little "aid" series of books at present being issued by Messrs. Baillièrè & Co., specially designed for medical students preparing for examination. It is scarcely possible to review it as it belongs to the class of "cram" books which every journal which would be called respectable is in-duty bound to decry. Candidly, however, we do not hold with such wonderful assumptions of anti-priggishness, and must admit

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\* London: Baillièrè, Tindall & Cox.

that given the dictum that there is a use for everything, even "cram" books are not without their benefits in often helping the lame duck over the stile. If there were no such persons in the medical profession the great ones would not be able to shine with such refulgence. Indeed, the stereotyped denunciations of "cram" too often mean that the endowed lecturer is too busy to take any interest in his students, and in consequence men who really try to impart instruction and succeed are dubbed "crammers."

Admitting the possibility, then, of touching a "cram" book now and then without soiling ones moral principles, we must say that for cheapness, good print, and perspicuity, Messrs. Baillières' "Aid" series are all that can be desired by a medical student desirous of brushing up his rusty knowledge before examination.

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### POISONOUS ICE CREAMS.

A LETTER, dated from the vague address "Belgravia," has appeared in the *Times*, calling attention to certain alleged cases of poisoning by ice creams. Unfortunately the letter, like most of its class, indulges in generalities such as "poisoning by some metallic irritant," and talks about the poisonous nature of the colours used, but the one specific step which the writer might have taken, namely, to submit a sample to the public analyst, has of course, been omitted, hence we are not likely to know what the metallic poison was.

It seems well to point out to public analysts that there are two possible ways in which metallic poisons may be introduced into ices.

It is well known that a good many samples of magenta do contain arsenic, and magenta is certainly used in some cases for colouring ices; here then is a possible, though we think improbable, source of metallic poisoning.

Again, the metal of which the freezing cans are made is often of very bad quality, and when acid is used to give the tartness of flavour, which is desired in some ices, it is quite possible that some lead, and perhaps some antimony also may be dissolved. The danger from this source is certainly greater than from the one previously mentioned.

It is, however, much more probable that any injurious effects which have been produced, are due either to the indiscriminate use of ices by children when heated by over exertion, or surfeited with a quantity of indigestible food, or to the use of decaying fruit in the making of the ices. Analysis could do nothing in either case, for even microscopical examination would fail to detect damaged strawberries after they had been smashed and semi-frozen.

No doubt samples will soon be purchased and submitted for analysis, and we have therefore pointed out what in our opinion are the points to which examination should be directed.

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A correspondent writes to the *Times* to point out the dangers of poisonous ice creams. He says "that these tempting delicacies are not harmless, two cases lately under my observation prove. In one case, the patient, a child about seven years of age, was seized with alarming symptoms of poisoning by some metallic irritant, which at one time threatened to prove fatal. In the other case also, a child, similar symptoms manifested themselves, though of a milder type. In both cases the cause was the subject of a searching investigation, and was ultimately clearly traced to the children having partaken of coloured ices at a street barrow. The colours represented in these ices are usually red, pink, yellow, and green, and in some instances blue. How the various colours are imparted to the article, sold at so low a price, and usually consisting of a *maximum* of ice with a *minimum* of what in the East-end is called cream, is a secret possessed probably only by the manufacturer himself. Whatever its nature may be, the above instances show that not only is it not harmless, but in some cases absolutely poisonous."

## ANALYSTS' REPORTS.

At the Somerset Quarter Sessions, Mr. W. W. Stoddart, the county analyst, presented his quarterly report. The document set forth that during the last quarter 147 samples had been submitted to him for analysis—two by the general public, and the rest by police superintendents; and, before giving the full details, Mr. Stoddart said the result was satisfactory, as only twenty six of the samples were found to have been adulterated. Mr. Welman (magistrate) remarked that the remuneration of the analyst was much in excess of that given in Devonshire, where the population was about the same. Mr. Speke, another magistrate, said he had looked through the list of articles analysed, and they all seemed to be pepper, mustard, and tea. While no end of pepper, mustard, and tea appeared to have been analysed, there was only one sample of beer. Mustard, pepper, and tea were only used to a limited extent, and would hurt nobody; but, considering the injurious forms of adulterated beer and spirits, it would be far more useful to the poor if examination were directed by the county analyst to those liquids. The Chairman said he had no doubt the Chief Constable would see to this. The Chief Constable intimated his readiness to fall in with any suggestion of the Court.

Mr. J. Carter Bell, Public Analyst for Cheshire, reported to the Court of Quarter Session for that county, that during the past quarter he had examined 44 samples of whiskies, 30 gins, 1 rum, 34 milks, 31 violet powders, 5 coffees, 5 peppers, 4 mustards, 4 teas, 1 vinegar, and 1 lard. He found 59 of them were adulterated. 9 violet powders, which should have been made of pure starch, were almost entirely composed of sulphate of lime, and, as violet powder was chiefly used as a soothing agent for infants' excoriated skin, the sulphate of lime, being in a fine crystallised state, would act as an irritant instead of a sedative.

At the Warwickshire Sessions, Dr. Hill, the county analyst, reported having had 23 samples of food and drink sent for analysis during the quarter. Of these 17 were sent by the inspector of the notorious Meriden district, and 6 from the Aston district. Of these samples 11 from Meriden were adulterated, and all from Aston, namely, 4 of coffee, 1 of milk, and 1 of rum.

Dr. Campbell Brown, the analyst for Lancashire, reports, that during the year 675 samples had been analysed, of which 152 were found to be such as constituted offences against the Act, and 18 were doubtful. Milk was found to be mixed with water in proportions varying from 5 to 60 parts to 100 parts of milk, or was deprived of a very large proportion of its cream; butter contained a fraudulent quantity of water; bread contained alum; and spirits were mixed with an excessive proportion of water, and were frequently raw spirits coloured. Ale contained excess of salt; tea was weighted and coloured with mineral matter, but not to a great extent; coffee was mixed with chicory; preserved peas were coloured with a poisonous salt of copper; cheese was badly prepared and unwholesome; mustard contained flour; and the 2 samples of drugs (1 of which was made up from the prescription of a medical man) were entirely wanting in the principal constituents. The total number of prosecutions was 92; convictions followed in 87, 4 were dismissed, and 1 was withdrawn. The penalties amounted to £235 19s., or within £8 of the previous year; and the costs amounted to £100. Although the number of offences detected was only 7 more than those of last year, and the number of prosecutions and convictions the same, a greater number of samples had been analysed to furnish those cases, so that the percentage of offences had fallen from 27·35 last year to 22·52 this year, and the percentage of convictions from 16 to 13½. It was ordered that this report be printed with the proceedings of the Court.

Mr. E. W. T. Jones, Analyst for the County of Stafford, reports having analysed 231 samples, of which only 31 were adulterated. These consisted of 1 alumed bread, 5 coffees containing chicory, 2 diluted gins, 5 mustards containing flour, 16 watered and skimmed milks, and 1 tea containing lie tea.

Dr. Swete, the public analyst for Worcester, reports:—"During the last quarter I have received 28 articles for analysis; of these 12 were samples of milk, of which 6 were rich good milk; 6 were wretchedly poor, but being within the very low standard I am obliged to consider them genuine. Beer, 3 samples: 1 from Upton-on-Severn, genuine; 1 from Malvern contained a large quantity of salt, the presence of a considerable quantity of sulphate of lime as well led me to consider the mineral nature of the water used to be the source of the *chlorine* found. One from Stourport is in my opinion salted, but as the chemists of Somerset House having recently declared a sample of beer with 68·5 grains of salt to the gallon genuine, I am also bound to give the benefit of the doubt to the vendor. The samples of pepper, oatmeal, and tea were all genuine. Violet powder: Considerable anxiety having arisen from arsenic being added to violet powder, I have received 2 samples from Stourport, which do not contain any poisonous ingredients, I think the arsenical violet powders will be limited to the east of England, one manufacturer having (probably unintentionally) permitted arsenic to be mixed with the cosmetic at Chelmsford. Violet powder has no fixed composition, each manufacturer having his own receipts for the ingredients, but I do not think arsenic would be added as a common adulteration. Four samples of mustard, 1 of mustard condiment, and 1 of coffee, are still under examination." The report was adopted.

Mr. Heisch reports as follows:—"Lewisham, 20 samples received, 16 milk, of which 13 were genuine,



1 contained 30 per cent. added water; 1—22 per cent.; and 1—20 per cent., this last was also skimmed; 2 butter, genuine; 2 violet powder, 1 contained 29 per cent. gypsum; 1—54 per cent. ditto, the rest being starch. Parish of St. John's, Hampstead, during quarter ending July 25th, 17 samples were analysed, milk 8, of which 1 was evidently derived from a diseased cow, and contained blood, pus, and pieces of skin, and Blyth's bodies, and 1 contained only 1·2 fat, the rest were genuine; 9 violet powder, of which 5 were either all starch or contained only 4 or 5 per cent. of Fuller's earth; 2 were entirely gypsum, 1—45 per cent. gypsum, the rest starch; 1—47 per cent. gypsum, and the rest starch.

A correspondent writes to the *Chemist and Druggist* to point out that some time since a number of oysters sent from Oran to Orleans were observed to possess a marked green coloration, the taste was peculiar, tart, and somewhat bitter; on being placed for some time in contact with a polished iron surface a thin layer of metallic copper was deposited. M. Balland ascertained by electrolysis the amount of copper present, and found it to average three milligrammes in each oyster without the shell. Many persons partook of these oysters without any injurious effects. He adds: "of course the addition of copper to food merely for improving the colour of the same must be kept in check, and I do not write with a view of defending such practice." We should think not.

### CORRESPONDENCE.

[The Editors are not responsible for the opinions of their Correspondents.]

TO THE EDITOR OF "THE ANALYST."

SIR,—Having recently examined a large number of samples of violet powder, I have been much struck by the variety of articles sold under that name, and I am inclined to ask the old question, what is violet powder? It is usually believed to consist of starch, and some scenting material, e.g. orris root; but I observe that in a recent case when a dealer was prosecuted for selling violet powder, not being of the quality of the article demanded, he set up the defence that any thing not injurious, might be sold as violet powder, as there is no recognized formula for it, and this defence was considered good by the magistrate, unfortunately the report did not say of what the powder consisted. Now it seems to me that if the powder is not of such a nature as to answer the purpose for which it is intended, it comes within the meaning of the 6th clause of the Sale of Food and Drugs Act, though it may contain nothing absolutely deleterious. The purpose as I believe for which violet powder is used, especially in the nursery, is as a desiccant, and to prevent chafing. The question, therefore is, will the articles sold answer these purposes properly? Now, the substance I have most frequently found in the violet powders of commerce is ground gypsum in sharp crystalline particles and fully hydrated, the quantity varying from 29 per cent. as a minimum, to 100 per cent. as a maximum; fully two thirds of the samples examined varied within these limits. How hydrated sulphate of calcium can act as a desiccant I cannot conceive, and the sharp crystalline grains would I should think, if applied to an irritable skin, be anything but soothing. Ought not the sale of such powder to be stopped? No one would purchase it if they knew what it was, yet it can hardly be said that gypsum is a deleterious substance, though I believe under certain circumstances it would produce deleterious effects.

July, 1878.

CHARLES HEISCH.

*From the "Pharmaceutical Journal."*

#### VIOLET POWDER.

SIR,—In common, no doubt, with other analysts, I have received a great number of samples of violet powder for analysis, and without offering an opinion as to what the composition of articles bearing that name ought to be, I have considered it my duty to endeavour to allay any unnecessary alarm which recent lamentable accidents connected with the use of such articles have tended to produce. You have, I think, sufficiently indicted in your leader last week that the term "violet powder" is applied to several preparations, differing greatly in composition, and not always used for the same purpose. I can fully confirm your statement that there are two principal varieties of so-called violet powder in commerce, starch forming the basis of one, and hydrated sulphate of calcium that of the other, while there are several sub-varieties produced by the addition of other ingredients. But while I admit the justness of your remarks in some respects, I cannot agree with your implied objection on merely inferential grounds to the use of hydrated sulphate of calcium as a dusting powder. It has been long and very extensively used, without, as I am informed, any fault having been found with it, and in cases that have come under my immediate observation it has proved very beneficial, and in the estimation of those using it sometimes preferable even to starch.

T. REDWOOD.

*From the "Pharmaceutical Journal."*

SIR,—I have been connected for more than forty years, man and boy, with the retail drug trade, and have during that rather lengthened period always understood that what is called "violet powder" was a composition of starch powder, orris root powder and a little perfume; the first article being about 95 per cent. of the whole. It seems, however, that I have been mistaken, and that terra alba, magnesia, etc., are the legitimate ingredients. When such an authority as Professor Redwood speaks, there is nothing left for a humble mortal like myself then to "baïsser la tête et croire."

DUM VIVO DISCO.

## LAW REPORTS.

**SELLING FICTITIOUS BUTTER.**—Ann Southall, grocer, of Portobello, was charged with selling adulterated butter. On the 29th of April, Samuel Toy, assistant to Mr. Horder, Inspector under the Adulteration Act, visited the Defendant's shop, and purchased a quantity of butter. A portion of it was sent to Mr. Jones, the analyst, who certified that it did not contain a trace of butter, but was a fictitious article. The defendant said she bought it for genuine butter. Mr. Spooner: You shall not sell such a thing, poisoning people. Defendant said Toy asked for butter at a 1s. a pound. Mr. Spooner: You will be fined £5 and costs.

**BUTTERINE.**—At the Liverpool Police Court, Mr. William Holmes, provision dealer, was summoned for selling butterine as butter. Inspector Ibbs stated that on May 31 he visited the defendant's shop and asked to be served with a pound of butter, which he received and paid 6d. for. He then told the person who served him who he was, and that he should have the butter analysed, and the reply was made that it was "all right," as it was labelled, and witness's attention was called to a label on a tub of butter outside the shop with a large figure of 6 printed on it, and underneath in small print the word "butterine." The tub from which witness was served was not labelled, neither was the paper in which the sample was wrapped. Mr. Atkinson said that Dr. Brown, the borough analyst, had analysed the sample, and reported that it was "perfectly clean and wholesome, and was a good substitute for butter. Mr. Raffles: Then why do you prosecute them? Mr. Atkinson: We prosecute them because it must not be sold as butter. Mr. Raffles (To Inspector Ibbs): I suppose you knew perfectly well that you could not get butter for 6d. a pound. Inspector Ibbs: Well, I get it higher up the road for 6d. a pound. Mr. Raffles: What! pure butter? Inspector Ibbs: Yes. Mr. Raffles remarked that the person who sold pure butter at that price ought to get plenty of custom. Mr. Segar, on behalf of the defendant, contended that the spirit of the Act of Parliament had not been infringed, and said that the defendant had gone to Dr. Brown, and the latter had told him that he ought to affix a label on the article. Mr. Raffles said that if the defendant had put a paper round the article and stated that it was butterine, he would have been all right; but he had not done so. He must pay 5s. and costs.

**IMPORTANT JUDGMENT.**—*SANDYS v. SMALL.*—In the High Court of Justice, Queen's Bench Division, Westminster, the Lord Chief Justice and Mr. Justice Mellor, heard the case of Sandys v. Small, which was an appeal from a decision of the justices of Derbyshire in a case where defendant, a publican at Langley Mills, was charged with selling whiskey adulterated with water in contravention of the terms of the Food Adulteration Act. The appellant is inspector of nuisances for the county of Derby; and in March last he sent a man named Slack to the Defendant's premises, where he purchased half a pint of whiskey, which was afterwards found mixed with water, upon which the defendant was proceeded against under Section 6. The magistrate, however, dismissed the case on the ground that the terms of the Act were complied with by the publican, inasmuch as he displayed in conspicuous positions in his bar-parlour and smoking room, cards containing the intimation that all spirits sold in that establishment were mixed; and, further, that the inspector, and not some one on his behalf, was the person to have purchased the whiskey, if it was alleged he was prejudiced by the sale. The justices now submitted a special case for the decision of the Court, Mr. Wills, Q.C., appearing for the appellant (the inspector), and Mr. Mellor, Q.C., for the respondent (the publican). The Lord Chief Justice remarked that the inspector was to see that no frauds were practised by the sale of inferior articles. But when the inspector knew that no fraud was practised or attempted to be practised, was not the prosecution a vexatious one? Mr. Wills: The man swore that he did not. The Lord Chief Justice: He swears by the card in saying that he did not see it "at the moment" he bought it. The man bought it with his eyes open, and I cannot imagine any moral delinquency. Mr. Wills: Then I shall ask to have the case remitted, to have the fact found out whether the inspector had notice. The Lord Chief Justice: Then Section 14 says that the person purchasing the article with the intention of having it analysed shall "forthwith" notify his intention of having it analysed by a public analyst. Now, he did not do that; he sent another man to make the purchase. Mr. Justice Mellor: And there might be tampering with the article in the meantime. The man who went in had a sort of "concealed principal" in the inspector. The Lord Chief Justice: I do not see how this inspector is "prejudiced;" he did not drink the whiskey; Mr. Wills: Then Section 13 is a dead letter; it abolishes the officer of health. The Lord Chief Justice: There are two classes of persons to prosecute—a member of the public, and the public analyst. Section 6 gives power to the purchaser to prosecute where an offence has been committed; and Section 13 gives power to the inspector to have it analysed; but it creates no offence. I am of opinion that this appeal must be dismissed. I should be very sorry indeed if in so holding I

thought I was doing anything to diminish the efficacy of a most useful Act of Parliament—useful, at all events, in this sense, and to this extent, that it is intended to prevent frauds being committed by the sellers of adulterated articles to the poorer classes of consumers, who have no means of ascertaining whether they really do get the article that ought to be supplied to them, and upon whom, independently of the protection that this Act gives, there is no doubt that very serious frauds were committed, which the Act to a great extent has been the means of preventing. Still, we must see that we do not unduly and unnecessarily interfere with the relation of seller and buyer to the prejudice of either, and I think we should be doing that if we extend the case in which both parties are perfectly aware of the terms on which they are dealing—if we were to extend to such cases provisions which were intended to apply only to clandestine fraudulent transactions on the part of the seller to the prejudice of the buyer. It seems to me that the true construction of Section 6 and the provisions which immediately follow it is this: that when a seller professes to sell a particular article, and he sells that article altered in some manner by the admixture of something else, it must be taken that he does it to the prejudice of the purchaser, unless the fact is duly and sufficiently brought to the knowledge of the purchaser; but if the alteration of the article by the admixture of something else, as the alteration of spirits by the admixture of water, is brought to the knowledge of the customer, and the customer chooses to deal on that footing and purchase accordingly, it never can have been intended that the dealing as carried on to the satisfaction of both parties should be interfered with. But, on the other hand, if the seller chooses to sell under the character of a given denomination of food, whether in the shape of drink, food, or drug, he chooses to sell the article with a certain admixture, it must be upon him—it is incumbent upon him—to prove that the purchaser knew what he was purchasing in respect of the quality of the article. The statute has provided him with means of insuring himself protection against the possibility of the presumption which otherwise presents itself operating to his prejudice; for the statute has expressly provided that if he in any way affixes or attaches to the thing which he sells a printed or written notice of the alteration which has been made in its quality, he then gets rid of the possibility of being charged with fraud within Section 6. If he does not have recourse to that, then, I think, it is incumbent upon him to prove that the presumption which otherwise would attach to the sale is in the particular instance unfounded. If he can show that he communicated, whether by this means or by that, that he brought home distinctly and expressly to the knowledge of the customer that the quality of the article had been affected by the admixture of some foreign ingredients, then he does not commit an offence within Section 6, because he does not sell the altered article to the prejudice of the purchaser. Both parties are left perfectly free to deal on that footing. Supposing that a man stuck over the bar where the spirit is sold, in clear and unmistakable terms, in words printed in sufficiently large capital letters, "The thing which I sell here is so many per cent. below proof," he would not, in my opinion, come within the 6th Section, although he might not affix the label to the gin or anything else which was sold, because it was not sold to the prejudice of the purchaser. The customer knows that he can get it cheaper by taking it in that way. I think, therefore, in the present instance there was no proof that the purchaser did not perfectly well know, or the man employed by the purchaser, that there was a notice in the bar and tap-room where spirits were sold that the spirits were not sold pure in quality. Mr. Wills says there may be some doubt about it, and that is the ground on which we are asked to show a favour to the respondent. I think in this matter, it being perfectly clear, beyond all possibility or dispute, that the appellant had in this instance stuck about in various parts, in a manner perfectly conspicuous to all customers, that he did not profess to sell spirits pure or up to proof, we will not send it back for the sake of the appellants, since in this particular instance we should be harassing the defendants unnecessarily, the man not having committed any offence against the statute. That being so, and as I think there is no offence within the meaning of the 6th Section, it seems unnecessary to consider whether the provisions of the statute as to the notice of the intended analysis being given, have been substantially complied with. Mr. Justice Mellor: I am of the same opinion. I should have been glad if the magistrates had specifically found the matter which Mr. Wills contends is rather to be inferred from what has taken place than not. They have not so done, and I agree generally in the construction of the section which has been put on it by my lord. I believe in a case where, under the circumstances that notice was given that gin or whiskey, or any spirit sold at that public-house were all of them mixed as the notice itself specified, not specifying the exact amount, but in large letters stating "all spirits sold here are mixed"—then, under sections 8 and 9, the notice is put opposite the bar window; and although it is said in the case that the man who bought the spirits "at the moment" did not see it, certainly I should infer that though he did not "at the moment" see it, it must have the meaning that at some decided moment he might not, but that he saw directly after, and before he paid the money, and before any notification could be given to the party of the intention to submit the matter to analysis. Then I think that it is not a case one would desire to send down again. The facts on any future occasion may be gone into more fully and more specifically, but in the way in which the magistrates have submitted it they seem to raise questions rather affecting a proviso than affecting the general section which raises the offence. Certainly with regard to that it may be a question. If this man intends to

protect himself absolutely, I think it would be a more prudent course, whatever the result of this case, that he should actually deliver a notification—a printed paper that it is so-and-so, and not to stick it on the bottle or post it up, but, in handing the article over to the purchaser, to deliver the notice. I don't wish to give any definite opinion on these points, because in my view it is unnecessary, for I agree with my lord that we are justified in coming to the conclusion that the offence was not actually committed. Under these circumstances, we ought not to send it down again, and, therefore, the appeal must be dismissed. The appeal was then dismissed, but without costs.

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#### NOTES OF THE MONTH.

Our contemporary, the *Chemist and Druggist*, which of course was down on Mr. Allen in an article headed "*Analysis*," based mainly on the Selby flour case, now states that 'it was not its intention to impute malice to Mr. Allen, and it does not think the article will bear that construction.' Of course not. Mr. Allen was not malicious, he only (we quote literally) "prided himself on the number of convictions he can secure," and there is "scarcely any business he has not taken in hand with the view of reforming." It is a comfort to think that the author had no occult intention in making such statements, but if there be not malice in the article we fail to understand the English language. We specially note that while the detraction (?) was published in a leading article, the apology is only printed as a paragraph at the end of Mr. Allen's letter. Thus a trade journal will try to take an analyst's character away, but has not the courage when fairly met to support its innuendos. If instead of always abusing public analysts the *Chemist and Druggist* would turn round on those undercutting (so-called) wholesale houses which imperil the honour of the honest retailer by selling him trash, after alluring him by low prices, it would be performing a real good to the trade it claims to represent. But, unfortunately, it is not the poor retailers that are the best advertisers; so how can a trade journal be expected to look after them when it can indulge in the more profitable—more congenial—and more sensational luxury, of stabbing in the back a class of men whose duties are difficult and whose position is irksome.

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Talking about analysts leads to a curious reflection. According to the trade journals the analyst alone is responsible for all prosecutions, and nothing is said against the inspector who actually buys, or the local authority which institutes and carries on the prosecution. Would they, we wonder, give any sympathy to an analyst who in the exercise of that discretion which they always presume he possesses, advised his vestry that although a certain article was not exactly what it was supposed to be, yet they should not prosecute because a trade custom had long consecrated the sophistication? Would they also be prepared to find that the analyst received for his trouble a curt intimation that such remarks were not his business—the vestry alone would decide and that in future he was simply to state the composition of articles? If such a case had gone on and been dismissed, as it very likely would have been, would this have been another "incompetent analyst"?

Will some of our friends, such as the *Chemist and Druggist*, kindly advise how an analyst should act in such a case so as to escape abuse from either one side or the other, or from both afterwards?

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Here is another curious reflection. Analytical chemists are at best only men, and *errare est humanum*. Suppose, then, an analyst gives a report which is a matter of

opinion, and on the *same results* the Somerset House chemists give a different opinion. Is not that a thing which happens every day in our law courts? Is there, therefore, a journal devoted to the abuse of vice-chancellors every time their decision is reversed on appeal? On the same principle why will not the *Chemist and Druggist* devote a column to racy innuendos against the judge who decided against their side in the prescribing druggist's case, supposing there should on appeal be a reversal in their favour. Surely what is sauce for the goose of an analyst, is also that for other ganders!

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There is one thing, however, to be said in favour of the *Chemist and Druggist*, which is, that it makes no pretence of impartiality, or of being more than a good trade journal, giving the best of practical information, and were it not for its craze on the subject of analysts, it would be an excellent journal of its class. But, what shall be said of the *Pharmaceutical Journal*, supposed to be the impartial organ of a great society—setting itself up for a scientific print—edited by a person who is himself an analytical chemist,—and yet lending itself to a system of traduction. In it we have articles directed to cast aspersions on analysts holding *public* appointments, and under that guise of science and impartiality, secretly bolstering up adulteration. A very fine specimen of the method of throwing discredit on his *confrères* was exhibited in a leaderette as to selling decomposed *spirits of nitre*. How would the editor like us to hint in the same manner that his certificate of analysis would, if tested in court, be found wanting? Such writing may be racy, but it is decidedly unprofessional.

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A discussion has, it seems, been going on in New York as to the desirability of the so-called butterine or oleomargarine as an article of food, and we have read a report, accompanied by analysis, stated to have come from the "Department of Agriculture at Washington" upon its properties. We are not aware who the eminent gentleman was in whose hands the sample was placed, but his competence to deal with the subject may be judged by the following extract from his report. He says—"the composition of the material shows no marked deviation from that of ordinary butter as found in the market, and there is no evidence of the presence of anything injurious or abnormal." The analysis on which this statement is founded reports the estimation of the total fat, casein, salt, sugar (?) and water. As, therefore, no attempt has been made to look into the character of the fat by the estimation of the fatty acids, it is not astonishing that nothing abnormal was found. The best of the joke is, however, yet to come, as the analyst then proceeds to say—"I also give below an analysis of butter found upon record, *not having had time to complete one myself as yet (!)*" After this statement it is not astonishing to find that the so-called analysis of the butter is also based upon the same lines. In conclusion, this authority says, when comparing butter and oleomargarine—"by these it will be seen that while the constituent parts are identical, there is a considerable variation as to quantities, especially as regards water and salt." We trust that American chemists are not generally so far behind the age.

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On the other hand we have a statement in the American *Dairyman* in which the writer shows a great distinction between the two articles, and urges upon the attention of those interested, the important fact, that the butterine may become the carrier of morbid secretions, germs of disease, and embryos of parasites; especially when pork fat is

employed. He bases this warning on the fact that owing to the low temperature at which the fat is melted it is virtually raw. To this the manufacturers answer that no pig's fat is ever used. As far as we see the truth lies somewhere between the two statements. That butterine is identical with butter in composition is simply nonsense; but that it is an agreeable and as a rule harmless form of preparing fat for consumption must be admitted, and there would be no objection to it if provision dealers would only be honest and cease to sell it as butter.

We have often pointed out the effects of locality on adulteration, but this month we have another unique illustration. Two persons are summoned for selling butterine as butter. One defendant alleged that she bought it as butter, so she was mulcted £5. The other defendant knew that it was butterine, although he sold it as butter, and he had only five shillings to pay. Therefore the greater offender has the least penalty, and Portobello is better protected than Liverpool.

### RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1877. No.	Name of Patentee.	Title of Patent.	Price.
4286	J. H. Kidd ... ..	Treating Refuse and Sewage to obtain Manure ... ..	6d.
4359	W. L. Wise ... ..	Disoxygenising Atmospheric Air ... ..	6d.
4465	R. Rawlinson ... ..	Treating Bone ... ..	2d.
4491	F. M. Lyte ... ..	Manufacture of White Lead ... ..	4d.
4542	P. Jensen ... ..	Isinglass, Gelatine and Glue ... ..	2d.
4558	A. M. Clark ... ..	Hydraulic Limes and Cements ... ..	4d.
4420	J. F. G. Kromschöder	Carburetted and Purifying Coal Gas ... ..	6d.
4453	R. Taylor ... ..	Cleaning Tin or Terne Plates, &c. ... ..	6d.
4580	M. K. G. Lieber ... ..	Manufacture of Soda and Potash, &c. ... ..	2d.
4618	H. B. Condy... ..	Treatment of Aluminous Earth ... ..	4d.
4638	L. T. Froideville and H. Taponier ... ..	Anti-calcareous Composition for preventing incrustation in Steam Boilers ... ..	2d.
4642	R. Werdermann ... ..	Phosphoretted Iron ... ..	2d.
4671	J. H. Jonson ... ..	Production of Saccharate of Lime ... ..	2d.
4672	J. H. Jonson ... ..	Purification and Treatment of Saccharate of Lime ... ..	4d.
4769	C. D. Abel ... ..	Treatment of Hydro-carbons ... ..	4d.
4479	P. Aube ... ..	Manufacture of Gas ... ..	6d.
4682	H. H. Murdoch ... ..	Manufacture and Refining of Sugar... ..	6d.
4717	A. Jay ... ..	Mixture for preventing incrustation in Boilers ... ..	2d.
4732	R. Calme ... ..	Blasting Powder ... ..	4d.
7765	J. W. Swan and B. S. Proctor ... ..	Purification of Opium ... ..	4d.
1878. 314	W. V. Wilson ... ..	Manufacture of Cyanogen products from Gas residues ... ..	2d.

### SOCIETY OF PUBLIC ANALYSTS.

The next meeting will take place at Dublin, during the meeting of the British Association, and will be held at the Royal College of Surgeons, Stephen's Green.

### BOOKS, &c., RECEIVED.

Aids to Chemistry; Phosphates in Nutrition, Anderson; Payne's Industrial Chemistry, Paul; The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Medical Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Country Brewers' Gazette; The Dairyman; The American Dairyman; The Practitioner.

# THE ANALYST.

SEPTEMBER, 1878.

## SOCIETY OF PUBLIC ANALYSTS.

A GENERAL MEETING was held on the 19th August last, at the Royal College of Surgeons, Dublin, Dr. Wallace, F.R.S.E. in the chair and Dr. Cameron acted as Secretary.

The minutes of the previous meeting were read and confirmed.

Messrs. Estcourt and Stewart were appointed scrutineers to examine the ballot papers and reported that Messrs. R. Mc Alley, of Falkirk; Thomas Woods, of Parsonstown; H. Leicester Greville, of London; W. Mc Cowan, of Greenock; and A. Ashby, of Grantham were duly elected members.

Dr. Cameron read a paper "On the Inconstant Composition of Well-waters," and Dr. Wallace, Mr. Allen, Mr. Estcourt, Mr. Stewart, and Mr. Braham joined in the discussion which ensued.

Dr. Cameron also read a paper "On the Solubility of Plumbic Iodate."

Mr. Estcourt read some "Notes upon the desirability of fixing by analysis some standards of value for beer based upon the qualities usually sold in large towns," on which Dr. Cameron, Mr. Braham, and Mr. Allen made some remarks.

Mr. Allen read a paper "On the distinctive tests for Carbolic Acid, Cresylic Acid and Creasote," on which a general discussion took place.

Mr. Wigner's third paper "On the Nitrogen Compounds present in the Cereals," was postponed owing to his indisposition.

## ON THE DISTINCTIVE TESTS FOR CARBOLIC ACID, CRESYLIC ACID AND CREASOTE.

By ALFRED H. ALLEN.

*Read before the Society of Public Analysts, at Dublin, on 19th August, 1878.*

SEVERAL observers have devised methods for distinguishing carbolic acid from wood-tar creasote, and have described tests which, when applied to the pure substances, leave little to be desired.

It appears, however, not to have been observed that cresylic acid, so largely present in the commoner kinds of carbolic acid, resembles creasote more closely than pure carbolic acid does, and fails altogether to respond to some of the tests which have been proposed for distinguishing carbolic acid from creasote. As any substitution of the coal-tar acid for wood-tar creasote is pretty certain to be made by the employment of a crude variety of carbolic acid, the presence in the latter of cresylic acid cannot rightly be ignored.

With a view of clearing up the discrepancies between the results recorded by other observers, and of ascertaining the most desirable tests for distinguishing carbolic and cresylic acids from wood-tar creasote, I have instituted a series of special experiments.

As the origin of some of the statements made by other observers cannot be traced,

owing to imperfect descriptions of the substances on which they worked, I think it well to define carefully the exact substances on which my own experiments were made.

The *Carbolic Acid* was a sample of Calvert's No. 1, for internal use; boiling point, 182° C.

The *Cresylic Acid* I prepared by fractional distillation of Calvert's No. 5 carbolic acid. The portion coming over between 195° and 205° C was collected separately, and again distilled, the first and last portions being rejected. The cresylic acid thus obtained, boiled chiefly at about 197° C, but another smaller fraction boiled at 203° C. I believe this difference is due to the presence of two isomeric creasols in coal-tar, having slightly different boiling points. Many of the experiments were made separately on both fractions, but without the least further distinction in their properties becoming apparent. The distillations were conducted in an atmosphere of coal-gas.

The *Creasote* was a sample of Morson's wood-tar creasote. It boiled at 217° C, and so probably consisted chiefly of creasol ( $C_3 H_{10} O_2$ ), as guaiacol boils at 200° C.\*

It was pointed out by Calvert many years ago, that carbolic acid forms a crystalline hydrate of the composition  $C_6 H_6 O, H_2 O$ , which fuses at 17° C. This fact is usually ignored by the book-makers, though well known to carbolic acid manufacturers. This hydrate would contain 16·07 per cent. of water. When water is gradually added to carbolic acid with repeated shaking, the crystals become liquified and at length a portion of the water remains at the surface.

In order to ascertain how much water carbolic acid would take up, a quantity of about 10 grammes of the crystallized acid was melted and boiled for a minute or two in a small weighed test tube to drive off traces of water. After cooling, it was weighed. Cold water was then added gradually, with repeated shaking, until about ·2 c.c. remained as a layer on the surface of the liquified acid. This was then removed by cautious use of wet blotting-paper, and the residual carbolic acid was weighed. 9·190 grammes were found to have increased to 12·527, which gives 26·6 per cent. as the proportion of water in the liquid acid. On repeating the experiment, a liquid acid containing 27·0 per cent. of water was obtained. This fact is of importance, as showing that carbolic acid will take up far more water than is commonly supposed. The proportion is also of interest, as it corresponds pretty closely with the formula  $C_6 H_6 O, 2 H_2 O$ .† Hence the liquid acid may be regarded a definite hydrate of phenol, but the fact that warm carbolic acid will take up a larger proportion of water than the above, and that the water is entirely separated by agitation with benzol, is against this supposition.

On trying a similar experiment with cresylic acid, I found that the water absorbed amounted to 13 per cent. of the hydrated acid. On repetition, the product contained 14 per cent.

$C_7 H_8 O, H_2 O$  requires 12·7 per cent. of water.

In the subsequent experiments, when mention is made of hydrous carbolic or cresylic acid, the products obtained as above are to be understood.

1. *Action of Cold*.—Absolute carbolic acid is solid at ordinary temperatures, and the hydrous substance solidifies in a freezing mixture of hydrochloric acid and crystallized sulphate of sodium. Neither absolute nor hydrous cresylic acid, nor creasote, shews any signs of freezing on exposure to the same degree of cold.

\* According to some observers at 210° C.

† The theoretical proportion of water in this compound would be 27·69 per cent.



2. *Solubility in Water.*—20 c.c. of water at about 17° C dissolves 18 c.c. of hydrous carbolic acid. This corresponds to a solubility of 1 volume in 11.1 of water. Hence the saturated aqueous solution contains 8.56 per cent. by weight of the absolute acid, corresponding to a solubility of 1 part by weight of absolute acid in 10.7 parts of water. This is a far greater solubility than is generally attributed to carbolic acid, the discrepancy being probably due to an impure acid being generally used. In hot water carbolic acid is still more soluble.

Hydrous cresylic acid dissolves in about 29 measures of water at about 20° C, which represents a solubility of 1 part by weight of absolute cresylic acid in about 31 parts of water.

3. *Solubility at 15.5° C (=60° F) in Solution of Caustic Soda containing 6 per cent. of NaHO\*.*—Absolute carbolic acid is completely soluble in an equal volume of soda solution containing 6 per cent. of pure NaHO (free from alumina); addition of more of the alkaline solution up to 6 volumes causes no change, the liquid remaining perfectly clear.

Absolute cresylic acid is insoluble in small proportions of 6 per cent. soda solution. When a large excess (9 volumes) is added, it disappears and forms distinct crystals.

Creasote is practically insoluble in 6 per cent. soda.

4. *Solubility at 15.5° C in Solution of Caustic Soda containing 9 per cent. of NaHO\*.* Absolute carbolic acid is soluble in an equal measure of 9 per cent. soda. On addition of any proportion of water up to 7 volumes the liquid remains clear, but is precipitated by 8 volumes of water. Carbolic acid is also soluble in two measures of 9 per cent. soda, and is not precipitated by less excess of the reagent than 5 or 6 measures.

Absolute cresylic acid is soluble in an equal measure of 9 per cent. soda, but is precipitated when the proportion of the reagent is increased to 3½ volumes. If to a clear mixture of equal volumes of cresylic acid and 9 per cent. soda, a few drops of water be added, precipitation occurs, and when the proportion of water is increased to one volume the original bulk of cresylic acid separates out. Hence, cresylic acid is insoluble in two measures of 4½ per cent. soda solution.

Creasote is insoluble in any smaller quantity than two volumes of 9 per cent. soda. It is partially reprecipitated when the proportion of the solvent is increased to more than 3½ measures.

5. *Solubility at 15.5° C in Solution of Ammonia* (sp. gr. .880.) Absolute carbolic acid is completely and readily soluble in an equal volume of strong ammonia. The solution is not precipitated by addition of less than 1½ volumes of water. A mixture of 1 part of carbolic and 3 of cresylic acid is soluble in an equal measure of ammonia, but the solution is precipitated on adding even a few drops of water.

Cresylic acid is almost insoluble in ammonia, requiring upwards of 16 volumes for solution, and then forming crystalline scales similar to those obtained by the use of soda.

Creasote is practically insoluble in ammonia, requiring 60 to 80 volumes for solution.

6. *Behaviour with Benzol.*—Absolute carbolic and cresylic acids and creasote are miscible with benzol in all proportions. The hydrous substances dissolve in 5 volumes of benzol with complete separation of the water. Hence benzol may be used for the determination of the proportion of water present in samples of carbolic and cresylic acid.

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\* These solutions contained respectively 94 and 91 grammes of water to each 6 and 9 grammes of pure caustic soda.

7. *With Chloroform, Carbon Disulphide, or Ether.*—Carbolic acid, cresylic acid, and creasote, react in much the same manner as with benzol. Agitation with 9 per cent. soda removes them from their solutions in the above solvents.

8. *Behaviour with Petroleum Spirit of sp. gr. .699* (commercial "benzoline.") Absolute carbolic acid dissolves half its volume of petroleum spirit, forming a clear liquid. On addition of a larger proportion of petroleum spirit precipitation occurs. With one volume of carbolic acid and three of petroleum spirit, the layers have about the same measures as the original liquid. Each layer however contains both liquids, as may be proved by cooling the tube with a freezing mixture (or by wrapping filter paper round it, and dropping  $\text{CS}_2$  on the outside) when carbolic acid crystallizes out. Absolute carbolic acid is permanently soluble in about ten measures of petroleum spirit at  $15.5^\circ\text{C}$  ( $=60^\circ\text{F}$ ). The solubility is enormously increased by rise of temperature. Hence carbolic acid and hot petroleum spirit are miscible in all proportions; on the other hand, by cooling with a freezing mixture, the carbolic acid is almost wholly deposited. If the cooling occurs slowly, it forms a heavy liquid layer with a portion of the petroleum spirit, but by rapid cooling, the carbolic acid is deposited in long crystalline needles, which render the liquid semi-solid.\*

Hydrous carbolic acid is almost insoluble in moderate quantities of cold petroleum spirit, which does not separate the contained water from it. (Another difference between benzol and petroleum spirit.)

Absolute cresylic acid appears to be miscible with petroleum spirit in all proportions. No separation, either of crystals or liquid, occurs by exposing a solution of one measure of the acid in three of petroleum spirit to a freezing mixture.

When hydrous cresylic acid is treated with cold petroleum spirit, the volume of the former increases somewhat by dissolving a little of the spirit, but on addition of a greater volume of petroleum spirit it undergoes slight solution. It is only very sparingly soluble in petroleum spirit, requiring upwards of twenty volumes for complete solution, when the water separates. Creasote is miscible with petroleum spirit in all proportions.

9. *Behaviour with Glycerine of 1.258 sp. gravity.*—Absolute carbolic acid is miscible with Price's glycerine in all proportions. A mixture of one volume of carbolic acid with one of glycerine is not precipitated by an addition of three volumes of water. In presence of 25 per cent. of cresylic acid, precipitation occurs on adding more than two volumes of water.

Absolute cresylic acid is miscible with Price's glycerine in all proportions. A mixture of one volume of glycerine and one of cresylic acid is completely precipitated by one volume of water. Creasote is insoluble in Price's glycerine, whether the latter be added in the proportion of one, two, or three volumes for one of creasote.

The sample of Price's glycerine used for the above experiments was found to have a density of 1.258.

10. *Behaviour with Collodion.*—Absolute carbolic or cresylic acid when shaken with half its measure of *Collodium B. P.* precipitates the nitro-cellulose in a transparent gelatinous form very difficult to see. It is best observed by inclining the tube and causing the

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\* Crystallized carbolic acid may be used for distinguishing between coal-tar, benzol and petroleum spirit. In the latter it is sparingly soluble, and is re-deposited in a crystalline state by rapid cooling. With benzol it is miscible in all proportions (the crystals of carbolic acid rapidly melting), and a solution of one measure in three deposits no crystals by rapid cooling.

liquid to flow gently from one end to the other. Creasote does not precipitate the nitro-cellulose from collodion, but mixes perfectly with its ethereal solution. Addition of much creasote to a mixture of collodion and carbolic or cresylic acid, causes the re-solution of the precipitated nitro-cellulose.

11. *Reaction with Ferric Chloride.*—The addition of one drop of a ten per cent. aqueous solution of ferric chloride to 15c.c. of an aqueous solution of cresylic or carbolic acid, causes a permanent violet-blue coloration. When creasote is similarly tested, a blue colour results, which almost instantly changes to green and brownish-yellow.

Other distinctive tests for creasote and carbolic acid are to be found in the books, but are almost worthless in practice. Thus the reactions with bromine, sulphuric acid, and nitric acid, are far too much alike to be of service for distinguishing between these bodies. It has been stated that creasote differs from carbolic in its power of rotating a ray of polarized light. I redistilled a sample of Morson's creasote to obtain it colourless, and carefully tried this test, expecting to find in it a possible means of determining the creasote in a mixture, but the rotatory power of creasote proved so exceedingly weak as to be quite worthless for the intended purpose, or even as a qualitative test. It is, however, quite possible that different samples of creasote may exhibit considerable differences in this respect, but if so, the test is valueless for quantitative purposes, and the problem is not so much to detect wood-tar creasote as to recognise an admixture of the coal-tar acids. I am also unable to confirm the statement that creasote gives a solid deposit when kept for some hours at the temperature of boiling water. I have not obtained satisfactory results by the reaction of an alkaline solution of the substances with hydrochloric acid and pine-wood, or with a solution of iodine in iodide of potassium.

From the foregoing details it will be seen that in various manners carbolic acid, cresylic acid and wood-tar creasote can be readily distinguished from each other. The case, however, is very different when we have to deal with a mixture of the three substances, such as occurs in the case of a sample of creasote adulterated with crude carbolic acid. In such a case many of the tests are greatly reduced in value or rendered absolutely worthless. As the problem is to detect the coal-tar acids in presence of wood-tar creasote rather than the reverse, only affirmative tests for the former bodies are of service, and in many cases these are seriously modified by the simultaneous presence of creasote. Thus, as has been pointed out by Mr. J. Williams, the ferric chloride test entirely fails to detect the presence of carbolic acid in a mixture of equal parts of that substance and creasote. The only marked differences I have been able to observe between Morson's creasote and a mixture of equal measures of that liquid and Calvert's No. 5 carbolic acid, are the following:—

4. When shaken with twice its bulk of 9 per cent. soda solution pure creasote was dissolved, and remained in solution when the solvent was increased to three volumes. The mixture was insoluble either in two, three or four times its volume of 9 per cent. soda. This anomalous result proved to be due to the presence of water, which reduced the strength of the soda solution. When the water was previously expelled by boiling the mixture of crude carbolic acid and creasote, solution took place with two volumes of soda.

9. When shaken with Price's glycerine (sp. gr. 1.258) pure creasote remained undissolved, though the proportion of glycerine was varied from one to three volumes. The mixed creasote dissolved completely and readily in an equal measure of glycerine.

The liquid was not affected by a drop or two of water, but a further addition caused precipitation. A mixture containing 25 per cent. of creasote, when shaken with an equal measure of glycerine, was not precipitated by less than one and a quarter volumes of water.

10. Shaken with half its volume of collodium (B.P.) pure creasote dissolved to a clear liquid. The mixed creasote showed decided signs of precipitation when the liquid was allowed to run gently from one end of the tube to the other. With a mixture of two volumes of Calvert's No. 5 acid to one of creasote, the precipitation of the nitro-cellulose was very marked.

As carboic acid, cresylic acid, and creasote boil at temperatures tolerably widely apart, I thought it might be possible to effect a sufficient separation by fractional distillation, to enable the test for the coal-tar acid to be more readily applied. For this purpose I introduced a mixture of No. 5 carboic acid and Morson's creasote into a small retort and distilled the liquid. The water, which came over first, was collected separately. The next portion of the distillate (amounting to about one-fifth of the whole bulk of the liquid) was boiled to free it from a little water, and was then tested with glycerine and with collodium. It dissolved readily in the glycerine, and precipitated half its volume of collodium. Hence the carboic acid of the mixed creasote was fairly detected, and there seems no reason why fractional distillation should not serve for the detection of smaller proportions of carboic acid, as it will certainly be most abundant in the first portion of the distillate. The ferric chloride test was not found of service for testing the distillate, sufficient creasote being present to produce a decided brown coloration.

As the tests with glycerine and collodium are the only reactions of service with mixtures of carboic acid and creasote, I did not think it necessary to apply the other tests to the distillate.

It will be seen from my experiments that the high value usually attached to the glycerine test is amply justified. It has been stated that pure creasote was soluble in anhydrous glycerine. This is certainly not my experience, but if it be true that some varieties of creasote dissolve in absolute glycerine, they will doubtless be precipitated by the least dilution, and can thus be distinguished from mixtures containing considerable proportions of the coal tar acids.

Mr. J. Williams examined a sample of German creasote which was supposed to be pure and which dissolved in glycerine, but the fact that 40 per cent. of the sample distilled at 200° to 203°C., together with other characters, render it very probable that it contained an unacknowledged mixture of the coal-tar acids. It must not be forgotten that cresylic acid is much cheaper than carboic acid, and is far more difficult to distinguish from creasote even when unmixed with the last substance.

I have thought it best to place my results on record in the fullest possible detail, as it is just the omission to do this that has caused so many confusing and incorrect statements to appear in our test books. The tests described are remarkably liable to failure when the conditions are slightly varied. This is notably the case with the reactions with solutions of soda, a change of a temperature or strength of the solvent causing extraordinary variations in the results.

Many of the experiments described in this paper were made under my direction by Mr. L. ARCHBUTT, to whose perseverance and accurate observation I am much indebted.

NOTES UPON THE DESIRABILITY OF FIXING BY ANALYSIS SOME STANDARDS OF VALUE FOR BEER BASED UPON THE QUALITIES USUALLY SOLD IN LARGE TOWNS.

By CHARLES ESTCOURT, F.C.S.

*Read before the Society of Public Analysts at Dublin, 19th August, 1878.*

THAT some definite standards both of strength and composition should be recognised for beer sold in the ordinary manner by retail, is I think, not only simply desirable, but absolutely necessary. A few considerations will convince us it is also possible.

In order to show that it is desirable I will describe the state of things as existing in Manchester, which may be taken as a fair example of a large town. Some months ago I received several samples of beer, which in due course, I analysed. I subsequently ascertained what price had been paid in each case, and found, to my great astonishment, that even in a large town like Manchester, the public obtained at the various places, widely different value for their money. I have estimated the value of these beers, taking as a basis the amount the Government would allow as drawback if each brewer were to export instead of selling in the home market. This drawback or allowance on export, as you will probably be aware, is based upon the assumption that each degree of original gravity of the beer indicates a given quantity of saccharine matter used by the brewer. Well, I found that while one part of Manchester got excellent value for its money in the shape of beer, deserving of a drawback of 71½-pence, other parts of the same town had to be content with beers worth varying amounts, down to the lowest at 45½-pence. I give with this a table of details resulting from analyses of these beers, and it will be observed that not only does the original gravity of each differ, but the amount of alcohol in these beers varies considerably, the most costly beer not having by any means the highest amount of alcohol. This I need not say disposes of the rather original method devised by some gentleman for ascertaining from the amount of alcohol present how much water had been added to finished beer. A beer brewed from a very much smaller quantity of malt, say than Bass's pale ale, can by fermentation be made to contain much more alcohol than is found in Bass's.

As only three qualities of beer are recognised by the general public in the large towns in England, I would suggest that it would be quite possible without seriously restricting the freedom of trade, to enact that these three qualities should be (within certain limits) of certain definite original gravities, and as they are already well-known by the prices at which they are sold, I submit that the possibility of the course I propose is self-evident.

In looking over the table appended to this, which table will I hope show the *raison d'être* of the title of this short paper, I wish particularly to direct attention to some apparent discrepancies in the total mineral matter other than sodium chloride, which was found per gallon. Thus, although the mineral matter in some cases decreases or increases in quantity as the beer is of a lower or a higher gravity, still this rule does not hold good, and it is found that a beer having an original gravity of 1066·4 has more mineral matter per gallon (excluding NaCl) than the beer of 1069·0 original gravity. This serious irregularity prevents our estimating the value of a beer, or its freedom from added water by the ash alone. As no doubt the members of the Society are aware the use of sugar is permitted in brewing, and it is to the use of varying quantities of sugar

with the malt in brewing, that these irregularities in the quantity of mineral matter in a beer are due. However, a low ash is fairly good evidence that a beer is not entirely made from malt. I have tried several methods for making an accurate determination of the value of a beer by analyses.

The data required are:—The original gravity, (which also gives in the specific gravity of the extract, the percentage of solid matter); the total ash; the sodium chloride; the phosphoric acid; and the ammonia produced when the beer is Wanklynized. This method of estimating the nitrogenous compounds in solution in the finished beer was used by me some two years ago, and was used simultaneously by several scientific brewers. The results obtained I have not published for two reasons, the main one being that I did not obtain permission from the brewers at Burton to publish my results, and the other is that my results were in many points necessarily incomplete. However, the phosphoric acid found and the ammonia produced by Wanklynising will fairly indicate the malt used, and the ash will indicate within certain limits the amount of sugar used. In any beer analysis it is obvious that a knowledge of the water used in brewing is absolutely necessary.

Regarding the use of bitters other than hops, I may, as I have already done, point out that the Government specifically refused, when asked three years ago, to define beer as malt and hops. To obtain such a change it is necessary that not only the public analyst but the general public should work, and then, and not till then, will a satisfactory result be arrived at. I must apologise for the incompleteness of this paper, and hope, before long, to forward the results of a series of analyses of genuine malt worts made into finished beers.

No.	GRAVITIES OF			Acetic Acid per cent.	GRAINS PER GALLON.			ALCOHOL.			Original Gravity.	Real Value expressed by amount of Duty paid in pence.
	Beer.	Distillate.	Extract.		Total Mineral Matter.	Mineral Matter other than salt.	Salt.	By Weight per cent.	By Volume per cent.	Percentage of Proof Spirit.		
1	1009.6	991.21	1018.1	0.18	364.8	254.8	110.0	5.00	6.22	10.97	1056.8	71.25
2	1008.2	991.60	1016.5	0.16	197.0	185.0	12.2	4.76	5.92	10.42	1053.0	66.5
3	1007.1	991.33	1015.6	0.15	233.0	214.5	18.5	4.92	6.14	10.80	1053.4	66.4
4	1007.9	991.68	1016.0	0.13	179.5	173.0	6.6	4.71	5.85	10.32	1051.7	64.8
5	1004.6	991.82	1012.3	0.17	200.2	172.6	27.0	4.62	5.76	10.14	1047.6	59.9
6	1005.2	992.03	1013.0	0.15	219.1	194.5	24.6	4.50	5.61	9.86	1047.0	59.2
7	1009.7	994.80	1014.8	0.17	203.0	131.0	72.0	2.80	3.56	6.25	1035.76	45.5
8	1005.0	990.72	1014.0	0.18	233.0	184.4	48.6	5.31	6.61	11.62	1055.22	69.2

Percentage of extractive matter excluding the ash. By Balling's tables with correction as applied by Thudichum and Dupré in wine analysis.

1.	2.	3.	4.	5.	6.	7.	8.
3.567.	3.631.	3.300.	3.552.	2.541.	2.666.	3.175	2.883.

## REVIEW.

### PHOSPHATES IN NUTRITION.\*

ALTHOUGH the review of strictly medical books is a matter outside our province, yet, when, as in the present case, we find an author honestly trying to apply the researches of analytical chemistry to the treatment of disease, it is a matter that strikes us as interesting to our readers.

\* *Phosphates in Nutrition, and the Mineral Theory of Consumption and the Allied Diseases*, by M. F. Anderson, L.R.C.P., Ed., and M.R.C.S., Eng. London: Baillière, Tindall & Cox. 1878.

Mr. Anderson's intentions and views as to the close relations of chemistry to medical science will be best seen by quoting his opening statements, in which he says:—

“ Chemistry has at all times, since men began to have any idea of this science, been of material help in the treatment of disease.

“ In the days of the old alchemists absurd expectations were held as to its future probable influence on life, as the phenomena and changes wrought under their hands were noticed, ideas were entertained that it would furnish means for prolonging or perpetuating life in eternal youth, by the discovery of some new agent which would arrest decay.

“ To this imaginary substance the term vital principle was applied, and men spent their lives searching after the phantom. Now that a knowledge of the laws of chemistry and its sister science physiology, has taught us the fallacy of such views, we can pity the misdirected energy of these old students in their endeavours to discover that which, according to the laws of nature, could not exist. Our pity should, however, be mingled with gratitude, for acting as the pioneers in a science which has conferred great benefits on mankind, that have not yet reached their limit, as every year is adding to our store of utility in its application. Although powerless to provide us with perpetual youth, or prolong life beyond the allotted time by the means originally sought after, chemistry may yet be made to minister in many ways towards the maintenance of life, by lessening, remedying, or preventing disease, so that in course of time the old expectations formed as to its power may be to some extent realised.

“ That up to the present time, chemistry has only acted an humble part in the investigations as to the cause and treatment of disease, is readily explained by the fact that hitherto analytical chemistry has been acquired only by a few, who, as a rule, pursued their work in a direction apart or distinct from physiology. Now that chemistry is more generally taken up by the medical profession, and as more attention is paid to quantitative analysis, and new and more perfect methods of analysis are introduced, results will be obtained which in the past have been unattainable.

“ Recent examinations of the inorganic materials in the soft tissues, and their relative quantities, have led me to conclude that these substances exert a very important influence in nutrition; and their absence or presence in insufficient quantities, either from diminished supply or imperfect assimilation, is the origin of a class of disease (organic) which have hitherto received no explanation as to cause.

“ That my views, involving as they do doctrines entirely new, and carrying so large an issue as the curability of organic diseases, will be at once generally accepted, is more than I can expect; but I am willing to trust to time and to practical results in treatment to test their truth. Up to the present time treatment based on the conclusions arrived at has in my hands met with remarkable success.”

The author then proceeds to consider the inorganic constitution of the various tissues of the body, the blood, and also nerve and brain matter. He illustrates his views by a large number of analyses, and shows that in all cases (except in the brain and nerves, which contain a slight excess of phosphoric acid), the mineral constituents are in such proportion as to form true tribasic phosphates—such compounds he regards as *tissue phosphates*, and gives *inter alia* the following examples:

Theoretical tissue phosphate, by his theory, should show in one gramme of mineral residue—

Lime	...	...	...	...	·214
Magnesia	...	...	...	...	·074
Potash	...	...	...	...	·208
Phosphoric Acid	...	·	...	...	·338
Total Tissue Phosphate	...	...	...	...	·834
Sodium, Chloride, &c.	...	...	...	...	·166
					<u>1·000</u>

Actual experiment gave him—

Lime	...	...	...	...	·214
Magnesia	...	...	...	...	·074
Potash	...	...	...	...	·208
Phosphoric Acid	...	...	...	...	·332
Total Tissue Phosphate	...	...	...	...	·828
Sodium, Chloride, &c.	...	...	...	...	·166
					·994
Loss on Phosphoric Acid	...	...	...	...	·006
					<u>1·000</u>

So that his actual analysis comes within ·006 of his theory, that the phosphoric acid of the tissues is thus combined.

Passing on to the contrast of the comparative effects of actual starvation and wasting disease, the author asserts that while in the former the tissue phosphates do not decrease, in the latter the falling off is very marked. This is a point worth noting by chemists engaged in medico-legal investigations. He says:—

“ The external appearances and general condition of a body, when death has occurred from starvation, are so like those presented in cases of tubercular disease, as to afford an opportunity of adducing conflicting medical testimony in favour of one or other view as to cause of death. In the late Penge case, for instance, analytical examination of the tissues, and of their mineral constituents, would have materially helped in arriving at an opinion as to which of the two conditions caused death. In starvation the mineral constituents of tissue phosphate would not be materially lessened—from wasting of the tissues, caused by the combustion of their organic matter, there would be an apparent increase in the percentage of mineral matter. On the other hand, in tubercular disease there would be a material decrease in the mineral matter as compared with the general wasting.”

Coming to the actual treatment of disease, the author refers to the use of the hypophosphites, but argues that if any mineral food is supplied at all, the full constituents of the tissue phosphate must be contained in it. He says:—

“ From its chemical composition any hypophosphite can only partially be useful, if we allow that hypophosphorous acid is, at the right time and in the right way, converted into the requisite phosphoric acid—by no means a proven fact—a large proportion of the necessary bases must be deficient. My ideas of treatment extend beyond this; and I propose, by supplying all the mineral ingredients of nutrition, to leave nothing to chance; so that if there be a fair amount of assimilation, all the mineral elements for tissue fabrication, or renewal, may be present. The farmer who calls in the aid of chemistry to enable him to ascertain the deficiencies of his soil for any particular crop, does not, if he expects good results, limit himself to supplying only a portion of the ingredients wanted. He takes care that the manure he uses contains all the mineral matter indicated to be wanted; if he neglects to do this, his success can be but partial, and his crops will fall short for want of some one essential for their growth. The same rules apply to the growth and development of animal life as apply to the vegetable kingdom, as far as the necessity of certain chemical compounds for their respective growth and development is concerned.

“ Without certain mineral constituents no plant can thrive, and without certain mineral matter no animal can live in health, the requirements of both are fixed and definite, and chemistry can be used to point out their character and quantity.”

On the whole, without venturing to discuss the medical conclusions, we must say that the chemical investigations are both interesting and valuable. The book is the result, not only of much thought, but of continued practical work in the laboratory, and is very interesting reading from beginning to end.



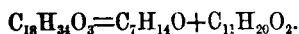
## DISTILLATION OF CASTOR OIL, UNDER REDUCED PRESSURE.

By F. KRAFFT.

From *The Pharmaceutical Journal*.

WHEN castor oil is distilled under a very low pressure, there passes over first a colourless oily distillate, equal to about one-third or one-half of the oil used, and then a small quantity of an oily liquid, whilst a slimy saponifiable mass remains in the retort. Half of the oily distillate consists of œnanthol, which is separated by distillation; after the œnanthol has distilled over, the temperature suddenly rises above 100°, and then remains stationery. The distillate which now comes over solidifies to a crystalline mass, the analysis of which led to the formula,  $C_{11}H_{20}O_2$ ; this melts at 24.5°, and boils at 198-200° under a pressure of 90 mm.

It appears to be a new member of the oleic series, forming a crystalline barium salt; on fusing with potash it gives acetic and nonylic acids; with bromine it forms a crystalline addition product, melting at 38°. The following equation represents the formation of œnanthol, and of the new acid from ricinoleic acid:



The remainder of the distillate obtained from the castor oil distilled under the above pressure chiefly at 250-265°, but has not yet been investigated.

## HOUSE OF COMMONS.

July 30th, 1878.

## SALE OF FOOD AND DRUGS' ACT AMENDMENT BILL.

In Committee on this Bill,

Mr. SAUL ISAAC moved an amendment, the object of which was to sanction the sale of spirits reduced by water, regard being had not only to the extent of such admixture, but also to the price at which the spirits so reduced are sold.

The amendment was opposed by Mr. MONK and Mr. COURTNEY, but supported on behalf of the Government by Mr. SCLATER-BOOTH, and carried by a majority of 29 to 8.

The Bill then passed through Committee.

The Bill was subsequently withdrawn by Mr. Anderson, who we believe intends to re-introduce it next session.

## ANALYSTS' REPORTS.

Mr. Estcourt, Public Analyst for the City of Manchester, in his quarterly report submitted to the City Council, lately said he had made analyses with the following results:—Ten samples of beer, all genuine; 11 samples of milk, 1 adulterated with water to the extent of 10 per cent. and skimmed to the extent of 30 per cent., and 1 adulterated with water to the extent of 9 per cent. and skimmed to the extent of 50 per cent.; 1 sample of sweets, which was genuine; 1 of preserves, genuine; 2 of bread, genuine; 4 of arrowroot, genuine; 5 of coffee, 1 adulterated with 25 per cent. of chicory; 1 of cream of tartar, genuine; and 1 of magnesia, genuine.

Mr. Ralph Betley, borough analyst, has presented his quarterly report to the Wigan Town Council, in which he says: "During the past quarter I have examined 7 food and drink samples—viz., 1 of bread, 2 of milk, 2 of beer, and 2 of spirits. All were of good quality."

Mr. Cornelius O'Keeffe, Public Analyst, has been appointed by the Committee of Merchants to the office of Analyst to the Cork Butter Exchange his duties being from time to time to take samples of the butter brought into the market and report thereon.—*Grocer*.

## CORRESPONDENCE.

[The Editors are not responsible for the opinions of their Correspondents.]

## MILK ADULTERATION.

TO THE EDITOR OF "THE ANALYST."

SIR,—As at the adjourned hearing of the milk case, held before the Bath magistrates, on the 12th inst., the worthy chairman expressed the inability of the magistrates to take notice of the chemical questions brought before them, would you kindly favour me with a little space so as to place the matter in a clear light before the public? Having learnt that at the first hearing the magistrates decided on sending the sample to Somerset House, I at once divided the portion which remained after my own analysis into two parts, one of which was kindly analysed for me by Mr. Stoddart, of Bristol, with the result that it contained "2 per cent. of fat." The other portion I analysed myself several times by different methods, but before giving the results it is necessary to state that when milk becomes sour, it is due to a portion of its solid constituents changing into lactic acid and gaseous products. This acid being like fat soluble in ether, would, if the milk were analysed by the process usually applied to new milk, be weighed with and reckoned as fat, thus giving too high a per centage. This it would appear the Somerset House authorities must have done, as my first analysis of the sour milk by this process gave 2.68 per cent. soluble in ether, the Somerset House result being 2.69. It is impossible to state positively that this is the case, as they give no other figures whereby an absolute conclusion can be formed, but the two numbers are so close that there is no reasonable doubt that the authorities used the process for new milk, and thus estimated acid and fat together. This is rendered the more probable, as my other analysis of the same sample gave from 2 to 2.25 per cent. of fat, thus not only corroborating my first result, but also coinciding with Mr. Stoddart's analysis.

The following figures will speak for themselves as to the reliance to be placed in the Somerset House authorities. In August of last year, a sample of milk sent from Bath to Somerset House was found by the analysts there to contain—water, 89.99; fat, 2.18; solids, 7.83; and was pronounced by them to be *unadulterated*.

On January 22nd, 1878, they gave the following reports on two samples forwarded from Kensington, London:—one, water, 89.09; fat, 3.22; solids, 7.69. Two, water 88.62; fat, 3.43; solids; 7.95. The first of these they stated to be *adulterated with not less than 7 per cent.*, and the second *with not less than 4 per cent. of water*.

Now, if you will kindly compare the above figures, you will perceive that in every particular, the Bath milk pronounced unadulterated was of a worse quality than the adulterated London ones, and these dicta were pronounced within four months of each other by the same authority, and signed by the same gentlemen. Further comment is superfluous.

J. W. GATEHOUSE.

BATH.

## LAW REPORTS.

## THE ARSENICAL VIOLET POWDER CASE.

At the Central Criminal Court, on the 7th of August, before Mr. Justice Field, Henry George King, surrendered to take his trial upon several indictments for manslaughter. Mr. Poland and Mr. Straight prosecuted for the Treasury; Mr. Warner Sleight and Mr. Crispe were counsel for the defence.

The case that was taken charged the prisoner with the manslaughter of a child named Ringrose.

On behalf of the prosecution it was stated that the prisoner carried on the business of a wholesale druggist and dysalster at Kingsland Green and had for several years been in the habit of manufacturing the article known as violet powder, which, under ordinary circumstances, appeared to be composed of starch and orris root, or some description of perfume. In 1875 the prisoner commenced the manufacture of some cheaper description of powder, in which terra alba, or sulphate of lime, was substituted for starch, and this article was sold by him to a very large extent in penny packets, which were labelled "For the Nursery, Superior Violet Powder, warranted free from grit." The ordinary article manufactured by the prisoner appeared to be perfectly harmless, but about twelve months ago the violet powder sold by him was found to be largely impregnated with arsenic, and the result was that a great number of children of poor persons residing at Loughton, where the powder was extensively used, lost their lives, that result being undoubtedly attributable to the large quantity of arsenical poison contained in the violet powder sold by the prisoner. The fact of so many children dying in such an extraordinary manner attracted the attention of the local authorities in the first instance, and eventually the Government interferred in the matter, when an enquiry took place at the instance of the Treasury, and in the result the prisoner was committed upon the present charges. The child whose death was now the special subject of enquiry was the daughter of a woman who resided at Shacklewell. It was about ten days old at the time of its death, and it appeared that the powder supplied by the prisoner had been constantly applied to it from its birth. A *postmortem* examination by

Dr. Tidy led to the discovery that the liver and other organs were largely impregnated with arsenic, and the death was clearly proved to be the result of arsenical poisoning. The portion of the penny packet of violet powder which remained was also analysed, and was found to contain arsenic in the proportion of thirty-eight parts out of one hundred, a quantity quite sufficient to account for the results that happened. The prisoner was examined as a witness before the coroner; he appeared anxious to give all the information in his power, and declared that he was entirely ignorant as to the way in which the arsenic had got into the violet powder. It also appeared that when his attention was called to the fact that the violet powder sold by him contained a large quantity of arsenic, he directed his traveller to get back all the packets he had sold to his various customers, and the whole that remained in his possession was destroyed. The case for the prosecution rested entirely upon the assumption that the prisoner had been guilty of criminal negligence in selling such a dangerous ingredient to the public.

Dr. Tidy, professor of chemistry at the London Hospital, said arsenic was a very much heavier article than terra alba, and the bulk of the latter would consequently be much greater than that of arsenic. It appeared to him that a person of ordinary skill and caution, while making up packets of this description, ought to have detected the difference between the two articles. He believed that a portion of the arsenic found in the body of the deceased child had been absorbed through the skin and that another portion had passed off into the air while the child was being dusted with the powder, and been taken into the system through the mouth.

In answer to questions put by Mr. Warner Sleigh, in cross-examination, Dr. Tidy said that the body was very much decomposed, and although it had been generally considered that arsenic was a preventive of decomposition, he had heard of cases where it had not had that effect, and he therefore did not regard it as a positive fact that the presence of arsenic would delay or prevent decomposition.

A long statement made by the prisoner to a detective officer was put in and read. In this statement the prisoner described the articles used by him in the manufacture of the violet powder, the principal ingredients being corn flour, terra alba, orris root, potato starch, and rose perfume. He denied most positively ever having had any arsenic in his possession, and stated that he could not in any way account for the arsenic getting into the violet powder, but he suggested that upon one occasion when he sent to the shop of Mr. Fox, a wholesale chemist and druggist in Bethnal Green Road, for 28lb. of terra alba, arsenic had been sent to him by mistake.

Mr. Henry Fox, jun., was called to disprove the suggestion of the prisoner. He stated that he did not remember the prisoner having been supplied with 28lb. weight of terra alba, and he did not think it possible that such an occurrence as sending arsenic by mistake for terra alba, could have taken place. In reply to Mr. Warner Sleigh, in cross-examination, the witness said the wholesale price of arsenic was £11 or £12 per ton, whereas terra alba was not worth more than £3 or £4 per ton, so that it was clear that in the sense of cheapness there was no inducement for the prisoner to make use of arsenic instead of terra alba.

Mr. Justice Field, at the close of the case for the prosecution, said he did not know what the jury thought of the case, but he certainly could not see what criminal negligence could be attached to the prisoner. The Foreman of the Jury said that a majority of them were of opinion that the death was the result of accident. Mr. Justice Field said that the opinion of a majority of the jury was not sufficient.

Mr. Poland, in the course of a brief summary of the evidence, said that when the jury heard that 28lb of a deadly poison had been distributed for the purpose of being used upon the bodies of young children, and the fatal results that had attended it, he was sure they would be of opinion that the case was, at all events, one that ought to be fully inquired into.

Mr. Justice Field said it was doubtless a proper case to be fully investigated.

Mr. Poland added that the only question for the jury was, whether the prisoner was guilty of criminal neglect in supplying this poisonous article to the public.

Mr. Warner Sleigh briefly addressed the jury for the prisoner, and contended that the prosecution had utterly failed in establishing any criminal negligence on the part of the prisoner, and that they ought to acquit him.

Mr. Justice Field, in the course of a short summing up, said that, whatever might be the result of the inquiry, he thought there could not be any doubt that from the very first the prisoner had met the charge most fairly, and that he had not only given all the information that he could in reference to the matter, but that the moment he was informed that there was some dangerous ingredients in the violet powder manufactured by him, he took measures to get back all he could of it, and destroy it. He then explained that before the jury would be justified in convicting the prisoner of this offence they must be satisfied that he had been guilty of some gross and criminal neglect.

The jury at once returned a verdict of Not Guilty.

Mr. Poland said that, after the full inquiry that had taken place, he did not think it advisable to proceed with any of the other indictments against the prisoner.

Verdicts of not guilty were, therefore, taken on all these cases, and the prisoner was ordered to be discharged.

## CHARGE OF SELLING ADULTERATED TINCTURE OF JALAP.

At the Romsey Borough Bench, Mr. William Blissett, dispensary chemist, was summoned, on the information of Superintendent Kellaway, with selling adulterated tincture of jalap. Mr. Glaisyer of Birmingham, solicitor to the Chemists and Druggists' Trade Protection Society, appeared for the defence.

Superintendent Kellaway deposed to having purchased from the defendant three ounces of tincture of jalap, and told him the purpose for which it was bought. It was divided in defendant's presence into 3 parts. One part he delivered to defendant, one to the analyst, Mr. Angell, the same day personally, and he produced the third part. He also produced the certificate of the analyst, which stated that "The strength of the spirit equal to 16 per cent. under proof or 40·66 per cent. of alcohol by weight.

"*Observations.*—This tincture should be made with proof spirit. There is therefore a deficiency of alcohol to the extent of at least 9 per cent by weight. Three per cent. may fairly be allowed for loss of alcohol during preparations of tincture."

Mr. Glaisyer here asked that the analyst should be put into the witness box by the prosecutor, but this was refused. Mr. Glaisyer said he had given notice for Mr. Angell's appearance, and that the case for the prosecution would be incomplete if he were not called.

The Magistrates decided that the prosecution could not be compelled to put the analyst in the witness box. Mr. Glaisyer thereupon called for Mr. Arthur Angell, the county analyst, who on entering the box asked the magistrates to whom he was to look for his expenses. Mr. Glaisyer said under the circumstances he would guarantee the fees, but he protested against the decision.

On being sworn Mr. Angell gave the following evidence in answer to Mr. Glaisyer: I am public analyst for the county of Southampton. The certificate produced is mine, and the contents are here.—Cross-examined: I had the sample personally from the superintendent. I did not weigh the quantity of tincture I received. Tincture of jalap is made by steeping the jalap bulb in spirits. I am not a pharmacist. I obtained my knowledge from study. I do not remember what proportion of jalap is used in preparing the tincture. The tincture should contain 49 per cent. of alcohol and 51 per cent. of water. This is the liquid portion. I am not prepared to say what proportion of liquid there should be found in 100 parts of tincture of jalap. I cannot tell how much solid matter and how much liquid there should be in 100 parts. I have allowed three per cent. for solid, as stated in my certificate. There would be solid matter in the tincture. I believe the quantities should be 2½ ounces of the bulb to a pint or a *litre* of spirits. I am, however, not certain, but I think it is a pint. I did not weigh the solid matter. I took a weighed quantity of the sample and distilled it. I then took the distillate and made it up to the same bulk as the sample. The temperature of my distillate was about 15 degrees centigrade. I then took the specific gravity; the result was that the distillate ranged sixteen under proof. The solid matter is the active principle. I believe the spirit is of use medicinally. I believe there was sufficient pure jalap in the tincture to perform the functions of the medicine. I believe the absence of the alcohol did not at all affect the efficiency of the preparation.

At this stage of the examination the magistrates said they should not require Mr. Glaisyer to reply for the defence, as they had decided to dismiss the information.

An application made by the solicitor for the defence for costs was refused.

At the Bath City Police Court, recently, Francis Hilyer, dairyman, of 2, Upper Lambridge Street, was summoned for selling to Inspector Montague a pint of milk, not of the nature, substance and quality demanded, to his prejudice, on June 25th. Mr. Moger, clerk to the Urban Sanitary Authority, appeared to support the prosecution; and Mr. J. K. Bartrum represented the defendant. Mr. Moger said in this case the deprivation of fat was very considerable, which must have a very deleterious effect upon the health of infants and others who required pure milk. The certificate of the analyst, Mr. J. W. Gatehouse, was as follows:—Water 88·50, fat, 2·20, ash, 0·72, caseine and sugar, 8·58, total 100. He was of opinion that the milk was deprived of 25 per cent. of its fat. Mr. Montagu deposed to purchasing the pint of milk of a man in the employ of the defendant, for which he paid him 2d. In answer to witness the man said he did not want to take a portion of the sample. Mr. Bartrum said the milk was purchased by the defendant, of two very respectable men, who he believed incapable of selling adulterated milk—Mr. Dill and Mr. Shellard. He had not very great confidence in the test of the city analyst, and their worships would recollect that he had been found to be wrong in one or two instances, when the articles were subsequently sent to Somerset House. He was requested in this instance to ask that the milk be sent to Somerset House, and that the question of costs be deferred. The Bench assented to that application, and the case was consequently adjourned for that purpose.

At the adjourned hearing on the 12th August, Mr. Payne (clerk to the magistrates) informed the justices sitting in petty sessions, that he had received a report from the authorities at Somerset House, which was to the effect that the milk contained 2·69 per cent. of fat. That amount, though lower than was found in average milk of good quality, was equal to that of low quality. They therefore did not feel justified in saying that any of the cream had been abstracted. The certificate was signed by J. Bell and

**R. Bannister.** Mr. Moger made some remarks tending to show that the difference in the analyses was due to the different times at which the tests were made. The Chairman said that although they were anxious to support the city analyst they could not enter into a chemical question. The case was then dismissed.

*At Brentford Petty Sessions, Mr. J. R. Hogarth in the chair, Mr. Samuel Foss, grocer, High Street, Brentford, was summoned by Mr. Gregg, an inspector under the Adulteration Act, for selling, to his prejudice, an article of food purporting to be butter, which was not of the nature, substance, and quality demanded.* Mr. Gregg stated that on June 14 he visited the defendant's shop, and bought a pound and a half of butter at 1s., at the same time telling defendant that he wanted it for the purpose of sending it to the county analyst for examination. Defendant then said "I will not sell it to you as butter, but I will sell it as 'bosch' butter," to which witness returned "It doesn't matter. You have given me the price of butter, and you may call it by any name you like." He told defendant it was necessary for him to put a label on the butter if he intended to sell it as "bosch," and defendant then gave him a piece of paper from a packet lying on one side. Witness paid 1s. 6d. for the sample. He produced the analyst's certificate, which stated, "I am of opinion that the said sample contained no true butter. It consisted entirely of foreign fat other than butter fat, but such fat is not injurious to health." The Chairman: In other words, there was not one particle of butter in the sample you sent up to the analyst? Mr. Smith: I am quite content. It was not injurious to health. Mr. Smith submitted that the summons was altogether a fallacy, inasmuch as the purchase was not to Mr. Gregg's prejudice, and he (Mr. Smith) quoted a case showing that as the tradesman was compelled, under a heavy penalty, to sell any article of food demanded by an inspector, every consideration should be given to the terms of sale. Defendant was then called. He produced an invoice showing that the article was consigned to him as "bosch" and said that "bosch" and butter were considered by the trade as two distinct commodities. He distinctly told Mr. Gregg that it was not butter, when the latter asked the price of it. Gave Mr. Gregg a paper containing the words — "Notice.— This article is sold as imported, without warranty." These papers were kept on the counter. Mr. Gregg pointed to the "bosch" and said, "What is the price of that?" Was quite certain he did not use the word "butter" at first. As soon as he called it butter witness said—"We don't sell that as butter; it is invoiced to us as 'bosch,' and we sell it as 'bosch.'" Mr. Gregg repeated, "I'll take a pound and a half of that butter," pointing to the "bosch," and witness replied "I won't sell that as butter." Mr. Gregg then said, "Well, I'll take a pound and a half of it," and witness answered, "Wait till my assistant comes in, and then I'll serve you." He did not serve him till the assistant came. By the Chairman: Had been in business two years. Had never had a single customer ask to be served with "bosch." The Chairman: What do they ask for? Witness: They ask for butter. By Mr. Gregg: Gave the printed notice before he had served the "butter." The Chairman said the magistrates had given the case special care and attention, and they felt that they could only arrive at the conclusion that the evidence given by the inspector was truthful. He (the Chairman) had put the question to defendant as to whether he had ever known a customer enter his shop and ask to be supplied with "bosch," and the reply, unhesitatingly given, was "Never." There was no ticket on the article, and he considered it very cruel that it should be sold to poor people as butter. Defendant might or might not give the purchaser a notice like the one that had been produced, but that did not state the article to be "bosch." The preparation was no doubt meant for the consumption of the poor, and it was a very hard thing that they should be deceived. Defendant might formerly have conducted his business in a proper manner, but it was not respectable to sell "bosch" for butter. It was the duty of the magistrates to convict him, and the only question was as to the amount of the penalty. He (the Chairman) thought that, properly speaking, it ought to be £20, the full fine, but some of the magistrates thought differently, and the penalty the bench inflicted was £5, or two months' imprisonment.

At the Wolverhampton police court, before Mr. Isaac Spooner (Stipendiary), Mr. Henry Round, grocer and provision dealer, was summoned for selling adulterated bread. Mr. Vaughan appeared for the defence. Samuel Foy, assistant to Mr. J. G. Horder, the inspector under the Food and Drugs Act, for the district of South Staffordshire, proved to buying a loaf of bread from the defendant's shop, and upon it being forwarded to Mr. Jones, the county analyst, he certified that it contained 28 grains of alum to the 4lb. loaf, and in his opinion such a proportion would tend to make bread indigestible, and thus injurious to health. In cross-examination Mr. Jones said the case was an average one of alum adulteration. He had, however, found as much as forty grains in a 4lb. loaf in a former case. Mr. Vaughan for the defence, said the defendant had been in the habit of buying his flour from respectable tradesmen, without having the slightest doubt as to its genuineness. He could also prove that in the baking process no alum whatever was placed in the flour. The Stipendiary said he should like to know if Mr. Horder pressed for a heavy penalty; and he replied that he did not know of anything to take the case out of the ordinary line. The Stipendiary said it was a very serious offence to sell adulterated bread, and he should fine the defendant £10 and costs.

**AN IMPUDENT SKIM MILK SELLER.**—Richard Bevan, of Doctor's Piece, Willinshall, was charged with selling adulterated milk. On being charged, the defendant sarcastically remarked: A penny a quart.

Mr. Spooner: I don't care if it was a guinea a quart. Defendant: A ha'porth of milk; I should be ashamed to bring it into court. Mr. Spooner: Be quiet. You shall not sell milk and water as milk; if you do I shall punish you. Samuel Toy, assistant to Mr. Horder, proved purchasing half a pint of skim milk, and sending a portion of it to Mr. Jones for analysis. The certificate of analysis of Mr. Jones was then handed in, and Mr. Spooner said 17 per cent. of water had been added after the cream was taken away. Defendant said he should be ashamed to have a man brought into court for a quart of skim milk. Mr. Spooner told him he should not allow him to get money from people for milk and water as milk. He would be fined £2 and costs "for selling skim milk and water as milk." Defendant made a sweeping accusation against the magistrate and inspector, whereupon Mr. Spooner told him if he did not keep a civil tongue in his head he should punish him.

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#### NOTES OF THE MONTH.

*The Brewer's Guardian* in waxing jubilant over the recent dictum of the Lord Chief Justice that a sale to an inspector is not to the "prejudice of the purchaser," has the following beautiful little specimen of trade journalism.

"The Adulteration Act was intended to protect poor persons from being imposed upon; if they have reason to suspect any article they have purchased has been adulterated, they can get it analysed for themselves, at nominal fees, or report the matter to the local inspectors; but we feel convinced the framers of the Act never intended that inspectors should be continually roaming about to obtain samples for the purpose of analysis, often only with the view of harassing and annoying a respectable tradesman."

The Act was undoubtedly made to protect the poor, and the appointment of Inspectors is the only way by which such protection can be obtained. We can well picture the Brewer and his friend the respectable (?) tradesman rubbing their hands with glee over the passing of an Act which would protect the poor man by compelling him first to find the necessary bottles, corks, and wax for dividing the sample; secondly, to advance the necessary sum of half-a-guinea for the analysis, on the chance of recovering it afterwards on conviction; and thirdly, to lose one half-day's work in taking the sample to the analyst, and another in attending the police court. We fear that the *Brewer's Guardian* in the character of the *Poor Man's Guardian* savours somewhat of the wolf in sheep's clothing.

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Recent correspondence in the *Grocer* shows that the National Chamber of Trade has not been slow to take what advantage it could of the introduction of Mr. Isaac's amendment into the abortive Sale of Food and Drugs' Amendment Bill, sanctioning the sale of spirits diluted by water without defining any standard of strength, but only vaguely stating that regard should be had both to the extent of the admixture and the price at which the article is sold. In writing to Mr. Selater-Booth, on the subject, Mr. Morrison, the Secretary, remarks, "it would be most unfair and illogical not to recognise the same principle in the case of milk, or any other liquid or compound article of food not injurious to health." We cordially agree with Mr. Morrison's remarks, as it is absurd to say that a publican should be permitted to dilute without making a declaration or being bound to a standard, while the unfortunate milkman who may follow his example is to be fined. It is stated that Mr. Anderson now bitterly regrets that he consented to Mr. Isaac's amendment, and as a thinking man anxious to protect the public, he must feel that he has much cause to do so. But the worst complication was still to follow when the amendment was supported by the government, which is now pledged in principle to a course of action, which if logically carried out, must lead up to the point that a tradesman may sell without declaration any mixture he chooses, and so make a profit at the expense of his customers, so long as he does not introduce anything dangerous to health. So after all the National Chamber of Trade may congratulate itself that its advice was not listened to.

The necessity, however, for a comprehensive amending Act is becoming more and more apparent every-day, and the course lately adopted by the Hull Sanitary Committee affords another good illustration of it. Acting on the advice of the Town Clerk, they decided not to prosecute in five cases of adulteration; first, because of the recent decision that an Inspector when purchasing samples must use the exact words of the Act, and not merely state that they are being purchased for analysis; and secondly, because of the view held by the Lord Chief Justice, or as Mr. Sclater Booth called it, "the arbitrary dictum of one learned judge," than an Inspector was not prejudiced by the sale to him for analysis of an adulterated article. Although the decision of the Sanitary Committee is much to be regretted, it is satisfying to note that the opinion of the Town Clerk, which was evidently based upon an imperfect knowledge of the facts was not allowed to pass unquestioned, even in the Hull local papers.

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We really hardly know whether to congratulate or sympathise with Faversham. It may be remembered that early in the present year the Town Council twice refused to appoint a Public Analyst, but ultimately, after receiving a third letter from the Local Government Board on the subject, agreed—though by no means unanimously—to have the terrible official the Board thought such a town should possess. Some six months or so after this reluctant decision was come to we hear of a gentleman being appointed to the post. However, better late than never, say we, and we can only hope that his office may not be made a sinecure, and that the members of this Town Council may soon find that the provisions supplied to them have improved in quality, which, we presume, is the only fact that would convince these sons of Solomon that wisdom is not the exclusive possession of Town Councillors.

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We cannot help referring to another benighted place with a Town Council composed of wiseacres who are so satisfied with the condition of their town that they, like the Faversham Councillors, object to a Public Analyst coming in their midst, and in reply to a communication, the Town Council of Godalming have informed the Local Government Board that they consider a Public Analyst for that place is not needed! We don't know what these Town Councillors are, whether tradesmen or manufacturers, but we hardly think they are competent to decide whether the town needs an Analyst. We should think the inhabitants—and especially the poorer class—would have given a different opinion as to the necessity of appointing one, and we have no doubt that in twelve months the gentleman appointed, if supplied with samples for analysis, would show such a *raison d'être* for his office as would utterly astonish these intelligent Town Councillors.

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Perhaps we ought to apologize to our readers—we hardly know—for not publishing the address of the President of the British Association, but when we saw that nearly every journal—medical, chemical, or comic—had found room for it, we came to the conclusion that it would be better, considering our limited space, not to bore our readers with even an abstract of it; not by any means because the address was a bad one, but even chemists may have too much of a good thing.

**GODALMING.**—At the quarterly meeting of the Town Council a letter from the Local Government Board was read asking why a public analyst had not been appointed, and after a short discussion it was decided that they should be informed that “in the opinion of the Town Council a public analyst is not needed.”

Mr. Sidney Harvey has been appointed Public Analyst for Faversham.

**THE HULL SANITARY COMMITTEE AND ADULTERATION.**—A meeting of this committee was held at the Town Hall lately, Alderman King, M.D., in the chair. The Town Clerk (Mr. Todd) reported with respect to five cases of alleged adulteration referred to him that he recommended no prosecutions in consequence of two recent legal decisions. By the first decision it was necessary that the inspector, on purchasing, should state not only that the articles were for analysis, but that they were for analysis by the borough analyst. The next decision was the more important one, for if it was confirmed the Act was rendered nugatory, and would require amending in the future. The decision was that a borough Inspector was not a person prejudiced, as he did not purchase the articles to eat. Several of the committee remarked that it was an unfortunate state of affairs and adulteration might be as rife as ever unless private persons purchased goods and employed analysts at their own expense. A resolution was passed adopting the recommendation not to prosecute. *Eastern Morning News.*

#### RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1877. No.	Name of Patentee.	Title of Patent.	Price.
4576	M. Hilton ... ..	Manufacture of Gas ... ..	8d.
4647	C. D. Abel... ..	Manufacture of Loaf Sugar ... ..	6d.
4771	F. A. Zimmerman... ..	Treatment of Pyroxylin ... ..	6d.
4832	H. Simon ... ..	Process and Apparatus for Developing Bromine... ..	2d.
4880	W. Weldon ... ..	Manufacture of Soda and Potash by the Leblanc Process	4d.
4888	S. Pitt ... ..	Agglomerating Chemical Substances ... ..	2d.
1878.			
12	H. Robinson and J. C. Mellish ... ..	Treatment of Sewage and Impure Waters ... ..	4d.
36	W. R. Lake ... ..	Artificial Caoutchouc ... ..	4d.
92	W. East ... ..	Treatment of Sewage and other Waters ... ..	4d.
120	W. R. Lake ... ..	Treatment of Carbonated Mineral Phosphates ... ..	4d.
133	W. Weldon ... ..	Manufacture of Soda and Potash ... ..	4d.
186	R. Messel ... ..	Manufacture of Sulphuric Acid ... ..	4d.
195	F. H. Atkins ... ..	Preparing Materials for Filtering Water... ..	4d.
208	J. H. Johnson ... ..	Dyeing ... ..	4d.
230	R. W. Wallace and G. Christopher	Purification of Gas... ..	2d.
256	W. Majert ... ..	Manufacture of Sulphuric Acid ... ..	2d.
304	T. T. Jones ... ..	Manufacture of Nitro-Glycerine ... ..	4d.
356	G. W. Von Nawrocki ... ..	Manufacture of Soda and Potass ... ..	4d.
523	H. Simon ... ..	Carbonizing Wool, Rags, &c. ... ..	4d.

#### BOOKS, &c., RECEIVED.

The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Medical Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Country Brewers' Gazette; The Dairyman; The American Dairyman; The Practitioner.



# THE ANALYST.

OCTOBER, 1878.

## ON THE INCONSTANT COMPOSITION OF WELL WATERS.

By CHARLES A. CAMERON, M.D., Fellow and Professor of Hygiene and Chemistry,  
R.C.S.I.; Medical Officer of Health for Dublin.

*Read before the Society of Public Analysts, at Dublin, 19th August, 1878.*

FOR some time past I have been engaged in examining the water of deep wells, and I have noticed the important fact that very often the water varies in composition at different levels in the same. Well the most remarkable instance of this kind which I have, up to the present discovered, is that afforded by a well at Glenfarme Hall, near Enniskillen, the residence of Mr. A. Loftus Totterham, D.L. Two specimens of water taken out of this well, one a few minutes after the other, were found to have the following composition:—

	No. 1. Grains.	No. 2. Grains.
Total solids per gallon ... ..	29·012	47·40000
Including—		
Albuminoid Nitrogen ... ..	0·625	0·0060
Saline Ammonia ... ..	0·010	0·0003
Chlorine ... ..	2·137	1·795

The water marked No. 1 was yellowish and very impure. It was in fact a very bad water. No. 2, on the contrary, was colourless, bright, and remarkably free from organic matter. It was very much harder than No. 1. In this case, therefore, a bad water and a good one were simultaneously procurable from the one well. The bad water was obtained by dipping a vessel into the well; the good water was pumped up from the bottom of the well, which was more than 50 feet deep. It was clear that the lower part of the well was supplied with water derived from springs; or, at any rate, which had percolated through a large amount of soil and had become purified, so far as its organic matter was concerned. The upper part of the well contained surface drainage, which appears to have floated upon the somewhat heavier water beneath. Specimens of water were a second time procured from this well, and again it was found that the water near the bottom was harder and purer (from organic matter) than that near the top.

In four waters from deep wells, which I have quite recently examined, I found that the composition of the water in each varied somewhat according to the depth. In one case the solids amounted to 66·23 grains per gallon at the bottom of the well, whilst nearer the surface the solids were only 3 grains per gallon. We may, in short, have two kinds of drainage water collected in the same well,—namely, surface drainage, and arterial or deep drainage.

It does not, however, always happen that the water in a deep well varies in quality according to the level at which it is collected, for I found no such variation in the waters of several very deep wells.

## NOTE ON THE ESTIMATION OF LEAD AS PLUMBIC IODATE.

By CHARLES A. CAMERON, M.D., Professor of Chemistry, R.C.S.I.

*Read before the Society of Public Analysts, at Dublin, on 19th August, 1878.*

I HAVE found that iodate of lead is more insoluble than the sulphate, and, indeed, is practically an absolutely insoluble salt. I propose, therefore, to estimate lead as plumbic iodate. If a volumetrical method be preferred to a gravimetical one, the lead should be precipitated by a standard solution of sodium iodate, and the excess of sodium iodate determined by the hydrochloric acid and sodium hyposulphite method. The plumbic iodate must be well washed and the washings added to the filtrates. As it is difficult to obtain pure iodic acid or alkaline iodates from the shops, the sodium iodate solution must be standardized by means of a solution of pure nitrate of lead.

As most soluble salts dissolve to a slight extent the iodate of lead; it must be precipitated from a solution free from saline substances.

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ON SOME EXPERIMENTS WITH THE SILICATED CARBON AND SPONGY IRON FILTERS.

By G. W. WIGNER, F.C.S.

WHEN staying at Margate recently I was dissatisfied with the character of the water supply, which was not, in my opinion, fit for drinking, and as it was therefore necessary to provide a filter, I considered it a good opportunity to test two of the rival filters which are among the most extensively advertised. The London water, although it is not by any means perfect, is yet too good to give any value whatever to the results of such an experiment. The Margate water, besides being evidently contaminated by infiltration from the sea, has a very unpleasant smell and taste, and the microscope shows a variety of objects which might be more readily passed in surface drainage than in drinking water. It was therefore fairly suitable for such an experiment.

The two filters chosen for the purpose were the "silicated carbon" and the "spongy iron," both were perfectly new and bought direct from the makers. As regards the construction I may just note for the information of those who have not seen both, that the principal mechanical advantages of the silicated carbon are—that the filtering body is a porous slab, cemented into the stoneware—so that it is impossible for any portion of the liquid to escape without passing through the entire thickness of the filtering material. The advantage of this is obvious, while the fact that this porous slab is effectively aerated every time the filter is allowed to run dry is no small advantage. On the other hand the speed of filtration cannot be regulated, and in practice it is somewhat irregular. In the spongy iron filter the regulation of the speed of filtration, though somewhat troublesome to the user, is very efficient; but owing to the very coarse grain of the principal filtering material it is not only possible but probable that a good deal of the water escapes without having been subjected to the influence of the spongy iron at all. The rate of filtration is much slower than in the silicated filter.

I did not consider it of any use to test these filters while quite new, as it must be

evident that if they were not capable of working satisfactorily for a few weeks on such water as that used the experiment was concluded. They were therefore put up side by side—filled regularly as nearly as possible with the same quantity of water and at the same time, the amount being about two gallons per day each and allowed to work thus for five weeks.

During this time I found that the silicated water was always preferred for table use. Even those who were entirely ignorant of the fact that filters were used would sometimes complain of a flat taste in the spongy iron water.

Since it is obvious, from what I have said, that each filter possesses advantages peculiar to itself, I determined, in addition to testing the water which had simply passed through each filter, to test samples which had passed through both, and as it seemed possible that the order in which the filters were used might make some difference, it was decided to try with silicated filter first, and with spongy iron first. I therefore had in all five samples, viz. :—

1. Water from main.
2. Ditto filtered through silicated carbon filter.
3. Ditto filtered through spongy iron filter.
4. Ditto filtered 1st through silicated carbon and 2nd through spongy iron.
5. Ditto filtered 1st through spongy iron and 2nd through silicated carbon.

The samples were distilled for ammonia as soon as possible. The following are the results of the five analyses :—

	No. 1. Tap in Main.	No. 2. Silicated Carbon Filter.	No. 3. Spongy Iron Filter.	No. 4. 1st Silicated. 2nd Spongy.	No. 5. 1st Spongy. 2nd Silicated.
Colour ... ..	Yellow Green Slightly Opaque.	Pale Blue	Pale Blue	Opaque Blue.	Chalky Blue
Suspended Matter ...	Traces	None	None	Traces	Slight Traces
Smell ... ..	Offensive	Very Slight	Offensive	Decidedly Offensive	Decidedly Offensive
Taste ... ..	Slightly Offensive	Saline	Saline and offensively flat	Unpleasant and very flat	Excessively flat and objectionable
Hardness before boiling	27·2°	16·9°	11·5°	14·0°	17·1°
Hardness after boiling	9·4°	5·3°	9·3°	10·7°	7·2°
Total Solids ... ..	69·60	66·90	58·35	60·70	69·75
Loss on Ignition ...	5·80	6·80	5·35	4·80	9·40
Total Mineral matter	63·80	60·10	53·00	55·90	60·35
Chlorine as Chloride of Sodium ... }	36·66	36·66	36·46	36·50	36·50
Nitrogen as Ammonia	None	None	·0728	·0875	·0149
Do. Albuminoid Ammonia }	·0033	None	·0161	·0140	·0051
Do. Nitrates	·7500	·7300	·6600	·6600	·7300
Do. Nitrites	Traces	Traces	Traces	Traces	Traces
Total Nitrogen in these 4 forms }	·7533	·7300	·7489	·7615	·7500
Oxygen absorbed from Permanganate }	None	None	·0630	·0314	·0183
Microscopical Examina tion of Residue	Very bad Animal and vegetable debris. Some small spores. Quartz.	Organic debris minute traces only. Mineral matter traces.	Satisfactory It was very free from suspended matter.	Satisfactory	Satisfactory

On looking at these results, the first general feature which deserves attention is that the two filters when used together do not appear to have affected any additions

purification, but rather the reverse. It is very difficult to account for this fact. In both cases an ample quantity of the once filtered water was allowed to flow through the second filter so as to rinse it out, and the rinsings were rejected. It is true the filters were not continuously worked under these conditions for any length of time, but this ought hardly to be an essential for this experiment.

Leaving this I would next point out the special features shown by columns No. 2 and No. 3, which are the two filtered waters, as compared with column No. 1, which is the unfiltered.

Both filters have equally removed the yellow green colour of the water, and the suspended matter.

The silicated filter has greatly reduced the smell, but the spongy iron has merely changed its character, so that instead of resembling decaying vegetable matter, it is a sort of indescribable smell, perhaps more resembling the smell of impure hydrogen produced by the action of acid on iron than anything else; but of course very faint, though offensive.

The taste has apparently been affected in a similar way. The silicated removed the offensive taste, and left only the saline. The spongy iron left the saline, but added to it a taste a little worse than if the water had been boiled, that is, there was something besides the flat taste. Bischof has alluded to a gas which he has observed within the bulk of spongy iron after it had been in use some time, which gas he says is sometimes explosive, sometimes not, and on one occasion he found this gas to contain a hydro-carbon; may not this hydro-carbon be the cause of this smell and taste?

The effects on the hardness are singular. The silicated reduced the temporary hardness by  $6.2^{\circ}$ , and the permanent hardness by  $4.1^{\circ}$ , total reduction  $10.3^{\circ}$ . The spongy iron reduced the temporary hardness by  $15.5^{\circ}$ , but only reduced the permanent hardness by a decimal. The spongy iron therefore reduces the total hardness the most, but bearing in mind the greater importance of permanent hardness, there is probably little to choose.

It is remarkable that the reduction of total mineral matter does not more closely follow this reduction of hardness. I have not yet made full mineral analyses of the residues to determine this point.

It is, however, in the ammonia and albuminoid ammonia, which are so often viewed as almost the sole proof of purity or otherwise, that the most important results appear. The silicated removes even the small proportion of albuminoid ammonia which was present, but the spongy iron produces a very marked proportion of free ammonia and so much albuminoid ammonia that the water would probably be condemned by those who trust mainly to that determination.

This result is a serious one, in whichever light we view it. If the albuminoid ammonia determination is of value, then *pro tanto* the filtered water is worse than the unfiltered. If the filter is a good one, and certainly many other experiments have pointed out that it is, then any analyst who reported on such a water, in ignorance of the fact that it had been through spongy iron, might be deceived. But still further, if spongy iron acts in this way, is it possible that metallic iron may in a less degree?

In considering this point all the special circumstances of the case must be borne in mind. For instance, the very saline character of the water, and the fact that this salt is partly due, in all probability, to infiltration from the sea, but still the fact remains.

It is unnecessary to go at length through the other columns. It is well, however, to point out that when two filters were used, in the case where the spongy iron was last the ammonia and albuminoid ammonia were almost as high as in No. 3, while, where the silicated was last, they were far less, though not so low as when the water passed through the silicated only.

It would be very desirable to have reports of similar trials on the water supply of other places, but I hope it will be possible to take the precaution of using new filters and keeping them at work for a month before taking the samples.

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### BRITISH ASSOCIATION MEETING.

The following are abstracts of two papers read at the Meeting in Dublin, and will be found of interest to our readers:—

#### MILK ADULTERATION.

By E. H. Cook, B.Sc.

SINCE the introduction of the Adulteration Act, the services of the public analyst had been most frequently called in to decide the question of the adulteration of milk; and he feared they must add that more unsatisfactory decisions were given than in other prosecutions. Instances had occurred in which innocent milk sellers had been fined for selling a pure article, and in many cases they might be sure the fraudulent dealer had gone unpunished. Milk was a substance which varied greatly in quality. In his own experience he had found a difference of as much as 18 per cent., and Dr. Voelcker had published analyses in which as great a difference as 25 per cent. occurred. As a result of four years' experience on this subject, it appeared to Mr. Cook that milk was subject to a variation owing to the food, a variation owing to the season, a variation owing to the animal, and a variation owing to health. The best milk was given by those cows which were fed on grass, and the better the grass (other things equal) the richer the milk. That the quantity of milk yielded by the same cow varied at different seasons of the year was well known, and the quality also varied considerably. Generally speaking, milk was richer in summer because the milk-producing articles were then available for food. Some cows gave better milk than others, which might be due to some individual peculiarity of the animal or to the breed. Guernsey was the best breed for quality combined with quantity. Devons produced milk rich in fat but were inferior to Guernseys. Herefords were good useful cows, as also were Shorthorns; but the first place must be given to Guernseys. Their milk is richer in solids and in fat, and the butter is of a finer colour. The course adopted by most analysts was to take as their standard the lowest percentage of solids or of "solids not fat" which pure milk had ever been found to contain; but this was open to objections. By the Adulteration Act the analyst was to fix the percentage himself, and it varied. In order that justice might be done, fraud detected, and the dignity of the chemist maintained, it was necessary to remedy that unsatisfactory state of things. Only one method appeared to offer a chance of success. Briefly, that was to buy and sell milk by quality instead of by quantity. One method of introducing the practice would be to divide the milk into two qualities, first and second, the former to include all milks containing 12 per cent. of solids, or 9 per cent.

of "solids not fat," and to be sold, say, at 4d. per quart, and the latter to include milks containing less than 12 per cent. of solids, or 9 per cent. of "solids not fat," and to be sold at a lesser price. The vendor thus selling according to the quality, no unjust prosecution could arise. Some efficient instrument, however, should be put into the hands of farmers and others, so that a rough analysis might be made, and the milk sold on the results obtained. This system, the author thought, would tend to stop adulteration, because it would no longer pay to adulterate, a better price being got for the better articles, and it would tend to put an end to those complaints of medical men, who, after advising their patients to take milk, found its effects so uncertain and unsatisfactory.

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### ON THE ADULTERATION OF DRUGS.

BY CHARLES R. C. TICHBORNE, LL.D.

THE author stated that in his paper he should not refer to the adulteration of the expensive drugs and chemicals such as saffron, scammony, quinia, nitrate of silver, which no doubt did occur; but a few recent experiences would illustrate the fact that adulteration is perhaps even more extensively carried on with cheap drugs than dear ones. He had been informed on good authority that powdered hematite—red iron ore—is frequently sold as the peroxide of iron. It is still a favourite remedy, particularly among amateur doctors; and as the Pharmacopœial article is only worth a few pence per lb., a variable rock with various proportions of oxide of iron—10 to 70 per cent.—should not be substituted for it. He was not, however, prepared to vouch for the correctness of this statement from actual observation; but the following instances had come under his own immediate notice:—

"Phosphorus and nitric acid," he said, "are not very dear substances, and therefore we would suppose that a preparation like phosphoric acid would always be made as directed from those chemicals, particularly when sold as the B. P. acid; but I place before you a specimen of the so called B. P. acid which is made from bone-ash and oil of vitriol. On reference to Watts' 'Dictionary of Chemistry,' vol. iv., pages 500 and 544, it is there stated that a very pure acid may be obtained by treating bone-ash with oil of vitriol, repeated treatment with  $H_2SO_4$ , evaporation, and other manipulations not necessary to specify in this paper. The writer says, after describing the process, 'The filtrate, when boiled, constitutes a solution of ortho-phosphoric acid, contaminated with a trace of sodium, but otherwise pure.' Now, whether it is possible to remove the whole of the lime and magnesia by easy and cheap means I am not prepared to say. But, as far as I can see, the sample of so-called phosphoric acid under examination more exactly represents the biphosphate of lime of the manure-makers than the Pharmacopœial acid. It gave a voluminous precipitate on adding chloride of ammonium and carbonate of ammonia, and also contained appreciable quantities of magnesium. Here we have a chemical product cheap in itself, cheap as regards the sources from which it is procured, and yet sold impure. The doctors' dose—30 drops—is not much, and yet it must be cheapened for the commercial greed.

"Linseed is a very cheap commodity, owing partially to the extensive cultivation of the plant for flax and other purposes, and also because, as regards the seed, we utilise the whole of the residue after expressing the oil. After getting the latter valuable

product we have the linseed cake, also valuable as a cattle feeder, which, when ground, is prized by the medical man for its emollient properties. Well may the plant be called *Linum usitatissimum*. Of such universal application is this substance that it becomes important that we should have it extremely pure and free from extraneous matter. Yet even the cheapness of this commodity has not saved it from the adulterator's hands. Extensively as it is pressed for oil, grapes are much more extensively pressed for wine and, unfortunately, the wine-grower cannot utilise the produce of his wine-press except for manuring his vinyard; therefore the wine-press residue may be practically considered as a dead loss. But one ingenious wine-grower bethought himself that, as he had a press, it was only necessary to add a little linseed farina to grape residue to produce a very presentable linseed cake, as far as the eye went. I show you now specimens of linseed cake manufactured abroad, in which the residue of the grape, stones and stalks, can be easily recognised by a very low power of the microscope."

Professor Tichborne next showed three samples of colocynth. Now the Pharmacopœia describes colocynth as "the dried decorticated fruit freed from the seeds." A colocynth apple had been found to be thus composed—

Seeds (inert)	...	...	...	...	...	Per cent.
Rind (nearly inert)	...	...	...	...	...	47.19
Pulp	...	...	...	...	...	33.78
						19.03
						100.00

So that, taking Meissner's analysis, which states that the pulp only contains 14 per cent. of colocynthin, we have—

Pure sample	...	...	...	...	...	Per cent. of active principle.
Turkey pulp ground without removing seeds	...	...	...	...	...	14.3
Colocynth ground with rind and seeds	...	...	...	...	...	4.2
						2.6

Of three samples shown to the Conference, Professor Tichborne said all were obtained in commerce.

"One is a sample of the very best average quality, but still containing a very large proportion of seed; in fact, it is very seldom without indications of the presence of that substance, and I believe it is generally the practice to powder the colocynthin pulp with the seeds remaining in it. The second sample is one which is much darker in colour, and consists of the whole colocynthin apple ground. The third sample is not only the whole colocynth ground up, but a sufficient quantity of potato starch, added to make the colour light—as well as being a profitable transaction. A medical man indeed, prescribing 8 grains of such a powder would be disappointed in the results."

#### PHARMACEUTICAL CONFERENCE.

We give below some abstracts of some papers read at this Conference in Dublin:—

#### THE TITRATION OF HYDROCYANIC ACID AND CYANIDES, AND ITS RELATION TO ALKALIMETRY.

By LOUIS SIEBOLD, F.C.S.

*Read before the British Pharmaceutical Conference.*

LIEBIG's method for estimating the strength of hydrocyanic acid by means of decinormal solution of silver nitrate gives perfectly accurate results if the following precautions be observed:—

(1) The solution of sodium or potassium hydrate should be placed in the beaker first, and the hydrocyanic acid added to it from the pipette. If instead of this, the acid is placed in the beaker first, and the alkaline hydrate added afterwards, there may be a slight loss by evaporation, which becomes appreciable whenever there is any delay in the addition of the alkali.

(2) The mixture of hydrocyanic acid and alkali should be largely diluted with water before the silver nitrate is added. The most suitable proportion of water, according to my experience, is from ten to twenty times the volume of the officinal or of Scheele's acid, which is more than twice the quantity recommended by Fresenius and other authorities. With such a degree of dilution the final point of the reaction can be observed with greater precision.

(3) The amount of alkali used should be as exactly as possible that required for the conversion of the hydrocyanic acid into alkaline cyanide, as an insufficiency or an excess both affect the accuracy of the result. With an excess the results are too high; with an insufficient quantity they are too low. The error due to the first named cause is but small and is pointed out in some of the standard analytical works, which therefore recommend the use of sufficient alkali to produce a distinct alkaline reaction and the avoidance of an undue excess. But it is just this direction which may lead a conscientious yet inexperienced manipulator to the far more serious mistake of using too little alkali, because litmus entirely fails to mark the point at which the hydrocyanic acid has been completely converted into sodium or potassium cyanide. These cyanides are so strongly alkaline to test paper, and hydrocyanic acid is so weak an acid that a mixture of the two may have a distinct or even a very strong alkaline reaction and yet contain a considerable amount of free hydrocyanic acid. Hence it follows that the use of a quantity of sodium hydrate quite sufficient to produce a strong alkaline reaction may only ensure the conversion of a portion, and perhaps of the smaller portion, of the hydrocyanic acid actually present into sodium cyanide. The inevitable result will be a serious error in the estimation, as the quantity of silver nitrate solution required to produce a permanent precipitate will only indicate that portion of the hydrocyanic acid which has entered into combination with the alkali; and this error may possibly amount to as much as 75 per cent.

I have alluded to this source of error at one of our previous meetings, in connexion with a paper on the preservation of hydrocyanic acid, and I pointed out on that occasion that the alkalinity of the mixture at the end of the reaction, *e.g.*, after the addition of sufficient silver nitrate to produce a slight permanent precipitate, may be regarded as a sure indication that a sufficient quantity or rather an excess of alkali has been used, and that the result of the determination will be fairly correct, or in the presence of an undue excess of alkali a little too high. The alkalinity of the mixture of hydrocyanic acid and sodium hydrate completely ceases after the addition of the required amount of silver nitrate, unless some excess of alkali was used, and if it does cease, the result of the analysis will almost certainly be too low. My reason for again touching upon these points is that the neutrality of the double cyanide of sodium and silver (the product of this reaction), on which these conclusions were based, also forms the basis of my present communication.

From what I have already stated it is clear that the titration of hydrocyanic acid with silver nitrate cannot give results of scientific accuracy unless the quantity of alkali



used is exactly that required to combine with the acid, or unless a correction can be made for the excess of alkali employed. It is true that a slight excess of the latter does not appreciably affect the result, but then the question arises how to make certain that the excess used is but a slight one. It will not do to start with just sufficient soda to render the mixture alkaline and then to add gradually more as the alkalinity ceases during the titration, because in that case free hydrocyanic acid would be present in the mixture during nearly the whole of the process, and under the influence of the exposure and the continual stirring a portion would inevitably be lost by evaporation, thus causing an error which, though perhaps not considerable, is certainly greater than that which would result from the use of even an immoderate excess of soda to start with. I find, however, that the following *modus operandi* will meet the difficulty and ensure results agreeing perfectly with those gravimetric determinations:—The acid is allowed to run from the pipette into an excess of solution of sodium hydrate; decinormal solution of silver nitrate is then added drop by drop until a slight opalescence is produced, and this point being attained, standard normal hydrochloric or sulphuric acid is added until the opalescence begins to increase, which does not take place until the whole of the free alkali is neutralized. From experience I find that for each c.c. of standard mineral acid thus required 0.01 c.c. should be deducted from the volume of the silver solution used, and the remainder calculated for HCy. It will be seen that in this process the cyanide of sodium and silver acts as an acidimetric indicator, and indeed, it answers well for the purpose, for a single drop of free acid produces with it a very distinct precipitation of silver cyanide.

The fact, that in the absence of a sufficient quantity of soda the volume of silver solution required to produce a permanent precipitate only indicates that portion of the hydrocyanic acid which has been used up in the formation of sodium cyanide, and that this determination of NaCy is in no wise affected by the presence of free hydrocyanic acid, renders this method applicable for the analysis of mixtures of the free acid and alkaline cyanides. Supposing the solution to be analysed contained free hydrocyanic acid and potassium cyanide, the volume of silver solution required to produce a permanent opalescence would show at once the quantity of KCy present. On now adding NaHo in slight excess and continuing the titration until the opalescence is again produced we find the quantity of free HCy. The results thus obtained are quite exact.

Before quitting this subject I wish to refer to a very handy process for the estimation of cyanides recently communicated to the Chemical Society by Mr. J. B. Hannay. It consists in the addition of decinormal solution of mercuric chloride to the hydrocyanic acid or cyanide rendered previously alkaline with ammonium hydrate, until a permanent precipitate is formed, which does not occur until the whole of the cyanogen has been used up in the formation of mercuric cyanide, as alkalis have no action on the latter. I have tried the process repeatedly with most satisfactory results, and believe that it will find much favour with pharmacists in the testing of hydrocyanic acid, especially as an excess of alkali does not affect its accuracy. But it cannot be used like the other for the analysis of mixtures of free HCy and cyanides.

I now come to the second part of my report, viz., the relation of the titration of cyanides to alkalimetry. It stands to reason that if an alkaline cyanide can be correctly estimated in the presence of free hydrocyanic acid by silver nitrate, this titration must answer as well for the estimation of a caustic alkali as for that of hydrocyanic acid. For that purpose the quantity of KCy or NaCy found, or the volume of silver solution

used, is simply calculated for KHO or NaHO instead of HCy. Now if the applicability of this test for alkalimetric purposes were confined to the determination of caustic alkalies, I feel certain that nobody would think of using prussic acid and silver nitrate in preference to the customary sulphuric acid and litmus; but I find that it answers equally well with the alkaline carbonates, and here I consider it decidedly preferable to the process in general use, for the following reasons:—

(1.) The solution of alkaline carbonate does not require boiling, as the carbonic acid does not interfere.

(2.) The change from perfect clearness to an unmistakable turbidity, as produced by a single drop of the silver solution, is more striking than that of the colour of litmus brought about by one drop of standard sulphuric acid.

(3.) As a decinormal solution is used the results are more accurate than those obtained by normal  $H_2SO_4$  or HCl.

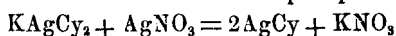
(4.) The results may be readily checked, without the necessity of operating on a fresh portion of the sample.

(5.) The chloride present in commercial alkaline carbonates can be estimated by the same process with but little additional trouble.

It is well known that hydrocyanic acid does not decompose alkaline carbonates at an ordinary temperature. But in the presence of silver nitrate the decomposition takes place in accordance with the following equation—



The first drop of silver solution added in excess precipitates silver cyanide.



The weak solution of the carbonate to be tested (about 0.5 to 1 gram in 100 c.c. of water) is mixed with 10 to 20 c.c. of hydrocyanic acid of Scheele's strength (a decided excess), and the decinormal solution of silver nitrate added drop by drop, stirring well all the time until a permanent turbidity is produced. Each c.c. of the silver solution required corresponds to 0.138 gram  $K_2CO_3$ , and to 0.0106  $Na_2CO_3$ . I quote the results of a few determinations to show the accuracy of the process.

Pure $K_2CO_3$ used	Found
0.5850	0.5851
0.1670	0.1672
0.8775	0.8779
0.2088	0.2085

If after the addition of the required quantity of silver nitrate the mixture is boiled down to less than half its volume or until the excess of free HCy has been completely expelled, then mix with a few drops of solution of potassium chromate and the addition of silver nitrate now proceeded with until the colour of the mixture changes to red, the volume of the test thus used will be found equal to that used in the first titration. This may serve to check the previous result. In the presence of chloride, however, the number of c.c. used in the second titration will be greater than that used in the first. The difference between the two exactly indicates the chloride.

If 40 c.c. were used in the first and 45 c.c. in the second experiment the difference of 5 c.c. must be calculated for chloride.

A few of my results will show the value of the method.

Used.	Found.
(1) Pure $K_2CO_3$ 0.2000	$K_2CO_3$ 0.2005
Pure NaCl 0.0680	NaCl 0.0683
(2) Pure $K_2CO_3$ 0.9750	$K_2CO_3$ 0.9750
Pure NaCl 0.1825	NaCl 0.1830

Hence I believe, that this method merits the attention of those who are much engaged in alkalimetric estimations.

I have also employed silver nitrate with success in the analysis of mixtures of hydrocyanic acid and mineral acids, and indeed I find that these processes may be advantageously extended to other applications, but my experiments in this direction are not yet completed.

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## THE VOLUMETRIC ESTIMATION OF SOME IRON COMPOUNDS OF THE PHARMACOPŒIA.

By H. N. DRAPER, F.C.S.

THE author said he brought forward his notes rather as queries than as results. Professor Tichborne had questioned to him the correctness of the figures given by the British Pharmacopœia in the volumetric estimation of arseniate of iron. The quantity of bichromate solution said to be necessary for the conversion of 2 grammes of ferrous arseniate seemed to Professor Tichborne too small. According to the British Pharmacopœia 100 c.c. of the solution are capable of converting from proto to per salt 1.68 gramme of iron. This statement is theoretically correct, and Mr. Draper found by actual experiment, taking the mean of three made with piano wire, that the actual quantity required was 97 c.c.

Now regarding arseniate of iron, the Pharmacopœia states that 2 grammes require 17 c.c. This is because the iron is in a "partially oxidised" condition. If it were possible to prepare the arseniate so that all the iron should be in a ferrous state the conversion would require 44.84 c.c. This shows that the British Pharmacopœia standard is that of a salt containing only 37.9 per cent. of absolute ferrous arseniate, a constitution which is but inadequately described by the phrase "partially oxidised." But on making the arseniate according to the Pharmacopœia instructions even this proportion of ferrous arseniate was not realized. The mean of three experiments gave only 21.7 per cent. Other specimens purchased in Dublin gave respectively 3.34, 5.2, 6.64 and 13.6 per cent.

A different result was obtained with the ferrous phosphate. The British Pharmacopœia requires a standard of 44.8 per cent. of absolute ferrous phosphate. By preparing the salt according to its instructions a proportion of 60.9 per cent. was obtained, and from four purchased specimens the following proportions were respectively found—24.1, 29.6, 31.3, 49.2.

In magnetic oxide the British Pharmacopœia requires, by its volumetric standard, only a proportion of 28.8 per cent. of true ferroso ferric oxide. A specimen prepared according to directions, however, was found to contain only 19.4.

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M. TEISSERENC DE BORT has just charged the Agronomic Institute to make a chemical analyses of all the wines sent to the Paris Exhibition. The number of samples to be examined is more than 10,000, coming from France, Spain, Italy, Austria, America, Africa, &c.

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Mr. J. H. Collins, Public Analyst for the County of Cornwall, and for the Borough of Penzance, has been appointed Analyst for the City of Truro and for the Borough of Launceston.

## ANALYSES OF BERLIN BEER.

THE following analyses are from the *Allgemeine Hopfen Zeitung*, Beer brewed in the celebrated Brauerie Konigstadt, of Berlin, was found to contain as follows:—

## LIGHT COLOURED BEER.

Alcohol ... ..	4.501	per cent. by weight
Saccharine ... ..	1.893	" "
Dextrine ... ..	0.861	" "
Albuminoids ... ..	0.630	" "
Hop-bitter, extractive and saline matter ...	2.296	" "
Acids ... ..	0.005	" "
Unfermented extract		5.680 per cent.

## DARK COLOURED BEER.

Alcohol ... ..	4.250	per cent. per weight
Saccharine ... ..	1.950	" "
Dextrine ... ..	1.053	" "
Albuminoids ... ..	0.621	" "
Hop-bitter, extractive and saline matter ...	3.386	" "
Acids ... ..	0.005	" "
Unfermented extract		7.010 per cent.

## LAW REPORTS.

At the Southwark police court, Henry Hopkins, provision dealer, was summoned by the sanitary inspector of St. George's, Southwark, for selling as butter a compound containing not a particle of butter. Mr. Edwards said that he purchased at defendant's shop a half-pound of butter. It was labelled "Good butter, 1s. 2d. a pound." He paid 7d. for it, and took a portion to Dr. Muter's for analysis. He produced a certificate from the latter, setting forth that there was not a particle of butter in it, but it was not injurious to health. The defendant said he sold it as he received it from the wholesale dealer at Mile End. He thought the sanitary officers ought to look after the manufacturers as well as the dealers. Mr. Benson told him that whenever he liked to take proceedings against the manufacturer he would render him all the assistance in his power, but the defendant must pay a fine of 10s. and 12s. 6d. costs.

At the Tunstall police court, Mr. Robert Lloyd, grocer and provision dealer, was summoned under the Food and Drugs' Act, for selling adulterated oatmeal. The oatmeal was purchased by William Giffard, an assistant to the inspector, who handed it to Mr. Jones, the county analyst. Mr. Jones certified that the article contained 15 per cent. of barley-meal. The defendant's reply to the charge was that the oatmeal was precisely the same as he had purchased it. A fine of 1s. and costs was imposed. The defendant was told from the Bench that he had his remedy against the party who supplied him with the article.

MARYLEBONE.—MILK ADULTERATION.—John Turney, milk dealer, was summoned by one of the sanitary inspectors of St. Pancras, for selling milk adulterated with water. The certificate of Dr. Stephenson, the public analyst for St. Pancras, showed that the milk was adulterated with 8 per cent. of added water, and was deficient in butter fat. The defendant said he sold the milk as he received it. Mr. Cooke observed that the percentage of water was very small, but as the defendant sold adulterated for pure milk, he must be held liable. He must pay a fine of 2s 6d. and 2s. costs.

Simon Ebben was summoned for a similar offence, the quantity of added water being 16 per cent. The defence was that the milk was sold as bought. Mr. Cooke fined the defendant 20s. and costs.

BELEFAST.—ADULTERATED MILK.—William Holden, farmer, was summoned by William John Anderson, sub-sanitary officer, on a charge of selling butter-milk adulterated with 28.48 parts of water. The offence was proved, and defendant was fined 20s. and costs. Defendant, on hearing the sentence of the Court, remarked that it was not justice, whereupon Mr. O'Donnell committed him for contempt of Court. Defendant then expressed his sorrow for having made use of the words in question, and his worship did not enforce the order.—Ann Jane Carlile was also summoned by Mr. Anderson for selling adulterated sweetmilk. A certificate was produced from Professor Hodges, borough analyst, stating that there was 34.27 per cent. added water in the sample. Defendant was fined £5 and costs.

At Guildford Borough Bench, before the Mayor, Christopher Wrist, grocer, High Street, was charged with having sold a quarter of a pound of cocoa which was not of the nature and quality of the article demanded by the purchaser. Defendant pleaded "Not guilty." Police Constable Butcher said that on July 27, he went to the shop of the defendant, where he purchased a quarter of a pound each of cocoa and coffee, and half a pound of butter, for which he paid 1s. 2½d. He told defendant that he was going to have the goods analysed, and that if he chose he might retain one-third.

Defendant replied that he did not care to do that, but that the coffee was not pure. Mr. Superintendent Law said he received the articles named from the last witness on July 27. On the 31st of that month he handed them to the borough analyst at Southampton, and he now submitted his certificate. The Clerk read the certificate, which stated that the cocoa contained 30 per cent. of starch and sugar. Defendant handed in a letter from Messrs. Epps and Co., stating that the label on the paper in which the cocoa was wrapped contained all that was necessary to comply with the requirements of the Act. The Mayor, having looked at the label, said it represented a true statement of the article, and if the analysis was found to be correct, the purchaser knew at the time what he was purchasing. Mr. Law: I take it that there was a label of this kind upon the article purchased, but I maintain that it is not sufficient, for the officer went into the shop and asked for a quarter of a pound of cocoa. There was no mention made as to a mixture. The Mayor: Was it supplied in a packet similar to this (holding up one of Epps's packets)? Mr. Law: I maintain that when a person sells an article of that kind he must call the attention of the purchaser to the fact that it is mixed with some foreign substance. No person would think of reading the whole of that printed matter on the label before he purchased. The Mayor: Then what's the use of the label? Mr. Law: I maintain that it is worthless. The Mayor: The purchaser has full knowledge of the nature of the article purchased by the label attached to it. Mr. Law: The purchaser's attention must be called to the fact that it is not genuine. There being a number of other cases, it was decided to proceed with the remainder before giving a decision.—Mr. John Fulk, grocer, Woodbridge Road, was similarly charged with having sold a quarter of a pound of cocoa. Defendant pleaded "Not guilty," and Mr. G. White appeared on his behalf. Police constable Butcher said that on July 27th he purchased from the defendant a quarter of a pound each of coffee and cocoa, and half a pound of butter, for which he paid 1s. and 2d. Mr. White suggested that, as there was another charge against defendant, he would like the Bench to hear them separately, so that the one would not prejudice the other. Mr. Law: The articles, the coffee and the cocoa, were obtained at one and the same time. The Mayor: The witness can give evidence of that I think. Mr. White: Do you mean that you will hear both together? The Mayor: Yes. Mr. White: They are separate and distinct cases, and I object, on behalf of my client, to have them heard together. It was decided to hear the case of the cocoa first, and the constable stated that he handed the articles he had bought to Mr. Law. Cross-examined by Mr. White, he said that it was on a Saturday when he went to defendant's shop. He was in plain clothes at the time. Defendant was the person who served him. He would swear that. Mr. White asked witness a number of minor questions, and the Mayor inquired if they were all necessary; they had got the fact that the constable bought the cocoa. Mr. White replied that he was conducting his case properly and fully, and he had no intention of occupying the time of the Court unnecessarily, but he had an object in view in asking the questions he had done. There had been a mistake made in the last case—the certificate was dated two days before the analyst received the articles—and he wished to conduct this case closely. Witness resumed: He first asked for cocoa, and afterwards for flake cocoa. Mr. White asked for the production of the sample sold. Mr. Law handed to Mr. White a packet, which he said contained the cocoa that the constable purchased at defendant's shop. On Mr. White opening it, and showing the contents to the constable, the latter swore that it was not what he bought from defendant. Mr. Law was about to make an explanation, when Mr. White said he had no right to interfere. There was a witness under cross-examination, and until that was completed no other person had a right to interfere in the case. Mr. Law: It is to your own advantage what I was going to say. Mr. White: I want the proper cocoa produced. If this is not it, and the policeman swears that it is not, where is it? Mr. Law: This is the cocoa that was obtained from Mr. Fulk. Mr. White: Well, your witness distinctly states that it is not. The Mayor: The question is, is that the article that he bought and took to Mr. Law? Mr. White: He says it is not. Police constable Butcher, in reply to the Mayor, said the cocoa produced was not the same as he bought from Mr. Fulk. The Mayor: Mr. Law says that is the article you brought him. Mr. Law: It is quite clear that it is the article bought from Mr. Fulk. There is a mistake in the certificate of the analysis, which is dated July 29, whereas I handed the articles to him on July 31. Mr. White: That's the reason I have in addressing myself more particularly to the details in this case. Mr. Law: The certificates are all wrongly dated. No rock cocoa has been returned adulterated. The certificate states that this is rock cocoa. A Voice: Then he doesn't know his business. Mr. White: There has been some mistake somewhere, and one thing I know is that we have not the right article here. The Mayor: I think this case had better be dismissed, at any rate. Nothing can be done with the analysis dated wrongly. Mr. Law: I shall ask that the whole of the cases be dismissed. The analyst has made a great mistake in dating his certificates. I cannot possibly, under the circumstances, go on with the cases. I took the articles myself and handed them to him personally on July 31. The cases were then dismissed, and Mr. Charles Seymour was informed that the summons against him would be withdrawn. Mr. White was making some *sotto voce* observations to the Bench prior to retiring, when Mr. Law observed that the police were only doing their duty. Mr. White remarked that if they had gone far enough into the case the Bench would have seen that the constable had been telling nothing but falsehoods from beginning to end. The Mayor said they could not allow such remarks. The matter then dropped.

At Greenwich police court, Thomas Clark, cowkeeper, Lewisham, appeared to a summons before Mr. Slade, at the instance of the Lewisham District Board of Works, charging him with selling as milk an article adulterated. The case had been twice before the court, when evidence was given that a man named Robinson was engaged by the appointed inspector under the Act to purchase a pint of milk at defendant's premises, and that on asking for such quantity and being served he tendered a three-penny piece, and received a penny change from defendant's wife. The inspector entered the place of business during this transaction, and said the milk was bought for analysis, when the defendant, who was in another part of the premises, entered the place of sale, and the wife of defendant went and brought a board, the back of which only could be seen in the place of sale, and the front only by passing under a porch. The board in question bore painted notices that pure milk was sold at 5d. a quart, and milk at 4d. with 20 per cent. of water, and this had been certified to exist by Mr. Heisch, analyst to the Board. On the part of the defendant it was stated about three years ago he was summoned, and fined 20s. at this court for a like offence by Mr. Balguy. At that time the defendant had exhibited the notice board over the door of the saleroom, and the magistrate suggested, from explanations given, that more publicity should be given. This has been since followed out, but it was asserted on the part of the prosecution that the sight of the notice board was obstructed by the porch. To settle this disputed point, it was arranged that Mr. Slade, the magistrate before whom the present case had been brought, should visit the premises in question. Mr. Slade now stated that he had viewed the premises on the previous day with the chief clerk, and he confessed that in entering the porch he should not have seen the board unless it had been pointed out to him. The question before him to decide was if sufficient publicity was given. The price at which the analysed milk had been sold, at 4d. per quart, had nothing to do with the case, as at various dairies pure milk was sold at that price. In considering his judgment he had to look to the poor and illiterate persons who would go to the dairy for small quantities of milk for their infants, not being able to see or read the notice if seen, and again he had to protect a tradesman who did all he thought he could do. The defendant had evidently followed out what was suggested at the hearing of the former case, but that was not sufficient and therefore he should only impose a fine of 10s. and 5s. costs.—Mr. Edwards, solicitor to the Board, said that the defendant having been fined 20s. previously, the fine ought to be increased, the full penalty being £20, but Mr. Slade would not alter his decision.

At the Southwark police court, Mr. Griffith Jones, grocer, carrying on business at 94, Spa Road, Bermondsey, was summoned by Mr. Thomas, the inspector appointed by the Bermondsey Vestry, for selling as prime butter a compound containing 80 per cent. of foreign fat. Mr. Thomas said that on June 13 last he saw a placard in the defendant's window on which was written in large letters, "Prime Butter, One Shilling a Pound." In consequence of that he sent his man into the shop for one pound. As soon as the assistant had served the butter, witness took it and divided it into three portions, telling the assistant he was going to have one portion analysed. Witness took it to Dr. Muter, who certified that there was not a particle of butter in it; that it was a compound of animal fat, manufactured to resemble butter, but not injurious to health. Mr. Benson did not think that prime butter, or any sort of butter, could be had for 1s. per pound. Mr. Edwin was positive that it could not, and the inspector must have known it. The compound in question was largely imported from France, and was highly nutritious. His client bought it from a large firm at Greenwich, at 10d. a pound, and sold it for 1s., and when it was sold the wrapper was generally stamped "compound"; but, by some mistake, the assistant forgot to stamp the wrapper. His client had promised for the future to placard it "butterine." Mr. Benson observed that it was a fraud upon the public to sell as "prime butter" a compound not containing a particle of butter; but as the defendant had promised not to sell the compound again as butter, he should inflict only a small fine of 5s., and 12s. 6d. costs.

Mr. Joseph Hughes, grocer, 28, St. James's road, Bermondsey, was fined 2s. 6d., and 12s. 6d. costs, for selling as pure mustard a mixture containing 50 per cent. of turmeric, flour, and starch.

At Sheffield, Mr. William Sheldon, grocer, was summoned for unlawfully selling two ounces of sweet spirits of nitre which was not of the nature, substance, and quality of the article demanded. Mr. A. H. Allen sent a certificate which stated that the sample was almost destitute of the real nitrous ether, which formed the most important constituent of "sweet spirits of nitre" and "spirit of nitrous ether" of good quality. The sample had not been watered. As a remedy it was useless. Mr. Allen appended to the certificate a statement that sweet spirits of nitre gradually deteriorated from decomposition and evaporation of the nitrous ether contained in it. In undiluted specimens this change occurred very slowly, extending over many months, and was rarely complete. Defendant stated that he sold the nitre precisely as he bought it from a Sheffield chemist, who declared it to be of good quality. Edwin Wiles, Mitchell Street, the chemist from whom the nitre was purchased, said it was entirely undiluted at his place. He bought it from a respectable house in York. The magistrates imposed a fine of £2 and costs, pointing out to defendant that, as regarded the present case, it did not matter in what state it was when he bought it. If, however, he sold it under quality, he was liable to a penalty of £20.

At the West Bromwich police court, Mr. Henry Dabbs, grocer, Hunter's Lane, West Bromwich, was summoned for selling adulterated coffee. Richard Foy, assistant to Mr. J. G. Horden, inspector under the Sale of Food and Drugs Act for the district of South Staffordshire, proved to visiting the defendant's shop and asking for two ounces of coffee, and upon being supplied he divided it into three parts, and informed defendant that he was going to have it analysed. He gave the defendant one part, Mr. Horden the other, and sent the third to Mr. Jones, the county analyst; and a certificate had been received that the coffee was adulterated with 57 per cent. of chicory. The Bench commented strongly upon the practice of selling adulterated goods, and fined the defendant 40s. and costs, or in default six weeks' imprisonment.

**ADULTERATED MUSTARD AT WEDNESBURY.**—Edward Wardman, of King's Hall, Wednesbury, was summoned for selling adulterated mustard. Foy, assistant to Mr. Horden, purchased 2oz. of mustard at the defendant's shop, and on a portion of it being analysed by Mr. Jones, it was found to contain 64 per cent. of mustard and 36 per cent. of wheat flour. Defendant, who said he never sold genuine mustard, was fined 2s. 6d. and costs.

**HEAVY FINES FOR ADULTERATION.**—Messrs. J. Hughes, J. Melter, and F. Marshall, dairymen, of Camberwell, and Charles Howe, C. Radcliffe, T. Williams, and E. Stills, of Brixtton, were summoned at Lambeth Police Court, by direction of the respective parochial authorities, for selling adulterated milk to the inspectors. Evidence was given as to the purchase of milk, and upon examination it was found in each case to be adulterated with water. For the defence it was urged that the milk had been purchased in the country, and that it was sold as it was received. The magistrate, in deciding the cases, said the milk, as stated, might have come from the country in an adulterated condition, but if parties like defendants neglected to protect themselves by having a warranty, they must put up with the consequences. Such a system was an important matter for customers, and he considered it useless to inflict small penalties. He should order each of them to pay a penalty of £10 and costs, with the exception of Howe and Williams whom he ordered to pay £5 and costs.

**ASSAULTING AN INSPECTOR.**—Mrs. Helen Evans, of 35, Dartmouth Street, Westminster, was summoned for selling milk not of the nature and substance demanded by the purchaser. She was also summoned for assaulting the inspector while in the execution of his duty. Mr. Warrington Rogers prosecuted for the Westminster District Board, and Mr. W. Wonton Smyth defended. It appeared from the evidence that the inspector sent his son into the defendant's shop on 30th June, and purchased a pint and a half of milk for which he paid 3½d. After the purchase was completed, the inspector himself walked into the shop, and said the sample obtained was for analysis. The defendant said she knew it was wrong, and begged him to give it her back, but he told her that he was bound to do his duty. She then came from the other side of the counter and endeavoured to upset the milk. Having partially succeeded in doing this, she struck him on the head and face and kicked him, without, however, occasioning him any serious hurt. Mr. Rogers put in the certificate of Dr. Dupré, the analyst, showing the adulteration to be to the extent of 40 per cent. Five years ago the defendant was convicted at this court for an adulteration of over 80 per cent. of water, and fined £10 by the late Mr. Arnold. The defence was that the milk was paid for at the rate of fourpence a quart, and, inasmuch as a notice was put up stating that this quality was adulterated, the defendant was not liable, as it had been recently held by the Queen's Bench in the case of a publican selling diluted spirits that the notice placed about the premises were a sufficient protection. Mr. Smyth also submitted that the milk was not sold "to the prejudice of the purchaser," as the inspector had almost admitted that he did not expect to get pure milk at this particular shop. The defendant admitted that the notice she relied on was covered with the shutters, as the shop was partially closed, it being Sunday. The magistrate thought it a very bad case, and fined the defendant £5 for the adulteration, and 20s. for assaulting the inspector.

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## NOTES OF THE MONTH.

The *Chemist and Druggist* has, we must admit, got some good ground of complaint in the fact that in the quarterly reports of some analysts such expressions are found as that "two samples of drugs were found entirely wanting of their principal ingredients"; "five samples, three adulterated"; and so on, while no prosecution has followed to test the correctness of these statements. We decidedly agree that were the analyst the prosecutors no articles should appear as adulterated in the quarterly reports unless the

cases had been fully taken before the court. Our contemporary, however, should remember that it sometimes happens that, for occult reasons only known to themselves, a local authority will not institute a prosecution even when the article is found bad. In such a case the analyst has no option, and he cannot withdraw the mention of the case from his quarterly report. Setting aside disputed questions of nomenclature and recognised strengths, the only real cases of absolute admixture of drugs that ever came under our notice were one of a sample of powdered jalap containing linseed flour and one of sulphate of quinine, containing more than 90 per cent. of the other cinchona alkaloids. The former article was, it turned out, purchased not by a chemist but at a small oil shop, and notwithstanding the certificate the authorities declined to prosecute on the ground that the oilman, not understanding drugs, knew no better! Doubtless the case afterwards appeared in the quarterly report, but what could the analyst do to prevent it? The latter case certainly should have been made the ground of prosecution. This appears just one of the points to be considered in any amendment of the Act, and the *Chemist and Druggist* does well to record it, only do not let the blame be thrown on the analysts personally for what they cannot help. If the Government would give the pharmacists an absolute monopoly of the sale of all drugs—a monopoly to which as men of education they are now as much entitled as their German compeers, and in return insist that nothing should be sold except in accordance with a definitely recognised scale of purity, &c.—it would put an end to much trouble and misconception.

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On the other hand some authorities will rush blindfold into prosecution on matters which never ought to be taken into court. An analyst is often snubbed when he makes the remark on his certificate that such and such a result does not give a good ground for proceedings, and is told plainly to mind his own business and leave them to judge. The result is that such really trivial cases as the recent slight deficiency in the alcoholic strength of a sample of tincture of jalap are brought into court. Our view is that in such a difficulty the analyst might address a letter to the inspector, saying that if asked his opinion on oath he would state that he did not consider the deficiency of any real importance. If then the prosecution was brought the analyst could publicly wash his hands of the whole affair. The only difficulty would be when his re-election came on. And if any Board could be found to object to such a letter, we say—let them.

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An interesting case at Guildford, in which the question of whether a label on Epps' cocoa declaring it to be a mixture, was a sufficient declaration without the vendor actually calling the attention of the purchaser to it, was unfortunately nipped in the bud by it being found that the analyst's certificate of the analysis performed at Southampton was wrongly dated. Such errors would be avoided if an analyst would always make a practice of filling in the heading of his certificate together with the weight of the article while the inspector was actually present. The thing must be done anyway, and to enter into another book and write all the certificates after the analyses have been made saves no time and gives room for error when there are several inspectors at work.



The *Dairyman*, naturally indignant that the publicans should have tried to get a little side wind of favour in the matter of watering their goods, makes the following amusing but perfectly true remarks :—

“ It is, however, coming it a little too strong, for these publicans, who it would seem are anxious to compel their customers to be water drinkers to a certain extent, to attempt to get the Act so altered that *they only* shall adulterate with impunity, while all other traders, forsooth, are to be subjected to the pains and penalties deservedly attaching to dishonesty of the description named. The mere fact of these gentlemen desiring to get such a clause interpolated in the Act, plainly indicates that they have a misgiving as to the legality if not morality of supplying gin and water when gin only is asked for, and it is satisfactory to know that they are still in the same uncertain frame of mind, as the Bill, in which the ill-advised amendment was embodied, has been withdrawn, and the Act of 1875 remains in *statu quo*.”

And yet, strange to say, the Local Government Board appears to have consented to act as foster father to the publicans' clause. We are sure that this cannot have been done with such careful consideration as Mr. Sclater-Booth bestowed on the original Bill itself.

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The Local Government Board is still bestirring itself *re* analysts' appointments, and the Plymouth Town Council has received a gentle hint that it is its duty to protect the interests of its fellow-townsmen by forthwith appointing a public analyst. After such dictation to that august body we fear that the individual appointed will not exactly lie on a bed of roses.

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The silly season in the papers has lately had a new feature beside the time-honoured gigantic turnip. Popular science nowadays is everything, and so we have a Mr. J. B. Watson writing to the *Times* as follows :—

“ As the fees of the analytical chemist are beyond the means of many, a few simple test papers might be prepared and used for many purposes. Certain cards should be prepared and hung in closets, which, by changing colour, would immediately betray the presence of sewage-gas in the atmosphere. Other papers might be prepared for testing the purity of water or tea, or other articles of daily consumption. The paper for testing water would immediately, should lead be present, betray its existence; the papers for testing tea would betray the presence of copper and so forth. The papers might be prepared in packets and labelled. These test papers would be very inexpensive, and could be used by the most inexperienced with confidence.”

So far so good, but why not at once start a company to supply the public with papers dipped in the true *elixir vite*, so that simply chewing one every day would make it a matter of indifference what they ate altogether. Perhaps Mr. Watson would object that the real article is as yet unknown, but then is not the same thing true of his “simple test papers?” Until he gives us his formula we fear the “simplicity” would be all on the side of the purchasers. But even this grand idea is not original, because it appeared somewhere in the silly season last year.

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When we noticed in the *Times* that Messrs. Wanklyn and Cooper had read a paper on “Elementary organic analysis by a moist process,” we experienced quite an eager desire to peruse so important a discovery; but alas! how our spirits fell when we read that it was only an extension of the old limited oxidation to cane sugar, for it seems that the other experiments were made before they “discovered the secret how to get the oxidation complete.” “Small beginnings make great endings,” so now that the hidden mystery of “evaporation to dryness” is made manifest, we shall look forward with absorbing interest to the next paper.

It is requested that when medical men prescribe orange-flower water they should put the word *concentrated* if they want it pure as imported, for it has leaked out at the Conference that some chemists critically examine the prescription, and if they in their wisdom deem that it is added only as a flavouring and not as a sedative they supply it diluted with water one in three. Sailors have a decided objection to "three water grog," but this wonderful article actually improves by dilution; besides what do patients know about it, and then—look at the extra profit!

One of our contemporaries suggests that licensed victuallers "should imitate the example of dairymen, and apply their trade society funds to prosecute adulterating members of their trade rather than to defending them against the consequences of their equivocal practices." This would be more like the common honesty which trade societies should possess.

### RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1878. No.	Name of Patentee.	Title of Patent.	Price.
174	A. E. Healey ... ..	Treatment of Paper and Woven Fabrics...	6d.
244	J. Livesey and J. Kidd ... ..	Production of Combustible Gas ... ..	6d.
301	W. M. Brown ... ..	Evaporation of Cane Juice ... ..	6d.
317	L. Peroni ... ..	Construction of Glass Tubes for Thermometers ... ..	6d.
372	F. L. H. Danchell... ..	Refining and Decolourizing Oils, Spirits and Syrups ... ..	4d.
443	J. Lee ... ..	Manufacture of Gas from Wood, Peat, &c. ... ..	2d.
449	J. H. Johnson ... ..	Treating Sugar ... ..	6d.
456	J. Johnson ... ..	Manufacture of Dextrine and Glucose ... ..	2d.
498	J. Wadsworth ... ..	Apparatus for Evaporating and Drying Sewage ... ..	6d.
500	J. Holloway ... ..	Sulphur ... ..	4d.
511	H. Baggley ... ..	Treatment of Sewage ... ..	4d.
519	A. S. L. Leonardt... ..	Recovering Arsenic from the Residue of Magenta Colours ... ..	6d.
522	W. Young ... ..	Manufacture of Gas ... ..	8d.
581	R. Punshon... ..	Treatment of Sewage ... ..	2d.
680	A. M. Clark ... ..	Dyeing and Printing with Derivatives of Aniline ... ..	4d.
646	E. Field ... ..	Treating Fatty and Oily Matters... ..	6d.
647	E. Field ... ..	Saccharification of Amylaceous Matter ... ..	4d.
682	A. Fryer ... ..	Treating the Refuse of Towns ... ..	6d.
714	A. M. Clark ... ..	Decolorizing Solid and Liquid Matters ... ..	2d.
729	W. P. Wilson ... ..	Purification of Gas ... ..	8d.
771	E. P. Alexander ... ..	Manufacture of Sulphate of Alumina ... ..	4d.
786	J. H. Johnson ... ..	Production of Colouring Matters for Dyeing and Printing ... ..	4d.
1624	C. D. Abel ... ..	Manufacture of Loaf Sugar ... ..	8d.

### BOOKS, &c., RECEIVED.

The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Medical Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Boston Journal of Chemistry; The Dairyman; The American Dairyman; The Practitioner; G. Jones, on Violet Powder.

# THE ANALYST.

NOVEMBER, 1878.

## A CURIOUS CASE OF POISONING BY MOULDY BREAD.

By ALFRED H. ALLEN, F.C.S.

I HAVE recently had the investigation of a very curious case of poisoning at Barnsley, and as the circumstances fortunately allowed of a very complete examination being made, and the case has several features of special interest, the following description may not be without value:—

At a cheap eating-house in Barnsley, kept by a Mr. Thresh, the cook made two bread puddings of the scraps of bread left from making toast, sandwiches, &c. These scraps had been accumulating for some weeks. After soaking the bread over night in cold water, she added milk, sugar, eggs, currants, and nutmeg, and then baked the puddings in separate ovens. The cook herself, the proprietor of the eating-house, the waiter, and a customer partook of one of the puddings,—distinguished as No. 1 in the evidence. The rest of it was sent to Thresh's own house, and four of his children partook of it. Of the eight persons who eat of No. 1 pudding, everyone was seized with violent purging, vomiting, and other symptoms of irritant poisoning. Their pulses were very rapid, but none of them had bloody motions. After thirty-six hours, Emma Thresh, a delicate child of three, subject to diarrhoea, died, and a week after eating the pudding, Mason, the waiter, also died. He was a very weakly man, given to drink, and was often purged ten and twelve times in an afternoon. Hence, his symptoms did not at first excite suspicion, especially as he did not vomit till the second day.

The other pudding was only eaten by one person, who did not take much, and did not suffer in any way.

The remainders of both puddings, the viscera of the two deceased persons, and the rest of the currants, nutmeg, and sugar used in making the puddings, and the spoon used in helping them were all submitted to me.

The medical man who made the postmortem examinations, having suspected arsenic or copper, my attention was first directed to metallic poisons, of which, however, no trace could be detected. The search was not limited to the sulphuretted hydrogen metals, but zinc, chromium, and barium were also carefully looked for.

I may take this opportunity of saying, that when a starchy or saccharine preparation like bread pudding is to be examined for metallic poisons, Fresenius' method of destroying organic matter (by treating the substance with hydrochloric acid and potassium chlorate) is very ill adapted for the purpose. A clear yellow liquid is readily obtained, but the colour is much darkened on heating, or on treatment with sodium sulphite, and on prolonged passing of sulphuretted hydrogen yellow or brownish organic matter is thrown down, which contaminates any true metallic sulphide, and causes other inconvenience. A far better plan, in my opinion, is to exhaust the starchy matters with cold dilute hydrochloric or sulphuric acid, adding alcohol, if necessary, to facilitate filtration. The solution so obtained may be conveniently tested for metals, alkaloids, oxalic acid, &c. The insoluble portion should then be treated with strong nitric acid and a little potassium

nitrate, evaporated cautiously to dryness, and ignited. Non-volatile metals can then be readily detected in the residue. In the case of the puddings in question, both this method and that of Fresenius\* were employed, with entirely negative results.

A search for phosphorus and cantharides was not omitted, and I also made a careful examination for alkaloids in the liquid obtained by treating No. 1 pudding with sulphuric acid and alcohol, but without result. Nor had the extract left on evaporating this liquid any bitter taste, or any poisonous effect on a mouse fed with it.

On arriving at this point I was much puzzled, and still more so when I found that No. 1 pudding, which had poisoned eight people, did not even purge a six weeks' old puppy which I fed on it for two whole days. Still the evidence that No. 1 pudding really poisoned the people was sufficiently strong to *hang it*.

At this stage I wrote to several friends to ask if they could suggest any explanation of the facts. I received in reply a letter from Dr. Tidy, suggesting *ergot* as a probable cause, but admitting that the empty bladder of Mason was not in accordance with the usual symptoms of ergot poisoning. One of the medical men subsequently pointed out that the extremely rapid pulse of the poisoned persons was opposed to the usual effects of ergot.

I examined the pudding under the microscope for ergot, but could find none. Nor had it any violet tint. Nor did the flour of which the bread supplied to the eating house was said to have been made contain any detectable trace of ergot when examined microscopically and chemically. The rye-meal of the same baker contained only a doubtful trace of ergot.

On treating No. 1 pudding with cold solution of soda an unmistakable smell of herrings was observed. After a time the mixture acquired a brilliant lake-red colour, which increased in intensity and was very permanent. The colour was very striking and characteristic, but not of the same shade as the violet-red I obtained from a bread pudding to which I had purposely added ergot. No. 2 pudding gave the same reactions as No. 1, but far less distinctly.

The lake-red colour with soda was producible throughout the mass of the pudding, and not merely on the surface. Portions of the pudding which had become visibly mouldy did *not* give the lake-red reaction, nor did a bread pudding prepared from pure materials for the purpose of comparison give any ergotoïd reaction.

Under the microscope, abundance of *mycelium* threads and other structures were observable.

From these results it appears that the red colour and trimethylamine odour observed on treating ergot with an alkali are not peculiar to that fungus, as has been supposed hitherto, but are obtainable from other sources. That the substance producing these reactions is a fungus there could be little doubt, and it is probable that it contains the same poisonous principle as ergot. In the present unsatisfactory state of the chemistry of ergot I thought it useless to attempt to isolate or identify the active principle.

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\*The best way of applying Fresenius' process to animal matters is to distil the substance with pure fuming hydrochloric acid, collecting the distillate in a little water. Arsenic, and probably antimony, will pass over, and can readily be detected in the distillate. The residue in the flask or retort is diluted with hot water, and submitted to the action of the gas given off on treating chlorate of potassium with strong hydrochloric acid. By proceeding in this manner, all the oxidising effect of chlorine peroxide is obtained without the objectionable introduction of solid matters. In this process, the animal matters are completely destroyed, and the poison dissolved without possibility of loss, and without the introduction of any foreign matter but compounds of chlorine.

I believe I have now obtained absolute proof that a body giving the ergotoïd reactions with soda is really a poisonous fungus, for I have reproduced it on a slice of bread soaked in milk and sugar and inoculated at one end with No. 1 pudding. In forty-eight hours the lake-red reaction with soda was obtainable from portions of the bread several inches removed from the pudding, and this distance was increased as time went on. Finally a portion of the bread far removed from the pudding produced violent purging on a mouse which was <sup>fed</sup> with it.

This last experiment was made subsequently to the verdict of the jury, which was that the deceased persons "Died from eating unwholesome pudding, but how and by what means such pudding became unwholesome there is no sufficient evidence to show." Everyone connected with the case whose opinion could be considered of value felt convinced that the cause of the disaster was the condition of the bread, but after the verdict I learnt that some of the jury could not conceive that a "mould" invisible to ordinary observation could be poisonous, and the cook did not notice any mould on the bread of which she made the pudding!

I may add that the poisonous pudding had no sign of crust on it, but was "sloppy," and of the consistency of bread and milk. The oven in which it was baked was a notoriously slow one. The separate lumps of bread were clearly distinguishable, and the heat had not been sufficient to burst, or in many cases to alter, the starch corpuscles.

The presence of a fungus, poisonous at a particular stage of its growth, would account for the pudding poisoning the original partakers, and yet being inert when tried on the puppy ten days afterwards. It might still be detectable by chemical reactions (like old ergot) and be capable of reproduction, as it seems to have been in the slice of bread.

There was no suspicion of malice on the part of anyone, or even of a trick having been played, and Thresh himself attributes the poisonous effects simply to "sour food."

On searching for recorded cases of poisoning by mouldy bread (as distinguished from ergotized bread) I found several instances in which very similar effects had been observed. In a case described in Von Boeck's new work on poisons, three persons were violently ill, and one, a child of a few years of age, died.

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#### NOTE ON A CURIOUS CASE OF DANGEROUS MILK.

By DR. JOHN MUTER, F.C.S.

I HAVE been lately consulted by a gentleman, whose family suffered an attack of sickness and purging after partaking of the usual morning's milk, with the view of, if possible, tracing the cause of the attack. The quantity saved was unfortunately very small, and was delivered to me in the can in which it came, but a larger amount of the same milk, which had been boiled, was also submitted. The latter enabled me to make a careful search for poisons, but with a negative result, and (after allowing for the probable concentration of the milk by boiling) showed that little or no water had been added. On opening the can, I was at once struck by the strikingly foul smell which emanated from it, and on putting the milk under the microscope, although I found no pus, casts, blood or other appearances indicating disease, I noticed some bodies which appeared to be fungoid cells. I then turned my attention to the can, and found that the smell, although partly communicated to the milk, really existed chiefly in that vessel. On partially washing

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the can I obtained decided appearances of fungoid growths and some bacteria adhering to the joints, which were entirely filled by a solid mass of decomposing milk constituents. I at once concluded that the milk had been rendered poisonous by being placed in this dirty can, which had quickly communicated its septic properties to the contents; and I reported accordingly. This shows that a poison, probably of a fungoid nature, can form in milk vessels when they have had the milk hardening in them, and are only given a slight perfunctory rinse. Our publicans take a pride in the perfect brightness of their cans both inside and out, and why should not our milkmen also avail themselves of a little sand and "elbow grease." Unfortunately the milk can is too often a dull, dirty, and unscrubbed receptacle, capable of conveying, as above shown, a dangerous fermentive poison. I, for one, will insist on having my milk in brightly-scrubbed cans (both outside and inside), and I advise the public to do likewise, or change their purveyor. I intend trying to obtain some more of the curious growth I saw, and hope to be able to describe it more minutely at a future date. I ought to say that the odour of the can was not at all that of simply stale milk, but something indescribably putrid and offensive.

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#### ON THE NITROGEN COMPOUNDS PRESENT IN THE CEREALS.

By G. W. WIGNER, F.C.S.

(*Third Paper.*)

In the previous notes on this subject I omitted to notice that the determinations of nitrogen had all been made by the soda-lime process. When I commenced the investigation I was of opinion that the results obtained by this process were sufficiently correct for the determination of such nitrogenous substances as are met with in the cereals, provided of course that the proper precautions were taken, and especially that the quantity of the grain burnt was not too large. Working in this way on 10 or 15 grains of the sample, I had found that with proper care the proportion of gluten shown by this process varied as the maximum error less than 0.2 in different analyses of the same sample. But on carrying these investigations further I am convinced that there are certain disturbing circumstances due to the samples themselves which render the results liable to a greater error than this. No alteration in the mode of procedure in the analysis is sufficient to account for some of the differences found, and I cannot at present trace any relation between the non-coagulable constituents and the irregular results, but the fact remains that I have found certain samples which show in some cases nearly one per cent. more or less albuminous matters by the soda-lime process than I should have expected them to do, and yet while repeats give nearly identical results, the percentages found differed materially from those given by the absolute nitrogen process. It seems to me probable that some of the non-coagulable constituents may be the cause of this disturbing action, but at present all I can say is that the residues which have been coagulated by acid give results which are more uniformly correct than those which are obtained from the original meal or flour. It may be possible for me on a future occasion to point out the exact differences in the results of every sample, but for the present I give the results by soda-lime process only.

Before passing to the results obtained from the analysis of the flour it will be convenient if I give some more general particulars as to these samples. They were, as I have said before, representative not average ones, and were selected from soils of different kinds, and from good and bad crops. Taking the weight per bushel as the standard of comparison most generally referred to, I have the following figures, for which I am again indebted to my friend, Professor Tanner. I also give in another column a determination of the actual weight of 100 grains or kernels of the sample. These weights were taken in such a way that I think the results are quite correct, and they may furnish some clue to the variations found between the different samples. I also give the specific gravity of the whole grain determined by direct weighing.

Mark.	Weight in lbs. per bushel.	Specific gravity of whole grain.	Weight in grains of 100 average corns of whole grain.
A	66	1.36	69.2
B	61	1.26	65.5
C	67	1.33	66.2
D	66	1.31	60.4
E	57	1.24	44.1
F	55	1.28	63.8
G	66	1.39	67.0
H	63	1.31	78.1
J	63	1.28	81.2
K	64	1.27	81.8
L	63	1.25	80.9
M	54	1.24	46.1
N	62	1.27	63.2
O	64	1.30	63.7
P	64	1.35	55.0

The weight of the corns will be seen to vary greatly, namely, from 44.1 grains per 100 to 81.8 grains per 100, the average of the whole is 65.75 grains as the weight of 100 corns.

As a further guide in considering the results it may be noted that Professor Tanner has kindly informed me that sample L was a very large crop, and sample E was a small crop; sample A was a very fine white wheat; sample B was harvested during very bad weather; sample J was grown on clay land after clover, and sample H on gravelly soil after clover.

As I have already referred to the results obtained from the whole meal and bran, I have next to consider those obtained from the samples of flour. It is necessary to bear in mind that these samples of flour were made by grinding the wheat by hand in a coffee mill, and dressing through a sieve with 80 holes per linear inch. The result of this mode of grinding and dressing is to mix the flour with pulverized bran to a much larger extent than is the case with commercial samples of flour which have been ground between stones and dressed through silk. The soda-lime combustions of these samples were all made on small quantities of flour, as I found the results obtained from say 10 grains more uniform than those obtained when larger quantities were taken. Slow combustion seemed to give the highest and most consistent results, and was therefore adopted, so that most of the samples were more than an hour and a half in the furnace, which is Griffin's gas. The samples were coagulated by carbolic acid, acidified with a few drops of metaphosphoric acid solution, and the filtrates saved for subsequent examination.

The following were the results obtained, the nitrogenous constituents being calculated as before by multiplying the nitrogen found by 6.33; the results are given in percentages:—

Mark.	FLOUR.				Percentage of true gluten, calculated on total nitrogenous matters.
	Total nitrogenous matters.	Nitrogenous matter, coagulated by carbolic acid.	Nitrogenous matter not coagulated.		
A	12.97	11.64	1.33	...	89.7
B	7.97	7.32	.65	...	91.8
C	7.85	7.60	.25	...	97.8
D	7.60	7.34	.26	...	96.6
E	8.86	8.10	.76	...	91.4
F	8.73	8.10	.63	...	92.8
G	9.43	7.59	1.84	...	80.5
H	8.86	8.35	.51	...	94.2
J	9.49	6.70	2.79	...	70.6
K	8.41	7.72	.69	...	91.8
L	7.78	6.73	1.05	...	86.5
M	11.28	10.12	1.16	...	89.6
N	8.40	7.88	.52	...	93.8
O	9.18	8.57	.61	...	93.4
P	12.13	11.13	1.00	...	92.0

The most discordant results are those shown by the J samples. Now on referring to THE ANALYST, pages 305 and 306, it will be seen that this sample of wheat showed in the whole meal the smallest but one percentage ratio between the true and non-coagulable albuminoids, namely 73.7 per cent., and that the bran from it showed a high ratio, namely 88.0 per cent. The proportion of flour obtained from this sample was 82.5 per cent. leaving bran 17.5 per cent. Now multiplying the results up we have:—

Bran	...	...	17.5	×	88.0	per cent.	=	15.40	per cent.
Flour	...	...	82.5	×	70.6	"	=	58.24	"
Total	...	...						73.64	"
Found in whole meal	...	...						73.70	"

This shows very good agreement in the results *inter se*, much better than prevails in some other cases. In the G sample, which shows the next smallest percentage, the figures worked out as above show by calculation from the bran and flour 83.3 per cent. of the nitrogenous matter present as true gluten, and the whole meal result was 83.9 per cent. In the case of the highest percentage the bran sample of C, after washing with carbolic acid, was spoilt, but the whole meal result was also one of the highest.

It will be more useful to show these results next in another form, putting side by side the results obtained from the whole meal, bran and flour.

PERCENTAGE OF TRUE GLUTEN CALCULATED ON THE TOTAL NITROGENOUS CONSTITUENTS.

Mark.	Whole meal.	Bran.	Flour.
A	87.9	42.4	89.7
B	80.9	59.6	91.8
C	92.5	—	97.8
D	91.9	40.8	96.6
E	65.9	76.6	91.4
F	76.4	86.8	92.8
G	83.9	89.8	80.5
H	81.0	70.1	94.2
J	73.7	88.0	70.6
K	79.4	64.3	91.8
L	74.0	66.4	86.5
M	90.0	78.8	89.6
N	95.3	81.5	93.8
O	76.2	52.1	93.4
P	79.8	55.7	92.0



It will be seen that the percentage ratio of true gluten found in samples M and N\* is greater in the whole meal than in either the bran or flour when sifted. It seems impossible to explain this result on any other supposition than the uncertainty of the soda-lime process already referred to.

Samples G and J give a higher ratio of true gluten in the bran than in the flour, and they are the only samples which do so. They have already been referred to.

The average of all these ratios is as follows :—

Whole meal ... ..	81.9 per cent.
Bran ... ..	68.1 "
Flour ... ..	90.2 "

I have in each case determined the nitrogen in the form of nitrates and nitrites in the filtrate from the carbohc acid process. To render these results readily comparable with the previous ones I must now give the percentages of actual nitrogen found by combustion side by side with those found existing as nitrates and nitrites :—

Mark.	Total N. by combustion.	Coagulable N. by combustion	Difference.	BRAN.	
				N. as nitrates and nitrites by aluminium process.	Difference = N. in other forms.
A ...	2.119	0.900	1.219	0.064	1.255
B ...	2.147	1.280	0.867	0.021	0.846
C ...	1.858	—	—	0.017	—
D ...	1.369	0.560	0.809	0.016	0.793
E ...	1.173	0.900	0.273	0.055	0.218
F ...	1.473	1.280	0.193	0.028	0.165
G ...	1.669	1.500	0.169	0.016	0.153
H ...	1.738	1.219	0.519	0.037	0.482
J ...	1.840	1.618	0.222	0.037	0.185
K ...	1.587	1.020	0.567	0.022	0.545
L ...	1.775	1.178	0.597	0.022	0.575
M ...	1.700	1.340	0.360	0.020	0.340
N ...	1.300	1.059	0.241	0.015	0.226
O ...	1.460	0.759	0.701	0.015	0.686
P ...	2.473	1.378	1.095	0.021	1.074

These results show an average of 0.027 per cent. of nitrogen as nitrates and nitrites still unaccounted for, and although there are considerable variations in the samples, the maximum proportion of .064 per cent. is still only a small one.

Taking the flours in the same way we get the following results :—

Mark.	Total N. by combustion.	Coagulable N. by combustion	Difference.	FLOUR.	
				N. as nitrates and nitrites by aluminium process.	Difference = N. in other forms.
A ...	2.049	1.838	0.211	0.019	0.192
B ...	1.259	1.156	0.103	0.017	0.086
C ...	1.240	1.200	0.040	0.022	0.018
D ...	1.200	1.160	0.040	0.025	0.015
E ...	1.400	1.279	0.121	0.022	0.099
F ...	1.378	1.279	0.099	0.018	0.081
G ...	1.489	1.198	0.291	0.019	0.272
H ...	1.400	1.318	0.088	0.021	0.067
J ...	1.500	1.058	0.442	0.022	0.420
K ...	1.330	1.219	0.111	0.016	0.095
L ...	1.230	1.063	0.167	0.021	0.146
M ...	1.781	1.599	0.182	0.017	0.165
N ...	1.326	1.245	0.081	0.018	0.065
O ...	1.450	1.354	0.096	0.020	0.076
P ...	1.915	1.758	0.157	0.018	0.139

\* The N sample was from the continuous growth of wheat for 9 years out of 10.

The average of this series shows :—

Nitrogen not coagulated	...	...	...	...	0.149 per cent.
Ditto as nitrates and nitrites	...	...	...	...	0.019 „
Ditto in other forms	...	...	...	...	0.130 „

So that in the case of the flours only about one-eighth part of the nitrogen is accounted for by this determination. The variations here do not seem to show any special law, except that the proportion present is, in nearly every case, less than that found in the corresponding bran.

The net result so far then is that in the bran we have an average of 0.390 per cent. of nitrogen, and in the flours an average of .130 per cent of nitrogen, which is not present as true gluten or as a nitrogen acid. Part of this quantity is no doubt present as gluten, and it seems probable that another portion may be in a body of the asparagin class. I am carrying this investigation further, but cannot report upon it at present.

My object in taking up this matter was to form a true opinion as to flesh-forming values, and it is quite clear to me that at present it will not do to assume that any nitrogenous bodies other than those coagulated by carbolic acid are really of value. Averaging the samples again I find that the whole meals show an average of 8.09 per cent. of true gluten, and the flours 8.33 per cent., or 0.24 per cent. of real flesh-formers in favour of the flour, and it must be borne in mind that this would have been larger if the bran had been more perfectly separated. I come therefore to the conclusion that the supposed greater feeding power of whole meal is not at present borne out by the facts.

I hope to give shortly a few similar facts as to oats and barley, which, as far as I can judge at present, show similar results.

At a meeting of the Scarborough Town Council, on the 26th October, Mr. James Baynes, jun., was appointed public analyst for that borough. The other candidates were Mr. Thomas Fairley, Leeds; Mr. George Jarman, Huddersfield; and Dr. Proctor, York.

Mr. Louis Siebold, F.C.S., editor of the "Year-book of Pharmacy," has been appointed Public Analyst for the County of Westmoreland.

Mr. J. Baynes has been appointed public analyst for the Borough of Hanley.

Mr. A. H. Allen has been appointed public analyst for Barnsley.

Dr. Drinkwater, F.C.S., has been appointed Lecturer on Chemistry in the Edinburgh School of Medicine.

FARADAY LECTURE.—Prof. Wurtz will deliver his lecture "Sur la Constitution de la Matière à l'Etat Gazeux," on Tuesday, November 12th, at half-past eight o'clock p.m., in the Theatre of the Royal Institution. Fellows and visitor's tickets can now be had on application to Mr. Hall.

In consequence of the Chemical Society's Dinner having been fixed for the 13th November, the next meeting of the Society of Public Analysts has been postponed to the 20th November.

ERRATA.—In Dr. Cameron's paper, on p. 337, third line, the full stop should be after, not before, the word "well"; and six lines from bottom, "3 grains" should be "53 grains."

The foll. wing are abstracts of some further papers read before the British Pharmaceutical Conference:—

### ON NECTAR IN VARIOUS FLOWERS.

By A. S. WILSON, M.A.

MR. WILSON reported the proportions of sugar he had found in many flowers, and calculated that in order to obtain 1 kilo. of sugar 7,500,000 distinct flowers must be sucked. As honey contains roughly about 75 per cent. of sugar, a bee has thus to make about two-and-a-half millions of visits in order to collect a pound of honey. It is rather a curious fact that nectar should contain cane sugar, seeing that honey never does, indeed, were a vendor to sell honey containing cane sugar he would probably be prosecuted under the Adulteration Act. A change must, therefore, take place while the sugar is in the bees possession—possibly through the action of the juices with which it comes in contact while in the honey bag, which is an expansion of the œsophagus of the insect. As nectar is acid in its reaction, it is, however, possible that the process of inversion may take place spontaneously.

### ON THE DETECTION AND ESTIMATION OF MINERAL OIL.

By W. THOMSON, F.R.S.E.

THIS referred to a process which Mr. Thomson had contrived for detecting mineral oil in animal, vegetable, or fish oils, with which he said it was often mixed to form a lubricating oil. He boiled some of the sample with an alcoholic solution of caustic soda, which converted all the animal, vegetable, or fish oils into soap. This was then mixed with sand and treated and washed with petroleum spirit, and distilled at a temperature under 190° Fahr., which dissolved out the mineral oil, leaving the soap insoluble. The spirit is then distilled off from the spirit solution of mineral oil at a temperature not exceeding 220° Fahr., and the residue of mineral oil weighed and calculated on the weight of the original mixed oil taken.

### NITRITE OF AMYL,

By D. B. DOTT.

THIS paper embodied the results of an examination of several samples of nitrite of amyl procured from different makers, with the view of ascertaining the degree of purity of the article in the market. The samples examined had a specific gravity varying from .864 to .876, the proper specific gravity being .877. By a single rectification they gave a yield of 6.7, 11.5, 33.3, 47.5, and 65.0 per cent. respectively, boiling at 90° to 100° C., while a sample prepared by the author in the ordinary way gave 85.0 per cent. One of the samples had an odour quite distinct from that of genuine nitrite of amyl, and produced little effect on the heart's action by the inhalation of its vapour. It will thus be seen that there is a great variation in the quality of the amyl nitrite of different makers, and that some of it is of very inferior quality. The author considers that some standard of purity less rigid than that of the Pharmacopœia ought to be adopted, as it is impossible to prepare a nitrite of amyl boiling constantly at 205° F. Indeed, there seems to be some doubt as to whether that is really the correct boiling point. The process for preparing nitrite of amyl, by passing nitrous acid gas through amylic alcohol is held to be the best, being decidedly preferable to that by the direct action of nitric acid on the alcohol.

## THAMES WATER.

BY G. W. WIGNER, F.C.S.

THE following analysis of samples of Thames water, which I have recently made for the Woolwich Board, will probably possess rather more than a passing interest. They show clearly how large a proportion of sea water finds its way up a large tidal river such as the Thames, to a distance of some forty miles from the mouth, and to within about a dozen miles of where it ceases to be tidal. The samples were taken when the river was in slightly more than its average condition of flood. The increase in the proportion of chlorine, as the samples are taken at greater depths from the surface, will be noted as a marked feature in the results. The samples were taken on an ebb tide.

The microscopical results gave the most convincing proof of sewage contamination, as fragments of partially decomposed food and animal fibre and disintegrated paper were found in more than two-thirds of the samples. All of them swarmed with living and dead infusoria and diatoms of many different species.

The samples Nos. 11, 9 and 10 were taken, as nearly as possible, at the spot where the wreck of the "Princess Alice" was found.

TABULAR STATEMENT of Results of Analyses of Samples of Thames Water taken on the 14th of October, 1878. All results expressed in grains per gallon.

Number ... ..	1	2	3	4	5	6
Place ... ..	Billingsgate.		Limehouse Reach.		Charlton Pier.	
Time ... ..	3 p.m.		3.35 p.m.		4.40 p.m.	
Depth ... ..	Surface	15 ft.	Surface	20 ft.	Surface	20 ft.
Temperature ... ..	56 deg.	56½ deg.	58 deg.	58 deg.	56¼ deg.	56½ deg.
Appearance of Sample ... ..	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid
Smell ... ..	Slight	Slight	Slight	Slight	Objectionable	Objectionable
Suspended Matter—Organic Matter ... ..	1.24	3.01	1.26	1.83	1.58	1.17
„ „ Inorganic ditto ... ..	6.12	13.33	5.82	6.98	4.91	5.35
Total suspended or sedimentary Matter... ..	7.36	16.34	7.08	8.81	6.49	6.52
Colour of Filtered Water ... ..	Yellow brown	Yellow brown	Yellow brown	Yellow brown	Yellow brown	Yellow brown
Dissolved Matter—Organic Matter ... ..	30.40	35.80	516.00	134.20	361.80	154.00
„ „ Mineral ditto ... ..	229.40	250.80	476.80	496.00	647.20	686.00
„ „ Total Solid ditto ... ..	259.80	286.60	992.80	630.20	1009.00	840.00
Chlorine ... ..	127.98	141.64	273.35	273.35	366.53	388.00
== Chloride of Sodium ... ..	210.90	233.42	450.45	450.45	604.01	640.87
Anhydrous Sulphuric Acid ... ..	16.05	17.77	32.19	33.73	43.52	47.13
Nitrogen as free and saline ammonia ... ..	.0140	.0260	.0440	.0440	.0740	.0700
Ditto as albuminoid (organic) ammonia... ..	.0100	.0120	.0160	.0180	.0200	.0200
Oxygen absorbed from a standard solution of permanganate of Potash ... ..	.1700	.2000	.1700	.1550	.1500	.1400

Number ... ..	7	8	11	9	10	12
Place ... ..	North Woolwich Pier.		Wreck at Powder Magazine.			Northern Outfall
Time ... ..	4.45 p.m.		5 p.m.			5.10 p.m.
Depth ... ..	Surface	20 ft.	Surface	20 ft.	40 ft.	5 ft.
Temperature ... ..	56 deg.	56½ deg.	55½ deg.	56 deg.	56 deg.	58 deg.
Appearance of Sample ... ..	Turbid	Turbid	Turbid	Turbid	Turbid	Very turbid
Smell ... ..	Most objectionable	Sulphuretted hydrogen	Most offensive	Most offensive	Most offensive	Decomposed sewage
Suspended Matter—Organic Matter ... ..	·78	·82	1·61	1·06	4·90	6·98
"    "    Inorganic ditto ... ..	5·47	5·96	4·23	4·77	27·42	17·78
Total suspended or sedimentary Matter... ..	6·25	6·78	5·84	5·83	32·32	24·76
Colour of Filtered Water ... ..	Yellow brown	Yellow brown	Yellow brown	Brown yellow	Yellow	Deep yellow brown
Dissolved Matter—Organic Matter ... ..	151·60	211·20	140·40	212·20	125·20	170·00
"    "    Mineral ditto ... ..	670·20	733·20	723·40	778·60	815·20	692·40
"    "    Total Solid ditto ... ..	821·80	944·40	863·80	990·80	940·40	862·40
Chlorine ... ..	383·93	413·83	419·94	442·32	452·26	400·08
== Chloride of Sodium ... ..	632·68	681·95	692·02	728·91	745·29	659·29
Anhydrous Sulphuric Acid ... ..	45·36	47·47	49·19	52·11	52·60	28·07
Nitrogen as free and saline ammonia ... ..	·0620	·0500	·0400	·0600	·0500	·2000
Ditto as albuminoid (organic) ammonia... ..	·0160	·0180	·0160	·0500	·0240	·0620
Oxygen absorbed from a standard solution of permanganate of Potash ... ..	·1350	·1650	·0850	·0850	·2195	·2850

Number ... ..	13	14	15	17	16	18
Place ... ..	Between Northern and Southern Outfalls.		Southern Outfall.	Jenningtree Point.		Gas Works Outfall Oct. 19.
Time ... ..	5.20 p.m.		5.30 p.m.	5.40 p.m.		3 p.m.
Depth ... ..	Surface	20 ft.	10 ft.	Surface	20 ft.	Surface
Temperature ... ..	55 deg.	56 deg.	57 deg.	56 deg.	56½ deg.	...
Appearance of Sample ... ..	Turbid	Turbid	Very turbid	Turbid	Turbid	Turbid
Smell ... ..	Decomposed sewage	Decomposed sewage	Decomposed sewage excessively strong	Very offensive	Very offensive	Offensive
Suspended Matter—Organic Matter ... ..	2·41	5·19	4·70	1·73	6·58	3·62
"    "    Inorganic ditto ... ..	10·11	24·51	12·23	8·87	27·59	9·99
Total suspended or sedimentary Matter... ..	12·52	29·70	16·93	10·60	34·17	13·61
Colour of Filtered Water ... ..	Urine yellow	Yellow	Very deep urine yellow	Yellow brown	Urine yellow	Yellow
Dissolved Matter—Organic Matter ... ..	156·80	116·60	116·20	164·00	185·00	78·40
"    "    Mineral ditto ... ..	743·00	766·60	587·00	839·80	927·60	367·20
"    "    Total Solid ditto ... ..	899·80	882·60	703·20	1003·80	1112·60	445·60
Chlorine ... ..	424·93	447·30	342·93	484·57	536·76	211·23
== Chloride of Sodium ... ..	700·24	737·10	565·11	798·52	884·52	348·07
Anhydrous Sulphuric Acid ... ..	50·36	49·87	40·60	21·20	16·05	23·34
Nitrogen as free and saline ammonia ... ..	·0255	·0315	·1900	·0680	·1400	·1200
Ditto as albuminoid (organic) ammonia... ..	·0070	·0070	·1100	·0160	·0500	·0120
Oxygen absorbed from a standard solution of permanganate of Potash ... ..	·1750	·1800	·3650	·1000	·1500	·1675

## ANALYSTS' REPORTS.

Dr. Bostock Hill, the Warwickshire analyst, at the recent county sessions presented his quarterly report, in which he stated that he had received twenty-two samples for analysis. All the samples were pure except a specimen of mustard which had been exposed to the weather. Dr. Hill was reappointed county analyst for twelve months.

At the Wilts Quarter Sessions, Dr. Donkin, the county analyst, presented his report, which stated that a sample of coffee which he tested was not good, there being an undue proportion of husk and chicory, which, however, might have been accidental. Some mustard consisted of two parts of mustard to one of flour and tumeric. The Clerk of the Peace said the report on the whole was favourable.

The report of the county analyst, Mr. W. W. Stoddart, was presented to the Somerset Quarter Sessions. He said during the quarter he had analysed 370 samples of food, two of which were brought by the public and the others by superintendents of the police. He had analysed 188 samples of beer, the result being that although the beers had varied greatly in quality, neither of the samples contained any ingredients injurious to health, or of a noxious character. On the whole the samples were much better in quality than last year. The Chairman said the report was highly satisfactory; one was curious to see if the cider was equally good, Somerset being a cider country.

Mr. J. Carter Bell, county analyst, reported to the Court of Quarter Session for Cheshire, that he had during the quarter ended September 30 analysed 89 samples, consisting of 56 beers, 5 gins, 1 whisky, 5 violet powders, 1 fuller's earth, 2 breads, 12 milks, 1 tea, 2 coffees, 1 hore-hound, and 2 lards. Of these 4 were adulterated—2 milks, 1 gin, and 1 whisky. Of the 56 beers only 1 contained more than fifty grains of salt to the gallon; many of them contained only three or four grains.

At the Cheshire Quarter Sessions recently, the salary of the county analyst (Mr. J. Carter Bell) was increased from £100 to £200 per annum, on condition of his undertaking analyses of water for a fee of 6s., and also a more extensive and complete analysis of beer.

Mr. T. Fairley, analyst for the Borough of Leeds, reports that during the Michaelmas Quarter he examined eighteen samples, twelve being milks (one of which contained 12 per cent. of water), and two peppers, one flour, one bread, and two butters, all of which were genuine, though the latter were of poor quality.

Mr. Fairley also reports that, as analyst for the North Riding of Yorkshire, he examined, during last quarter, thirty-one samples, including one whisky, which contained 37 per cent. of water. A sample of sweet spirits of nitre contained an excessive proportion of water to the amount of 31 per cent., and no more than a trace of nitrous ether. Two peppers contained sand, one mustard 15 per cent. of wheat flour, and one oatmeal 20 per cent. of barley meal. The other samples, ten milks, one bread, one flour, three oat-meals, one sugar, six peppers, &c., were all genuine.

Mr. J. Baynes, public analyst for Kingston-upon-Hull, reports that in consequence of the prevalence of typhoid fever, he examined microscopically thirteen samples of milk and five of water during the past quarter, and they were all pure. He states that the Act has been a dead letter during the quarter, owing to the quibble which has been raised as to the term "prejudice of the purchaser."

Mr. Baynes also reports that, as analyst for the East Riding of Yorkshire, he examined 43 samples, including 18 milks, 10 of which contained added water, ranging from 5 to 22 per cent., 10 breads, of which only one was adulterated, but that seems to have been the very essence of adulteration, containing, as it did, the very large quantity of 22 grains of alum per 4-lb. loaf, 1 sample of butter, 1 of baking powder, 2 of coffee, 6 of lard, were all genuine. As were also 2 samples of oatmeal and 2 of pepper. One water was contaminated.

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It is reported from Paris that 273 sacks of flour, supplied to the Châtellerault garrison, have been thrown into the Vienne, having been found so adulterated as to be unfit for food. The soldiers had long found fault with the bread, and the contractors will probably be prosecuted.

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Two German State Analysts, Drs. Hebenstreit, of Chemnitz, and Skalweit, of Hanover, have published, in tabular form, the results of most minute analyses made by them of over forty samples of German Beers. In none were found anything besides malt, hops, yeast, and water.

## LAW REPORTS.

**EXTRAORDINARY CASE.**—David Davis, milk dealer, 23, Red Cross Street, Borough, appeared before Mr. Benson, at Southwark Police Court, on an adjourned summons, obtained by Mr. Errington, the sanitary inspector of St. Saviour's District Board of Works, charging him with selling milk on the 20th ultimo containing 25 per cent. of added water. Mr. Simpson, clerk to the district board, prosecuted, and stated that on the 3rd instant the prisoner appeared before Mr. Partridge on the present charge, which he denied, and asked his worship to be allowed to send his sample of the milk to the Government analyst at Somerset House. That had been done, and now he (Mr. Simpson) and his witnesses attended to know the result. Mr. Benson told him he had received two certificates from the Government analyst. One marked 71 contained 25 per cent. of added water, and No. 72 was pure milk. It seemed to him very strange that such should be the case if the samples were taken at one and the same time. Mr. Errington was here sworn, and said that on the 20th of September he purchased the milk at defendant's shop, and told Mrs. Davis that he was going to have it analysed. In her presence he divided it in three portions, and sealed the bottles up with the official seal. One he left with Mrs. Davis, one he took to Dr. Bernays, and the third he kept, and marked 71. When the case was called on before Mr. Partridge on the 3rd instant, defendant produced what appeared to be the bottle of milk he left him, and said he was satisfied that it was genuine, and requested his worship to remit it to the Government analyst at Somerset House. Stewart Ramsay, 147 M, one of the officers of the court, said that by direction of Mr. Partridge he took the two sample bottles of milk to the Government analyst, at Somerset House. The one he received from the defendant he marked 72. The latter seemed to him to be rather loose at the cork, and it smelt rancid. The seal was on the cork, but did not touch the bottle. Mr. Errington was recalled, and in answer to Mr. Simpson, he said he had on several occasions taken milk from defendant's place for analysing, and had left several sealed bottles with him. The bottle of milk defendant sent to the Government analyst might have been one of them, as the sample was found to be good. Dr. Bernays, Professor of Chemistry at St. Thomas's Hospital, said he received a sealed bottle of milk from Mr. Errington on the 20th ultimo, and analysed it immediately. He found it to contain 25 per cent. of added water. He had compared the Government analyst's certificate, No. 71, with his own, and found them to correspond. He had also examined the Government analyst's certificate No. 72, and was positive that it could not be the same milk. It was impossible, and he had no hesitation in saying that it was not the sample left by Mr. Errington on the 20th ultimo. Mr. Benson here asked defendant what he had to say after such evidence. He replied that he was positive that the bottle of milk he handed into the court on the 3rd instant was the same his wife received from Errington on the 20th ultimo. All former samples were destroyed as soon as he knew no proceedings were taken against him. He called his wife to support his statement, when Mr. Benson said that after hearing the evidence of Mr. Errington and Dr. Bernays, he was satisfied that Defendant had committed a gross fraud on the Court, as well as the Government analyst, by handing in a sample of milk which had been left with him on a previous occasion. He therefore fined him £10, and £1 13s. costs. He could appeal if he thought proper.

At the Leek Police Session, before Joshua Brough, John Brough, J. Robinson, and Hugh Sleigh, Esqs., Mr. William Tunnicliffe, grocer, of Lognor, was charged by Major Knight, inspector under the Act, with having sold two ounces of mustard, which article was not of the nature and quality demanded. Mr. Broun, of Stockport, appeared for the defendant. William Gifford, the inspector's assistant, stated that on August 3rd he visited the defendant's shop and was supplied with two ounces of mustard, for which he paid 2½d. He then informed the defendant that he had purchased it with the intention of having it analysed by the public analyst. Major Knight put in a certificate from Mr. E. W. T. Jones, the county analyst, to the effect that the mustard contained only 72 per cent. of real mustard, and that the remaining 28 per cent. was chiefly wheat flour and a little turmeric. Mr. Broun said that the mustard supplied to the informant was manufactured by Messrs. Celman, of Norwich, and they had instructed him to appear on behalf of the defendant. This was not a case which was contemplated by the Act. Mustard was asked for. There were different kinds of mustard. There was the pure and simple flour of the mustard seed, and there was a mustard which was a condiment—mustard mixed with flour and turmeric. He took exception to the form of Mr. Jones's certificate. There was a form prescribed by the Act of Parliament in which these certificates should be made out, and this form had not been adopted. The magistrates, after a short consultation, decided to dismiss the case on the technical question raised by Mr. Broun of the form of the certificate.

At Cardiff Police Court, before the Mayor, Alderman Taylor, and Alderman Alexander, Mr. J. Rees, grocer, Grange Town, Cardiff, was summoned for refusing to supply police constable James with pepper for the purpose of analysis. The constable, who is employed on detective duty, said that on Saturday he went to the shop of the defendant and asked to be supplied with two ounces of pepper. The defendant replied that he had no pure pepper in stock, only a mixture. The constable then asked for two ounces of whatever kind the defendant had, and placed money upon the counter for payment of the article. The

defendant upon this said, "You have been bested once Mr. James, and I shall refuse to supply you with the pepper." The Bench characterised the offence of the defendant as serious, and said he would be fined 40s. and costs. He was liable to a fine of £10.

At the Gainsborough Police Court, on Tuesday, Catherine Metcalfe, of Corringham, was charged with having sold coffee adulterated with chicory and sugar. Superintendent Veitch bought a quarter of a pound of coffee at defendant's shop, and an analysis showed 17 per cent. of sugar, besides chicory. Defendant said the coffee tin contained the words "chicory and coffee," and she said it was so at the time. Two or three ounces sometimes represented her weekly sale, and she sold it as she bought it—Fined 10s. and costs.

At the Malton Sessions, on Saturday last, Mr. Lindall Anderson, grocer, &c., of Old Malton, was charged by Superintendent Park, inspector under the Food and Drugs Act, with selling sweet spirits of nitre, which, according to the analysis of Mr. Fairley, of Leeds, contained 46 per cent. of water, but no appreciable quantity of nitrous ether, the article on which its medicinal value entirely depended. The defence was that the nitre was sold in the same state as when procured from a wholesale druggist's firm, and also that defendant told the inspector that it was diluted. Superintendent Park denied that this was said until after he warned defendant that he was about to have the "sweet nitre" analysed. Defendant was fined the mitigated penalty of 10s. and 8s. costs, which he paid, remarking that he should expect the wholesale firm to refund him the amount.

At Bow street, William Pitt Hitchman 5, Museum Street, Bloomsbury, dairyman, was summoned for selling milk adulterated with water. The milk had been bought by Inspector Hoyle for the purpose of analysis, and this fact constituted the defendant's case. He did not deny that the milk was adulterated, but argued that under the Act it was necessary that the sale of the adulterated article should have been "to the prejudice" of the purchaser. A Scotch case in which it was said the Judges of Appeal had decided that this was the correct reading of the Act, was referred to in support of this argument. Sir James Ingham admitted that everything turned upon the exact meaning of these words in the Act, "to the prejudice of the purchaser," and said he remembered reading the Scotch case referred to. There was also a recent case, in which the Lord Chief Justice of England had, as he remembered, made some observations, rather bearing out the decision of the Scotch Judges. He should refer to both these cases during the remand. Mr. Poland appeared for the prosecution, and produced the English case referred to by Sir James Ingham. In that case, "Sandy v. Small," it was decided that when the purchaser knew the thing he was buying was adulterated, he was not "prejudiced" so as to bring the sale of the adulterated article within the meaning of the Act. The learned counsel argued that in the present case, although the inspector suspected the milk to be adulterated, he had no actual knowledge of that fact. Sir James Ingham said he should again adjourn the case. The matter was one of great importance, for it seemed to him that if the Scotch ruling was upheld the whole Act of Parliament would be made nonsense; if so they would require a new Act.—*Times*.

**ADULTERATED BEER.**—Richard Holmes, landlord of the Warwick Arms, Snow Hill, Birmingham, was summoned for selling beer adulterated with salt. Mr. Neville (instructed by Mr. Ansell) defended. Mr. F. Brooker, sanitary inspector, said that on the 24th of August he bought some beer at the defendant's house, stating at the time that he was going to have it analysed. He divided it into three parts, one of which he left at the house, and another he handed to the borough analyst. Dr. Hill, the borough analyst, said he had analysed the beer and found it to contain an excessive quantity of salt—94 grains to the gallon. Such an amount of salt was unnecessary and was injurious, inasmuch as it provoked thirst and incited to drink. Mr. Neville contended that the amount of salt was not excessive, stating that the excise authorities allowed 50 grains. He also urged that as the beer had not been bought by Mr. Booker for consumption the defendant could not in the words of the Act, be guilty of selling adulterated beer to the prejudice of the purchaser. He cited a case in which it had been decided that unless the beer was bought for consumption the prosecution must fail. Mr. Lowe said the question they had to decide was whether the quantity of salt was excessive. Ninety-four grains did appear to them to be a quantity of salt, which in the direction suggested by the analyst, would be injurious to health, as provoking undue thirst. The objection raised by Mr. Neville they should pass over. They had to deal with the case in a common sense way, and should fine the defendant 20s. and costs. Mr. Neville asked for a case for the superior courts. Mr. Lowe: We are bound to do that if you desire it. Mr. Fitter: There are two or three cases pending now.

**ANALYSIS OF WINE.**—M. Boussingault, director of the laboratory of the Agricultural Institute at Vincennes, is charged by the Minister of Agriculture to submit to analysis the various types of wines exhibited at the Exhibition. This investigation will include about ten thousand specimens of wines produced from all the wine-growing countries of the two hemispheres. M. Boussingault will be assisted by his son in this laborious and interesting work.—*Brewer's Guardian*.



## NOTES OF THE MONTH.

We quote the following from the *Lancet*;—

The Newport (Isle of Wight) Town Council having received a letter from the Local Government Board inquiring upon what grounds they had arrived at the conclusion that there was no necessity for the appointment of a Public Analyst, decided that a reply be given to the effect that their conclusion was based on the fact that, as to prosecutions under the Adulteration of Food and Drugs Act, the law had been rendered inoperative by the judges, who had decided that adulteration was not to the prejudice of the purchaser, who purchased for the mere purpose of prosecuting the seller.

We cannot help thinking that when the Local Government Board finds such an impression as this getting abroad among Town Councils—and it is by no means an unusual impression, even in places where an analyst has been appointed—it is time the President thought of preparing a Bill for next session to remedy this and other existing defects in the present Act.

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In another column will be found the report of a case heard before Mr. Benson, at the Southwark Police Court, which strongly illustrates the perils to which the reputation of a Public Analyst is every day exposed by the fraudulent tampering with duplicate samples. Happily in this instance the fraudulent act recoiled upon the head of the offender, and the strict lesson read by the infliction of a fine of £10 may deter other tradesmen from trying the same game. Analysts must be careful to see that whenever a tradesman's sample is sent to Somerset House the inspector's duplicate shall also invariably accompany it. The case is also satisfactory inasmuch as it is one of the first in which the analyst's certificate has actually agreed with that of the Government chemists. Will Dr. Bernays kindly for the benefit of his *confreres* give us his figures, and those found by the Court of Appeal, so that we may publish both, and get to the bottom of the allowance for decomposition in milk made by the latter?

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No class of men could possibly have a greater interest in having questions of disputed nomenclature authoritatively settled than Public Analysts, and with no section of traders does this seem more difficult than with pharmacists. In that trade it is distinctly the interest of wholesome houses to perpetuate misnomers under the shadow of which they can vend inferior articles, and so appear to their customers as "cheap" houses. We have had at various times most acrimonious attacks made upon analysts who have, in the discharge of their duty, been obliged to certify that "sweet spirits of nitre" contained no nitrous ether, because we are told that sweet spirits of nitre does not mean *spiritus aetheris nitrosi* B.P., as commonly supposed by medical men and the public. Another striking feature of a similar nature was "milk of sulphur" containing two-thirds of its weight of calcium sulphate and held by the trade, and even by some of those who from their position ought to teach the trade, to be quite a different article to the pure *sulphur precipitatum* B.P., for which it is undoubtedly and unblushingly sold. Then again we have "white precipitate," of course *hydrargyrum ammoniatum* B.P. says the medical man who orders his patient to buy some and use it, but there he is wrong

again, it is not that article but *diammonium mercuric chloride*, containing about one-half of the proper amount of its *expensive ingredient*, namely mercury. Descending from drugs to cosmetics sold by the same trade we do not even then escape this mass of mystifications, as we suddenly learn that "violet powder," supposed by all to be scented starch, is not so, but is powdered *steatite*, *selenite*, or any other cheap mineral the vendor chooses to put up in a packet, add a little perfume, and label it "violet powder."

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In the face of all this, it is encouraging to find our favourite enemy, the *Chemist and Druggist* speaking out boldly for once, forgetting the delinquencies of analysts to urge on the mineral water trade the definite abandonment of the name *soda water*. It is well known that for years no manufacturer has produced true soda water, but has simply bottled up water charged with carbonic acid, and sold it under that name. It appears that ten years ago before its vision was blinded by the "analyst" bogie, this really representative trade journal declared against the misnomer, and it now repeats its remarks. It gives an excellent suggestion that advertising makers of aerated water might even make popular capital out of the truth by selling "Blank's pure super-carbonated water, guaranteed to contain no alkalies, but to be prepared from pure water and carbonic acid." The truth is sure to prevail, and honesty is the best policy, and then *if it pays as well*, what a splendid thing it ought to be. But joking apart, Public Analysts should welcome this suggestion, which if adopted, would free them from at least one source of periodical abuse.

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The loss of the Princess Alice has suggested to some persons that many of the unfortunate sufferers died poisoned by the foul water off Beckton, instead of by actual drowning. It is in the play of Faust, we think, that a certain eminent character, in answer to the hero's remark made, after killing Valentine, to the effect that it was not duel, but murder, says, "you make a delicate distinction where there is so little difference," and it is to be feared that, pure or impure, the unfortunate persons died from imbibing water. However, even such melancholy events do good in calling attention to the state of the river, and the analyses ordered by the Woolwich Local Board will be perused with much interest by the public.

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In reply to a query from a correspondent as to whether the use of alum in baking powder would render the manufacturer liable to any penalty under the Sale of Food and Drugs Act, the *Chemist and Druggist* says:—"It would be bold to say that analysts will not bring such a case forward, but with our present light we certainly see very little chance of a successful prosecution in such an event." It is to be hoped that makers of such compounds will soon obtain a little more light, because if a man be not directly

punishable for putting into a substance to be used for the making of bread, a chemical which is held to be an adulteration when found in that article, all we can say is, that law and justice would in this case be widely divorced. Certainly a baker who happened to be fined through the use of such a powder would have his remedy against the manufacturer. The *Chemist and Druggist* had better order his cook to select an alumed powder for making all his household bread and pastry, and then after a year publish the result of its action on his alimentary organs. Not that for a moment we mean to suggest the following up of the dictum *fiat experimentum, &c.*, because that would be both rude and vulgar.

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We noticed the other day that an analyst of good repute had signed a letter as Y.Z., F.I.C. Now whatever meaning the gentleman referred to may attach to these letters, it is only right to point out that they do not constitute a legal or even a recognised title, and that if certificates so signed should unfortunately be produced in court, it would be found that the lawyers did not care a F I G for such a handle to a name, and would soon make its value like the Institute—"limited."

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Patentees are suffering just now from one of the periodical attacks to which the class are subject. This time it has taken the form of electric fever, and specifications are being filed for improvements in the electric light, at the rate of about one per day. We fear a very small percentage will survive the payment of the £50 tax.

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It is, however, very satisfactory to know that official trials are to be made in London of this means of lighting, and that the Corporation, who generally take a bold course in such matters, have decided to try not only one, but several of the systems which have been proposed of late. Some of the open spaces in London streets will afford admirable opportunities for such experiments.

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The members of the Society of Public Analysts should pay special attention to the next meeting. Some important decisions must then be come to, as to the representations to be made to Government on the alterations necessary in the Sale of Food and Drugs Act. It is far too common to leave the executive of a society to settle such matters and then undertake the work, but if public analysts are not sufficiently interested in the matter to point out defects which have been found in their own experience, they can scarcely expect people to pay much attention to complaints after the event.

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**ANALYST'S APPOINTMENT.**—The appointment of an analyst for Dorsetshire, under the Food and Drugs Act, 1875, was, at the Quarter Sessions recently, the subject of some discussion; Lord Portman presiding on the occasion, and Lord Shaftesbury being also present. The committee previously appointed to consider the question reported that they had received an application from Mr. Comyns Leach, of Sturminster; and they suggested that the borough authorities would do well to concur in the appointment of that gentleman. The chairman said the Local Government Board had intimated their approval of Mr. Comyns Leach's appointment by the county, and it was agreed to communicate with the boroughs on the subject, so that at the next sessions the matter might be settled. The Synod of Salisbury diocese petitioned the Court to appoint an analyst in the interests of temperance, the adulteration of beer and spirits being "injurious to the health and well-being of the public." The memorialists also represented that such adulteration was carried on to no small extent. The memorial was laid on the table, and a laugh was caused by Lord Portman remarking that it so happened that water was specially exempted by the Act from analysis.

## RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1878. No.	Name of Patentee.	Title of Patent.	Price
804	P. S. Brown ... ..	Obtaining Sulphate of Ammonia from Ammoniacal Liquors	6d.
816	J. Mactear ... ..	Utilizing Lye Products of Soda and Potash Manufactures	4d.
861	T. F. Scott ... ..	Apparatus for Producing Electric Light ... ..	2d.
878	W. R. Lake ... ..	Manufacture of Celluloid ... ..	1/0
886	F. Werth ... ..	Purifying Gum, Resinous Oils, &c. ... ..	4d.
891	J. Barrow ... ..	Manufacturing Ammoniacal Salts ... ..	4d.
904	S. H. Parkes ... ..	Microscopes ... ..	2d.
916	H. C. Spalding ... ..	Transmitting Power by Electric Currents... ..	6d.
921	T. Muir ... ..	Treatment of Wheat in the Manufacture of Wheaten Semolina, Meal, and Flour ... ..	4d.
924	E. Hopcroft .. ..	Filtering Water and Purifying the Animal Charcoal ... ..	6d.
929	P. Dronier ... ..	Electric Lamp Lighting Apparatus ... ..	2d.
934	J. B. Mackey & J. Sellers ... ..	Soap ... ..	2d.
945	C. B. Cooper & C. W. Smith ... ..	Soap ... ..	2d.
955	G. W. Von Mawrocki ... ..	Manufacture of Sulphur from Soda Residues, &c. .	4d.
1021	H. and C. H. Hills ... ..	Treatment of Cupreous Pyrites ... ..	4d.
1084	W. J. Blinkhorn ... ..	Manufacture of Sulphuric Acid ... ..	4d.
1101	J. Moad ... ..	Manufacture of Iron and Steel ... ..	4d.
1112	T. J. Smith ... ..	Processes for Removing Moisture from Substances ... ..	6d.
1117	W. L. Wise ... ..	Producing Dyes from Products of Madder and Tar ... ..	4d.
1129	A. Browne ... ..	Destroying Vegetable Matter or Burl contained in Dyed Animal Fabrics ... ..	4d.
1131	J. Holloway ... ..	Producing Sulphur from Pyrites ... ..	4d.
1136	W. L. Wise ... ..	Production of Sulphate of Ammonia from the Nitrogen of Marshy Moors... ..	10d.
1148	W. E. Newton ... ..	Manufacturing Sulphocyanides and Ferrocyanides ... ..	6d.
1156	T. Greenwood & T. C. Redman... ..	Refrigerating Chambers for Preserving Meat ... ..	8d.
1186	C. N. May ... ..	Treating Oily and Fatty Matters ... ..	6d.
1201	R. Messel ... ..	Production of Monohydrated Sulphuric Acid ... ..	2d.
1224	G. F. Redfern ... ..	Aqueous Solutions of Tannin or Tanning Ooze ... ..	4d.
1623	J. Pintsch & J. Schülke ... ..	Apparatus for Lighting and Extinguishing Lights by Electricity ... ..	6d.
1705	H. Simon ... ..	Process and Apparatus for Developing Bromine ... ..	6d.
2069	R. S. Ripley ... ..	Manufacture of Gas for Heating, &c. ... ..	6d.
2213	E. J. Corbett .. ..	Removing and Destroying Gases from Sewers ... ..	4d.
2217	W. R. Lake ... ..	Manufacture of Tablets, Cakes, or Blocks of Camphor ... ..	2d.
3109	S. Pitt ... ..	Evaporating Saline Solutions ... ..	6d.

## BOOKS, &amp;c., RECEIVED.

The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Boston Journal of Chemistry; The Dairyman; The American Dairyman; The Practitioner.

# THE ANALYST.

DECEMBER, 1878.

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When **THE ANALYST** was started in 1876, the first number was issued in April, and the volumes have consequently extended from April in one year to March in the next year. This has been productive of considerable inconvenience to some of our subscribers, and we have therefore decided to alter it by making this number the final one of the third volume. Our readers will have noticed that we have carried on the paging from the end of the last volume, so that those who do not want to make a book so small as nine months' numbers can have the second and third volumes bound together.

The January number will then commence the fourth volume, and we shall hope, by the addition of still more new matter, and perhaps of even a larger number of original papers, to more than keep up the position we have already attained.

The title page and index to the third volume will be issued with the January number, but must be separately ordered by those who are not subscribers.

Many of our subscribers have paid their subscriptions up to March next, and the publisher will, of course, send them the first three numbers of the new volume. A subscription of 3s. 9d. will then become due for the remaining nine months of the year.

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## SOCIETY OF PUBLIC ANALYSTS.

A GENERAL MEETING of this Society was held at Burlington House, Piccadilly, on the 20th November, the President, Dr. Dupré, F.R.S., in the Chair.

The Minutes of the Meeting held in Dublin, were read and confirmed.

Dr. J. Baker Edwards, Public Analyst for the District of Montreal, Canada; and Mr. R. G. Fraser, Public Analyst for the District of Halifax, Canada, were proposed for election as members. The ballot will take place at the Meeting, in January. The President said it must be very satisfactory to Members to know that the fame of the Society had extended to that distant Colony.

Mr. Bernard Dyer, and Mr. J. Newlands were appointed Auditors to examine the Accounts for the current year.

Dr. Dupré read a paper, "On the Sale of Food and Drugs Act in its relation to the dilution of Spirits."

Mr. Heisch also read a paper on the same subject.

Mr. Wigner read a paper, "On the clauses of the Sale of Food and Drugs Act which relate to the purchase of samples."

A long discussion ensued after the reading of these papers, and ultimately a Committee was appointed to consider the Amendments necessary in the Act, and to report thereon, and if necessary, to appoint a deputation to wait on the President of the Local Government Board.

Dr. Dupré read a paper, "On the Detection and Estimation of Alum in Wheat-Flour."

Mr. Wigner read a paper, "On Cleopatra's Needle," and another paper, "On the Nitrogenous Constituents of Cocoa."

## ON THE SALE OF FOOD AND DRUGS' ACT, IN ITS RELATION TO THE DILUTION OF SPIRITS,

By A. DUPRE', Ph.D., F.R.S.

*Read before the Society of Public Analysts, on 20th November, 1878.*

TOWARDS the end of the last Session of Parliament, an amendment to the "Sale of Food and Drugs' Act Amendment Bill," was moved by Mr. Saul Isaac, and apparently supported by Government, which, in effect, directed that in judging of the adulteration of spirits by water, regard should be had, not only to the extent of the admixture, but also to the price at which the spirits so reduced were sold. This amendment will, most likely, be re-introduced during the coming session, and as it will, if passed, most seriously affect the working of the present Act, a short discussion in our Society regarding it, will not, I think, be out of place. In order to start such discussion, the following observations are offered:—

At first sight the proposed clause seems extremely fair and reasonable; a little closer examination, will, however, I believe, show that it would be quite unworkable with the machinery established under the present Act. I say nothing here of the alteration in principle involved, which will also merit most serious consideration.

The amendment directs, that not only the extent of dilution, but also the price at which the reduced spirit has been sold is to be taken into consideration. But who is to be the judge of the fairness, or otherwise, of the price charged? It cannot be the analyst, for his analysis is absolutely useless for fixing the price, nor the inspector, for he has no special training as a spirit taster, neither can it be the magistrate, for he has only to decide on the evidence brought before him. Who then is to do this? are we to have special officers appointed under the Sale of Food and Drugs' Act, whose sole duty it will be to taste spirits found diluted by the analyst, and to decide what the value of the spirit was before it had been diluted, and are we to have a second Somerset House Court of Appeal to decide on questions even more difficult to settle than the amount of solids in milk.

An Act of Parliament must be taken in its widest application, and with our recent experience it would indeed be lamentable if a fresh loophole for evading the provisions of the Act were given to adulterators. If a principle is sound it may be pushed to its extreme legitimate conclusion, and yet be found valid. What, however, becomes of this clause if thus treated?

The wholesale price of French brandy, duty paid, and of about proof strength varies, roughly speaking, between about 15s. and 35s. per gallon. The higher priced brandy could therefore be diluted with water to nearly two and a half times its bulk, or be reduced to a strength of about sixty per cent. under proof, and still the cost of the article so reduced would be as high as that of the cheaper brandy undiluted. Is this diluted brandy to be passed as unadulterated? In such a case, the analyst, as before stated, would be absolutely incapable of deciding upon the value of the brandy on the strength of his analysis. Who then is to decide? and would not such a case give rise to an enormous amount of conflicting evidence? The same difficulty, though perhaps to a minor degree would arise, whatever might be the price of the brandy. If now we turn to whisky, we shall find that here also the prices vary, irrespective of mere alcoholic strength, but not to the same degree as in the case of brandy, though even here

the price, duty paid, may easily vary between 13s. 6d. and 18s. per gallon, and most probably, the cheaper would be the stronger. In such a case, therefore, one gallon of the more expensive whisky might be reduced so as to yield 1.33 gallon, and yet the cost price per gallon would be the same as that of the cheaper whisky unreduced. The variation is, I believe still less in the case of gin. As long, however, as there is any variation at all in the price of spirits, not governed by their alcoholic strength, the amendment proposed will be unworkable by the officials appointed under the present Act. It will no doubt be said that I have brought forward an extreme case, but my answer is that every such case, unless specially excluded, must be judged of by the provisions of the Act.

The clause under consideration is, I suppose, chiefly intended to apply to the spirits sold at public houses, or by small retail dealers, and if this be so, the clause might, perhaps, be amended as follows—"provided that the price per proof gallon as calculated from the price paid for the reduced spirit, does not exceed—

In the case of brandy	...	...	...
„ whisky	...	...	...
„ gin	...	..	...

so, and so many shillings per proof gallon." These prices would have to be fixed by the Act, but this I think would offer no serious difficulty. The working of the clause would then be restricted to the cheaper kinds of spirit, and it could be worked by the officers at present appointed.

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## ON THE SALE OF FOOD AND DRUGS ACT, IN ITS RELATION TO THE DILUTION OF SPIRITS.

BY C. HEISCH, F.C.S.

*Read before the Society of Public Analysts, on 20th November, 1878.*

I WAS somewhat surprised to find myself put down for a formal paper this evening. I had intended to confine myself to some remarks on whatever might fall from our President, and though I have a paper before me, what I say must necessarily be more in the shape of remarks than an original communication.

I cannot quite agree with our President that to take price into account is an unmixed evil, especially in an article like spirits, much of which is sold according to its strength. I am quite aware that flavour and other circumstances affect the price of some spirits, as well as strength, but as a rule these are what may be called almost fancy spirits—fine old brandies, and so on, the purchasers of which can well take care of themselves. The spirits we have to do with are mainly those sold in small quantities in public-houses, and many of these are priced according to strength. Many houses of which Gilbey is a notable instance, price even brandies on the same principle. I have just heard of a case where some brandy was sold as *Martell's case brandy*, which turned out to be many degrees more under proof than any to be found in Martell's cases, and the vendor was convicted of selling an article under a false name, solely on the question of strength; but when spirits are mentioned, there is no doubt that gin is the one spirit more especially meant, and the dictum of Mr. Justice Grove that it should not be sold at more than twenty under proof, I have no doubt is what provoked the introduction of the clause in question. Having had a good deal to do with gin distillers, I know that,

unless specially ordered, it usually leaves their premises at either seventeen or twenty-two under proof, but is also prepared at thirty-three under proof for special market. Publicans, however, rarely buy anything but seventeen under proof. The price of this varies with the price of grain; it has been as low as 10s. per gallon, and as high as 12s. 1½d., but may be taken as averaging 11s. The publican puts to this, each his own flavouring, and brings it down to various other strengths, which are commonly known as 6d., 5d., and 4d. gins, that being the price per quartern at which they are sold. The precise degree of dilution will vary a little, but in round terms we may say that 6d. gin is from twenty to twenty-two under proof, 5d. from thirty to thirty-three under proof, and 4d. from thirty-nine to forty-two under proof. Now, if we take the price at 11s. per gallon for seventeen under proof, it costs the publican 4·12d. per quartern. To make it twenty-two under proof he has to add, in round numbers, half a pint, two quarterns of water to the gallon, which makes the cost per quartern 3·88d. ; to bring it to thirty-three under proof 7·5 quarterns of water are added, which makes the cost 3·34d. per quartern ; and to bring it to thirty-nine under proof he adds 11·54 quarterns, which makes the cost 3·03d. per quartern. Now, taking the selling prices before-mentioned, and the risks of waste, and all other expenses into account, this shows no excessive profit. Moreover, he can charge no more per quartern if he pays 12s. per gallon. The cost to him, in each case, is shown below :—

Cost at 12s. per gallon.	Per quartern.	Cost at 11s. per gallon.	Per quartern.	Sold at
17 U.P. ... ..	4·50d.	17 U.P. ... ..	4·12d. ...	6d.
22 U.P. ... ..	4·25a.	22 U.P. ... ..	3·88d. ...	6d.
33 U.P. ... ..	3·64d.	38 U.P. ... ..	3·34d. ...	5d.
39 U.P. ... ..	3·31d.	39 U.P. ... ..	3·03d. ...	4d.

Books are published, showing the publican at a glance what his spirits have cost him after various dilutions, according to the price he pays for them, and it seems to me only reasonable that a man who takes 4d. gin should be content with the dilute article, while one who pays 6d. and gets 39 U.P. has good reason to complain, and that the carrying out of Mr. Justice Grove's decision would cause considerable injustice. Practically price is taken into account. Two cases were tried at Greenwich, one of which was dismissed because the gin was as strong as could be expected for 5d., in the other the publican was fined for selling gin of about the same strength for 6d. Though difficulties might arise in some cases, I think they might be faced, in order that substantial justice might be done in general. Even in articles where we profess to have a standard, magistrates will now take price into consideration. We must all remember the case of watered milk, in which the magistrate, when he found that only 3½d. a quart had been paid, at once dismissed the case, at the same time asking the inspector what he could expect for the price. I should therefore not so much object to see the consideration of price clause introduced.

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ON THE CLAUSES OF THE SALE OF FOOD AND DRUGS' ACT, WHICH  
RELATE TO THE PURCHASE OF SAMPLES.

By G. W. WIGNER, F.C.S.

*Read before the Society of Public Analysts, on 20th November, 1878.*

THOSE who have followed the published reports of prosecutions under the above Act, will no doubt have been struck with the fact, that the defence in nine out of ten cases is



entirely of a technical character, and in the tenth case the defence set up is generally an alleged blunder on the part of the analyst. I need hardly remind you that these technical objections have taken every form, and have dealt at one time or other with every one of what may be called the working sections of the Act. In a large number of cases the objections have been taken under the section which relates to the labelling of samples—in as many, or perhaps even more instances, some quibble has been raised as to the precise form of the analyst's certificate, and several cases have broken down because the analyst had not thought it desirable to injure his balances by weighing a quartern loaf, and had not therefore stated the weight of the sample in his certificate. But the most important of all these, I may say, frivolous objections, and the one with which I shall more particularly deal this evening, is that which relates to the first few words of the sixth section, commonly known as the "prejudice to purchaser" clause.

Attention has of late been drawn very prominently to this clause, owing to some judicial decisions and expressions of opinion, which of course, have had great weight with magistrates, who have consequently dismissed several cases where there was no doubt that the articles had been tampered with, but because these articles having been bought by inspectors for analysis, and not for use, the magistrates considered that the inspectors were not prejudiced by having adulterated articles sold to them as pure.

It is quite evident that if the Act is not to remain a dead letter, a definite decision of the Supreme Court overruling this objection must be obtained, or the present Act must be amended. It is true that steps are being taken to obtain the opinion of a higher Court on the matter, but it seems highly improbable that any decision can be given for some months, and meanwhile in many districts the Act is rendered totally inoperative, and in other districts the authorities hesitate at prosecuting even in the most flagrant cases, lest they should be saddled with the costs, through the collapse of the case on this technical point.

A good many suggestions have been made to overcome this quibble—which I think has been allowed to succeed under a wrong idea, as I will presently show. Some of these suggestions equal the objection itself in quibbling—such for instance as instructing the inspectors to eat or consume a portion of every sample they purchase—or giving a portion of every sample to the inspectors—or giving them the residues of samples found to be pure and not the remains of adulterated samples, by which of course the inspectors would be actual losers, or even making the inspectors purchase the samples out of their own money.

It would, however, be eminently undesirable, even if not impracticable that any such tricky mode of procedure should be adopted, and to my thinking it is astonishing that we should have to consider what to do to meet the adulterator's objection. We may at once admit that an inspector who, by the direction and with the money of the local authority, purchases a sample for analysis, is not personally prejudiced if that sample turns out impure; but is it necessary that he should be? The Act says "to the prejudice of the purchaser," but the inspector is *not* the real purchaser—he is simply the servant and buys it by the direction of the local authority, and pays for it with their money, and therefore it seems to me that the purchaser is, not the inspector who merely goes into the shop and buys the sample, but the authority which instructed him and paid him to do it. And as to the local authority being prejudiced by their inspector buying an adulterated article, I consider that they are on several grounds—first they pay for an article not of the

nature and quality demanded, and next they have to institute a prosecution to get the vendor of this impure article punished. The Act does not define in what manner the "prejudice" is to arise, whether by a person being half poisoned with an adulterated article, or by paying for a pure article and getting an impure one, or by the expenses of a prosecution. And there can, therefore, be no doubt that the prejudiced parties are in the first instance the local authority; and ultimately the public, with whose money the sample is purchased, and who in turn are the masters of the local authority.

However, as another view has been judicially taken, it seems clear the Act must be amended, and as a considerable amount of discussion is certain to take place both in and out of Parliament when the amending Bill is brought forward, it appears desirable to recall what occurred while the Sale of Food Act was passing through the Houses of Parliament.

It will, no doubt, be in the recollection of many analysts that the clause in question did not appear at all in the Act when the latter was first introduced to Parliament as a draft Bill. This Bill was, no doubt, tinctured very strongly indeed with a trade bias, and the word "knowingly," and the phrase "usages of the trade," occurred so frequently and persistently, that it would probably have been almost impossible to have secured a conviction under it. The clause in question—the 6th—as it stood originally in the Bill, ran thus—"No person shall knowingly sell any article of food or any drug which is not of the nature, substance and quality of the article demanded by the purchaser." If this had stood without any qualification, it seems very probable that it might have answered the purpose for which it was intended, but unfortunately the clause went on to say "except as herein excepted or provided," and these exceptions were so wide that it was difficult to see what adulterations would not be passed. This became quite evident to the members of the House when the Bill was first discussed, and when it was reprinted before being considered in detail in committee, the words "to the prejudice of the purchaser" were found to have been introduced.

The discussion which took place on the first reading of the Bill gave some clue to the reasons for the introduction of these words. One of the speakers on that occasion read a communication which he had received from a public analyst and member of this society, in which, after pointing out a number of the defects in the 1872 Act, the writer went on to say that, as the samples brought to him for analysis were all purchased by inspectors in uniform, he always got the best of everything, and that when he wanted *cream* for his own use he sent an inspector to purchase *milk*, and always got cream instead. Some of the members of the House, with a keen eye to their trade constituents, naturally thought that this was unjust, and I believe that this was the first and, perhaps, only reason for the introduction into the Bill of the words referred to.

No one, however, appears to have at all thought of the perverted meaning which might be, and indeed has now been, placed upon them, for on looking carefully through the whole of the discussion which took place while the Bill was before Parliament, I find that, although every clause was criticized unfavourably from one or other point of view, the only criticism which appears to have been bestowed upon this phrase, was the general one that the Bill would have been much simpler and more workable if it merely enacted that "No person shall sell an adulterated article," and then set out in a schedule what should be considered as adulteration.

Even in the House of Lords, when this very clause was again recast, and the

exceptions in it very materially altered, no one seems to have thought that any harm could arise from leaving in the words "to the prejudice of the purchaser." In fact, viewed in a common-sense way, they appeared to mean simply what was intended, namely, that if a purchaser got a *better* article than he asked for the vendor should not be held to have committed an offence. So much, therefore, for what took place in Parliament.

Immediately the Act was passed, the National Chamber of Trade, who, from their own standpoint, had taken a very active part throughout in framing it, issued instructions for the guidance of retail traders, and on going through these I find that although the retail trader has most of the loopholes of the Act carefully pointed out to him, although he is particularly instructed to show to the satisfaction of the Court that he could not, with reasonable diligence have ascertained that the article sold by him was mixed or coloured, and although he is told to insist fully on the clauses for the division of samples, for the calling of the analyst as a witness, and for the appeal to Somerset House and to the Quarter Sessions, nothing whatever is suggested about the "prejudice to purchaser" question.

Very shortly afterwards the Local Government Board issued an official notification in reference to the Act to the Clerks of the Peace throughout the country. This, which was a carefully drawn up circular, pointed out the differences between the 1872 and 1875 Acts, and summed up the matter, as regards the public, by saying:—

(1.) "The new Act protects the purchaser against the delivery of any article which differs in substance, nature, or quality from the one demanded."

(3.) "It prevents the sale of articles mixed with ingredients, not in accordance with the demand of the purchaser, without a label indicating that they are mixed."

(7.) And (as if by way of satire on the Act) "it renders the law more intelligible."

Clearly, therefore, the Local Government Board did not believe that any difficulty was introduced by the words in question.

About the middle of 1877 the objection that the inspector was not prejudiced began to be taken by clever solicitors in defending adulteration cases, but as far as I can ascertain the objection was not sustained for some months, except in one case in the Midland Counties. It was then raised on appeal in a Scotch Court, and the opinion of the judges there was decidedly that the objection could be upheld. The point was subsequently referred to incidentally in a case in the Queen's Bench, and the opinion of the Lord Chief Justice coincided with that of the Scotch Judges. The natural consequence, of course, has been that many magistrates, in different parts of the country, have followed these rulings, and have dismissed cases simply on the ground of this technical objection having been taken. The objection has frequently been raised before several of the metropolitan magistrates (several times in my own hearing), but I am not aware that any of them allowed it until this month. When, however, Sir James Ingham, as the head of the metropolitan police magistrates, allows the objection—although during the very same week three or four of the other metropolitan magistrates decided not to follow his ruling—it is clear that the point cannot be decided by any mere discussion, but that we must at once endeavour to get an amending Bill introduced as soon as Parliament meets, because, although as I have mentioned an appeal case is coming before the Superior Courts, yet many months will probably elapse before a decision is obtained, and even then, if the judges should uphold the decision, we should still have to strive for an amending Act.

I have just put these facts before the Society in order that they be in a position to pass some definite resolution to-night as to the steps to be taken in the matter. Personally I am of opinion that a committee should be appointed, and that a deputation should be sent to the President of the Local Government Board, to ask him to introduce an amending Bill at the opening of the ensuing session. The question will then be open for discussion, as to whether we should suggest the desirability of any other amendment beside this particular one, and those which have been alluded to in the other papers read to-night. No doubt there are several other points which it would be desirable to have altered, but it must be borne in mind that every fresh alteration very probably means fresh opposition to the passing of an amending Bill.

Meanwhile, as to the "prejudice" question, until something is done the vestries and county authorities have, at any rate, one remedy in their hands, and they may do well to follow the example of one of the London District Boards, and for the present instead of prosecuting the vendors of samples found to be adulterated, direct these vendors' names to be read out at the Board meetings in order that they may be published in the newspaper reports. This, at least, would have the advantage of giving a considerable degree of publicity to the facts shown by the analyses, and might even prove as strongly deterrent as a prosecution and a light fine at the police courts, the reports of which are too often kept out of the newspapers.

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In the discussion which took place on the preceding papers,

Mr. Angell said he thought that, as public analysts, they should not trouble themselves much about the question of price, as the matter would be rendered much more difficult if they took into consideration the different ways in which publicans sell their gin, but if they could arrive at some understanding as to what the fair standard for gin should be they would have no more difficulty. If they entered into the question of price as to this, they must do so with regard to all trades.

Dr. Bartlett said he had had a good deal of professional business in connection with distillers, and also been consulted upon the analysis of a large number of samples of different spirits obtained in different parts of England. His experience so far agreed with that of Mr. Heisch's as to there being three different prices of gin and three different and varying degrees of dilution. This applied not only to London but to almost all the other towns of England. He had no hesitation in saying that when once the question of price was introduced into the certificates of analysts, these certificates would virtually become mere trade valuations, upon which no conviction for adulteration could be obtained. An article is demanded—say brandy. The question then came, what is brandy? As to its being more valuable or less valuable, that is the business of a trade expert or broker, but the analyst can only deal with the proportion of proof spirit and with the possible presence of injurious matters. With brandy as with whisky, certain limits of alcoholicity must be recognised as being those under which the trade is usually carried on by respectable dealers. These limits will have to be determined upon a sufficiency of sound evidence, and will form standards by which analysts will be guided in giving evidence as to undue dilution, which in itself constitutes adulteration. These standards of proportion of proof spirit, below which brandy and whisky ought not to be sold, might be discussed with propriety by the Society of Public Analysts, and a concerted action might be taken upon such agreed standards in the same way as had been done with

regard to milk. As for gin, if it were proved that "first," "seconds," and "thirds" gin are really required by the wants of the lower orders, an assertion which Dr. Bartlett strongly combatted, he thought similar limits of alcoholic strength might be adopted, but nothing could induce him to think it would be safe either to the public or to the analyst to have the quality known in any way by the price, which, after all, is entirely arbitrary. His experience had been that inferior spirits, sometimes the worst and the most injurious, although containing a minimum of alcohol, were sold in certain localities at higher prices than such as could be purchased in other neighbourhoods which were both stronger and more wholesome. The element of price, as regards the dilution of spirits, was therefore a complete snare, and would, he was sure, prove not only a delusion but the downfall of all efforts to promote purity and wholesomeness in the retailing of such articles. The importation of the question of price also imports the question of valuation, which he (Dr. Bartlett) regarded as the thin end of the wedge by which the purity of all articles of food, or drink, or of drugs, would have to be estimated by the double sliding scale of the prices at which the samples are sold and the amount of money-value received by the purchaser. Unless public analysts add to their chemical qualifications the prerogative of sworn trade valuers, asserting their competence to estimate every article of food and drugs; and unless their valuations are to be held in Court as legally indisputable, no conviction for adulteration will be sustained as long as price has to be considered. The Food and Drugs' Act would, under these circumstances, become a dead letter, and the appointments of public analysts must cease to exist. In some districts, and in some Courts, local authority and hypercritical judgment of the meaning of the Act already combine to throw its working powers into abeyance. He was informed that it was proposed at Arundel to appoint a public analyst (for the honour of the position) without salary, but with the assurance that he would not be expected to expend either his time or his chemicals, as "it was not intended to send any samples for analysis." So also the action of the Scotch Judges, and of Sir James Ingham, regarding the prejudice to purchaser when the samples were bought specially for analysis, showed a disposition to quibble at the obvious meaning of the Act, which is now having the most disastrous effect in directly inspiring a pettyfogging line of defence, which no respectable shopkeeper would adopt if he relied on the *bona fides* of the source from which he obtained the goods. The purchasing inspector is, however, undoubtedly the servant of the ratepayers, and it is difficult to see how such a ruling can be sustained on appeal.

Dr. Muter said that after the exhaustive remarks of Dr. Bartlett he did not see that much remained to be said. If it were simply a matter of limiting the thing to gin he should not object to Mr. Heisch's view, because his experience agreed with Mr. Heisch's as to there being three prices of gin. But the great difficulty was the getting in the thin edge of the wedge; when once they had anything to do with price they must apply it to everything, and then you must employ a spirit broker, and by and by there might be a class of milk brokers. In reality he thought what was wanted was to keep the Act strictly for what it represented itself to be, and that there should be some central authority appointed by the Government, whose duty it should be to enquire into and from time to time fix standards for various articles of food and drink. Nearly all the break-downs that had taken place had been over disputed standards—very seldom over a real difference of opinion as to the chemical nature of a thing, but as to what the chemical nature meant. In conclusion Dr. Muter said he thought the appointment of a Committee

would meet with every one's approbation, and suggested that it should include some members of the Society outside the Council.

Dr. Dupré, in replying to the remarks made on his paper, agreed that gin was very little governed by quality, and that it might be taken under the clause, but unfortunately the clause did not say it was to be restricted to gin, and it would be applicable to all spirits sold unless any were specially excluded, and then the clause would be useless. Gin would be the least affected. They had not to deal with honest people, but with those who would break the law if they could. Dr. Dupré also thought a Committee should be appointed to consider the question.

Mr. Heisch pointed out that Mr. Paget, three or four days after Sir James Ingham gave his decision, not only decided a case in a precisely opposite direction, but cited a case in which Justices Mellor and Lush gave a decision contrary to Sir James Ingham, and Mr. Paget also said that he did not see what right a magistrate had to repeal an Act of Parliament.

After some further discussion, a Committee was appointed as stated on page 373.

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### ON CLEOPATRA'S NEEDLE.

BY G. W. WIGNER, F.C.S.

*Read before the Society of Public Analysts on the 20th November, 1878.*

I NEED hardly remind the members present that the granite of which Cleopatra's Needle is composed, was obtained from quarries situate at Syene, on the Nile. The general appearance of the granite is probably pretty well known, so that I need not do more than draw attention to the specimens, which, by the courtesy of Mr. Dixon, I am enabled to exhibit to-night. There will, however, I think, be some interest taken in the results of some analyses which I have recently made of different parts of it.

The specific gravity of the stone is 2.682. It has a very uniform density throughout, fragments broken from the top and bottom differing in gravity only in the fourth place of decimals. The surface of some portions, especially of that face which has laid upwards in Egypt is very considerably weathered, and it was consequently desirable to ascertain the relative absorbent powers of the unchanged stone and of the weathered surface when exposed to water. For this determination two pieces were selected, one of which was taken from the centre of the base, which had to be dressed flat in order to make the obelisk stand erect on its pedestal, and the other piece, which had a considerable portion of weathered surface on one side.

The lump of sound granite weighed about 2,000 grains, and after two days submersion in distilled water it had absorbed .6 of a grain of water, but no further increase in weight took place although it was left some days longer under water and was repeatedly weighed. On being exposed to the air of a warm room for 24 hours it lost all the moisture it had absorbed, and weighed .10 of a grain less than it did at first. Calculating as closely as I can, from the area of the rough stone, the absorption would be at the rate of 7.8 grains of water per square foot of surface.

The lump having a portion of the surface weathered, weighed about 3,300 grs.; after being submerged in distilled water for two days the weight had increased 1.3 grs., after two days more it had increased another 2 grs., after which time the weight remained

very nearly constant. A considerable portion of the surface of this piece of stone was of course a recent fracture, and calculating the absorption of this newly fractured part at the same rate as above would only account for an increase of weight of .70 grain. We have, therefore, 1.6 grs. absorbed by the weathered surface; this surface measured 5 square inches and the absorption was therefore at the rate of 46.1 grs. per square foot, or nearly six times as much as on the sound part. This absorption does not of course include surface moisture, as the surface water was in each case carefully removed by blotting, and the stone exposed for an hour on a table to a temperature of 65 Fahr. before being weighed.

The 46 grs. of absorption per square foot gives us a comparatively fair estimate of the amount of water which can be retained in the weathered surface and which is ready by its expansion on freezing to split or disintegrate that surface still further.

Another portion of the stone was roughly powdered and by means of Sonstadt's solution separated as far as possible into Mica, Quartz and Feldspar. After dividing it in this way into 12 or 14 portions of different gravities, the proportions of each of the proximate constituents were estimated so that the following results are probably within about 1 or at most 1.5 per cent. of the truth.—They showed,—

Mica	...	...	...	...	...	...	9 per cent.
Quartz	...	...	...	...	...	...	22 „
Feldspar	...	...	...	...	...	...	69 „
							100

Taking pure fragments of each of the three constituents the specific gravities were found to be as follows:—

Mica	...	...	...	...	...	...	2.986
Quartz	...	...	...	...	...	...	2.747
Feldspar	...	...	...	...	...	...	2.595

I should note that the proportion of Mica varied considerably in different parts of the stone.

The portion of granite taken from the centre of the base and not weathered was analysed, and gave the following results:—

Silica	...	...	...	...	...	...	68.18 per cent.
Sesqui Oxide of Iron	...	...	...	...	...	...	4.10 „
Alumina	...	...	...	...	...	...	16.20 „
Lime	...	...	...	...	...	...	1.75 „
Magnesia	...	...	...	...	...	...	.48 „
Soda	...	...	...	...	...	...	2.38 „
Potash	...	...	...	...	...	...	6.48 „
Manganese	...	...	...	...	...	...	traces
							100.07

The portion taken from the exterior surface which was probably weathered as much as any portion of the Needle, gave the following results:—

Silica	...	...	...	...	...	...	70.36 per cent.
Sesqui Oxide of Iron	...	...	...	...	...	...	4.13 „
Alumina	...	...	...	...	...	...	15.37 „
Lime	...	...	...	...	...	...	2.05 „
Magnesia	...	...	...	...	...	...	.45 „
Soda	...	...	...	...	...	...	2.40 „
Potash	...	...	...	...	...	...	5.34 „
Manganese	...	...	...	...	...	...	slight traces

100.10

It will be seen that the weathering has scarcely affected the iron. The alumina has decreased from 16·20 to 15·37, and the lime has increased from 1·75 to 2·05, while the alkalis show a decrease in the case of soda from 2·88 per cent. to 2·40 per cent. and in the case of potash from 6·48 per cent to 5·34 per cent.

A few of the most perfect crystals of Feldspar were picked out and analysed separately, and gave the following results:—

Silica ... ..	63·88 per cent.
Oxide of Iron } and Alumina }	22·25 "
Lime ... ..	1·09 "
Magnesia ... ..	·45 "
Soda ... ..	1·84 "
Potash ... ..	10·66 "
	100·17

Some of the Mica separated and analysed in the same way gave the following results:—

Silica ... ..	41·16 per cent.
Oxide of Iron ... ..	7·30 "
Alumina ... ..	41·18 "
Magnesia ... ..	6·77 "
Soda ... ..	·92 "
Potash ... ..	5·24 "
	102·57

The quantity of Mica separated was so small that it was impossible to repeat this analysis.

In conclusion, I must point out what an act of vandalism it would be to cover such a stone as this with silicate solution, as has been proposed. Such a solution would not even fill up the pores of the weathered portion, and it could not sensibly increase the coherence of the porous surface. The only proper course is to fill the pores with a non-porous and neutral substance—such as paraffin wax for instance.

### CORRESPONDENCE.

[The Editors are not responsible for the opinions of their Correspondents.]

TO THE EDITOR OF "THE ANALYST."

SIR,—As you have asked for information with reference to the case 71, heard by Mr. Benson, at the Southwark Police Court, I hasten to give you all that can be required. The milk analysed was done in duplicate, and the results given as follows:—

Total solids ... ..	9·46	9·34
Water ... ..	90·54	90·66
Fat ... ..	2·88	2·80
Solids* not fat ... ..	6·58	6·54
	100·00	100·00
*Ash ... ..	0·60	
Salt ... ..	0·20	

Using Professor Wanklyn's method of calculation, I gave it as containing nearly 25 per cent. of added water.

The sample of milk which the inspector was supposed to have left with defendant was brought into Court, and defendant insisted upon his sample being analysed at Somerset House. He doubtless thought



that judgment would be given upon his sample, which he had exchanged with a neighbour, whose milk was unexceptionably good. The certificate from Somerset House of the inspector's sample, after three weeks' keeping, read as follows:—

Water	...	...	...	...	...	...	...	...	90.93
Fat	...	...	...	...	...	...	...	...	2.91
Solids not fat	...	...	...	...	...	...	...	...	6.16
									100.00

The opinion subjoined:—"This milk has not less than 22 per cent. of added water."

Since this report, another equally interesting one has been decided in Lambeth Police Court, before the presiding magistrate, Mr. Chance. I gave a certificate in the case of No. 77 of  $7\frac{1}{2}$  per cent. of added water, based upon the following analysis done in duplicate:—

Total solids	...	...	...	...	...	...	...	11.22	11.24
Water	...	...	...	...	...	...	...	88.78	88.76
Fat	...	...	...	...	...	...	...	2.91	2.98
Solids* not fat	...	...	...	...	...	...	...	8.31	8.26
									100.00
*Ash	...	...	...	...	...	...	...	0.71	
Salt	...	...	...	...	...	...	...	0.12	

In this case the analysis was not disputed, but the poor milk was owing to the class of cow, and if it be claimed as a pure milk, should be sold, as Mr. Chance suggested, as a poor milk. Dr. Redwood, analyst to the Metropolitan Dairymen's Society, was brought forward to prove that it was possibly a genuine milk. With the consent of Dr. Redwood, and on my suggestion—it having been admitted that this was a portion of mixed milk from 18 cows—the remainder of the herd, 15 in number, was milked next morning, and an analysis made both by Dr. Redwood, Mr. Stewart, and myself. The result was as follows:—

	Bernays.	Stewart.	Redwood.	Redwood.
Total solids	11.83	11.84	11.68	11.64
Water	88.17	88.16	88.32	88.36
Fat	2.63	2.68	2.60	2.62
Solids* not fat	9.20	9.16	9.08	9.04
100.00				
*Ash	0.84			
Salt	0.16			

We both agreed that this was genuine milk, and Dr. Redwood candidly admitted that my former analysis indicated a milk possibly but not probably genuine. The magistrate inflicted a fine of £10 and £5 5s. costs.

I may further mention that this sample which on a Saturday gave 9.20 solids not fat, gave 9.04 on Monday.

Yours faithfully,

ALBERT J. BERNAYS.

ST. THOMAS'S HOSPITAL,  
November 18th, 1878.

### ANALYSTS' REPORTS.

**MILK ADULTERATION IN MARYLEBONE.**—Mr. Alfred W. Stokes, the public analyst for Paddington, reports that during the last quarter, 21 articles of food had been submitted to him for analysis: and on the whole, he was sorry to state that a rather large amount of adulteration is still going on in the parish. Of the 21 articles, no less than 18 were adulterated, the largest proportion being samples of milk. These numbered 14, of which two only were not adulterated. The rest were diluted with water, varying from 10 to 20 per cent. This adulteration might not be due solely, nor perhaps mainly to the London vendor for no fewer than 10 of the adulterated samples referred to were brought from the country supplier, to be re-sold here. This report having been presented to the Sanitary and Public Health Committee, they have passed the following important resolutions, viz., directing the inspector under the act forthwith to take proceedings against certain of the sellers of the samples referred to, and recommending that inasmuch as it appears the wholesale dealers will not prosecute the adulterators of milk in the country, the vestry do take such steps as may be necessary, to prosecute such wholesale dealers.

Mr. J. W. Gatehouse, the Public Analyst for Bath, reports that during the quarter ending September 28th he analysed 42 articles under the "Sale of Food and Drugs' Act," of which 39 were genuine and 3 were not genuine. These 3 articles consisted of milks, which were deficient in fat to the extent of 54, 30 and 25 per cent. respectively. The charges for the analyses, according to the scale agreed upon, amounted to £15 12s. 6d. For private individuals he had analysed 8 articles of food, in which 3 were genuine and 5 adulterated or unfit for food. Ale, 1 sample, genuine, but decomposed by keeping so as to be unfit for consumption; milk, 1 sample, contained 10 per cent. of added water; milk, 2 samples, unfit for food from containing blood; rum, 1 sample, containing resins.

At the last meeting of the Newport (Monmouthshire) Town Council, Mr. Thomas, the borough analyst, reported that on June 14 he analysed fifty samples, and during the last quarter he had also analysed fourteen samples. About twenty convictions under the Sale of Food Act had been obtained during the half-year.—At the last meeting of the Bath Town Council, Mr. J. Gatehouse, public analyst, presented his report for the quarter. He said he had analysed forty-two articles bought by the inspector, of which thirty-nine were genuine. Among the genuine samples were two of butter, two of confectionery, and one each of arrowroot, oatmeal, pepper and coffee. For private individuals he had analysed eight articles of food, of which three were genuine, and five adulterated or unfit for food. One adulterated sample was rum, containing resins. The results of the analyses of the articles brought by private individuals compared very unfavourably with those brought by the inspector.

### LAW REPORTS.

At Bow Street, a summons against William Pitt Bitchman, of 5, Museum Street, Bloomsbury, for selling milk alleged to be adulterated with water to Hoyle, inspector of nuisances, was again before the Court, Sir James Ingham said in this case the adulterated milk sold by the defendant was purchased by a sanitary inspector, not for consumption, but for the purpose of analysis. The question was whether in such circumstances the milk was sold "to the prejudice of the purchaser" within the meaning of the 6th section of the Food and Drugs Act, 1875. A case very similar to the present came before the Justiciary Appeal Court of Scotland. The Court held that prejudice to the purchaser had not been proved, the purchase having been made for the purpose of analysis only. The same construction of the statute appeared to have been adopted by the Lord Chief Justice of England in the case of "Sandys v. Small." According to a report contained in *The Analyst* (which is in conformity with the report in the newspapers at the time), his Lordship said, with reference to adulterated whisky bought by an inspector for analysis. "I do not see how this inspector is prejudiced, as he did not drink the whisky." Sir James Ingham thought it would be unbecoming in him to express an opinion contrary to such high authorities, and therefore he dismissed the summons.—*Times*.

Subsequently upon the application of the counsel for the prosecution, a case was granted for the Court of Queen's Bench.

LAMBETH.—ADULTERATION OF MILK.—Mr. Marsden, Vestry Clerk of Camberwell, applied to Mr. Chance, and said the magistrate would remember that he had a case of milk adulteration before him a short time back, when an objection was taken that the inspector, as the purchaser, was not prejudiced, and his worship adjourned the matter to look into the case of "Sandys v. Small." Since then Sir James Ingham had given a decision which rendered it highly necessary that the vestries should take immediate steps. He therefore, now wished to ask his worship what opinion he held upon the point, as it was intended to take out other summonses under the Act. It would be satisfactory to the Vestry, to the public, and those tradesmen who sold a bonâ-fide article, to know what his worship thought on the matter. Mr. Chance considered it was a very proper application. He was anxious to hear Sir J. Ingham on the subject, and had an interview with him. Mr. Mayo had taken the same objection in this Court, but he, (Mr. Chance) had overruled it, as he considered it made the Act all nonsense. He considered also, that if any person paid the price of a pure article, and was served with water, it was sufficient to show the purchaser was prejudiced. He (Mr. Chance) should continue to hold his opinion until overruled by a decision in a superior Court against it. With regard to Sir James Ingham he saw the difficulty taking place, in the country particularly, in consequence of the decision in the Scotch Courts. Sir James Ingham told him that he considered the best course was to have the question decided by a superior Court, and that was partly why he gave the decision against the vestry. It was the best way to set the matter at rest. Mr. Chance further remarked that he saw that a few days back Mr. De Rutzen had refused to accept the objection, and convicted the defendants. He (Mr. Chance) repeated that in all cases brought before him and proved he should continue to impose penalties, as he considered he was justified in doing. Sir James Ingham was of the same opinion, but considered it best to have a case taken for the superior Court. It would be nonsense to imagine it was ever intended that persons should be supplied with milk and water for months, and the party supplying such a thing to ride off without conviction. Mr. Marsden thanked his worship, and stated that he would mention the matter to the vestry.—*Telegraph*.

**MARYLEBONE.—ADULTERATION.**—John Gowers, of 1, Marylebone Road, Paddington, appeared, in answer to an adjourned summons by the Vestry of Paddington, charging him with selling as pure milk found on analysis to be adulterated by the addition of 18 per cent. of water.—Mr. Hortin prosecuted for the Vestry, Mr. C. L. Berkeley defending.—At the first hearing evidence was given as to the purchase of the milk by Thomas Reeves Clifford, sanitary inspector, and its analysis by the public analyst, and Mr. De Rutzen adjourned the case to enable him to look into the law and the decisions on the subject, having regard to the recent decision of Sir James Ingham, and also to the fact that the solicitors on both sides asked that, whichever way the decision went, he would grant a case.—Mr. Berkeley contended that the case was on all fours with that heard by Sir James Ingham, where the chief magistrate dismissed the summons, on the ground that the sample was purchased by the sanitary inspector, not for consumption, but for analysis, and, therefore, he was not prejudiced.—Mr. De Rutzen, in delivering his decision, said: The facts of this case are admitted, and the only contention on the part of the defendant is that, as the milk was purchased for the purpose of analysis, and not for consumption, it could not be said to be sold “to the prejudice of the purchaser” within the meaning of the 6th section of the Act. I am aware that there was a case decided in the Scotch courts where it was so held, but that case is not binding upon us, and I may add that the case of *Sandys v Small*, which is relied upon by the defendant, has in my opinion no bearing whatever upon this case. I have had to decide a great many of these cases, and I have always convicted where the circumstances of the cases have been similar to this, and in doing so I have not acted entirely upon my own view of the statute. There appears to me to be direct authority for it in the case of *Sandys v Markham*, 41, “Justice of the Peace,” page 53, which was heard in the Queen’s Bench before Justices Mellor and Lush, where this very point was raised. It was a case of selling adulterated mustard. The inspector bought a sample for analysis. The magistrate dismissed the information, and in the case which they stated for the opinion of the Queen’s Bench they gave as one of the grounds of their decision “That (notwithstanding the fact that the appellant, in procuring the sample for analysis and not for consumption, pursued the course pointed out by section 14 for giving effect to the Act) the sale in question under the circumstances was not to the prejudice of the purchaser.” This point, which went to the root of the whole case, was argued before the judges, and was disposed of by Mr. Justice Lush, who said, “Surely if the purchaser did not get pure mustard, as he was entitled to, prejudice must be presumed. I consider this a very strong case, and until it is decided otherwise, I shall continue to act upon that view. In this particular case there will be a fine of £10 and costs.—Mr. Berkeley asked whether, if he applied for a case, after looking into the decision, his worship would grant it.—Mr. De Rutzen said he would.—Four other cases were then gone into, the defendants’ names and addresses and the degrees of adulteration being as follows: Richard Crofts, 2, Kilburn Park Road, Maida Vale, (defended by Mr. Berkeley), 15 per cent. of added water; George Robinson, 3, Kilburn Park Road, Maida Vale, 15 per cent. of added water; Emanuel Lawrence, 97, Chippenham Road, Paddington, 12 per cent. of added water; John Orchard, 16, Campbell Street, Hall Park, Paddington, 10 per cent. of added water.—Mr. De Rutzen said in all these cases a cruel fraud was committed on poor people by water being sold to them when they asked for milk. It was the added water that made the fraud, and the only way to stop it was by inflicting heavy fines on those who sold the adulterated milk to innocent people. There was no rule by which they should not sell milk and water, and no reason why they should not say to a customer, “I have a nice mixture of milk and water at so much a quart.” It was the suppressing this very material fact that was the fraud.—The defendant Crofts was fined £10 and 2s. costs, Robinson £10 and 2s. costs, Lawrence £5 and 2s. costs, and Orchard £1 and 2s. costs.

At Bow Street police court, on the 20th November, Mr. Jones, solicitor to the parish of St. Giles, applied to Mr. Vaughan for summonses under the Adulteration Act. He said that before taking these summonses out, however, he should like to know whether Mr. Vaughan, after the recent decision of the chief magistrate, Sir James Ingham, would be inclined to give any decision in the cases. Several other London magistrates, since that decision, had not held themselves bound by it, but had convicted, their opinion being that in these cases the question of prejudice did not arise. Mr. Vaughan said he thought all these cases should stand over until the opinion of the superior Courts upon Sir James Ingham’s decision had been taken. A case had been granted. Mr. Jones said no doubt that was so, but it had been fixed not to come on till next term. The matter was very serious, for since Sir James Ingham’s decision, adulteration had been, and no doubt would continue, vastly on the increase. Mr. Vaughan repeated that all these cases ought to stand over till after the decision of the judges had been given. The proper course to pursue was to take out the summonses and then adjourn them until the point had been decided. He thought that whoever these summonses came before ought to adjourn them for that reason. Mr. Jones then took out some summonses in the ordinary course.

A statement is reported to have been made by Mr. Bridge which is interesting. After convicting a grocer named Horden of Goldhawk Road, for selling coffee mixed with chicory. Mr. Bridge (according to the *Daily News*) referred to the recent decision in a milk case heard at Bow Street, and said that as a doubt had arisen whether the officer of a parish was prejudiced in consequence of the decision in the Court in

Scotland and the reported dictum of the Lord Chief Justice of England, Sir James Ingham inquired of the defendant if he could have a case stated in the event of a conviction; but he declined to do so. Mr. Poland, who appeared for the parish, said he would take a case if the summons was dismissed. For the purpose of having the question decided, he dismissed the summons, and granted a case for the opinion of the Court of Queen's Bench. Sir James gave that decision simply for the purpose of having the case stated, and not to form a precedent. He (Mr. Bridge) believed that all the magistrates were of opinion that the selling of an article not of the substance and quality demanded was to the prejudice of the purchaser, whether an officer of the parish or any other person; otherwise the Act would become a dead letter. He should go on hearing cases; but he suggested that the parishes should not enforce the convictions until the question had been determined.—Mr. Jones said he was very glad to hear those remarks. He had no doubt that his Board would act upon them.—Mr. Bridge said he had been requested by Sir James Ingham to make that statement.

**FLETCHER'S FURNACES.**—We have recently had an opportunity of carefully testing the injector furnaces made by Fletcher of Warrington, and we find them certainly the most convenient and efficient gas furnaces we have yet seen. The burner is extremely simple, a horizontal tube about one inch in diameter and eight inches long, into the side of which the gas is led, while a jet of air is blown into its open end. The combustion of the gas seems absolutely perfect. Starting with the furnace cold, and even slightly damp, and with a gas supply from an ordinary  $\frac{3}{4}$  tap, cast iron in rough lumps was melted in seventeen minutes, and in nineteen minutes the melted mass weighed 3lbs. The crucibles, which the furnace is capable of taking, would hold three times this quantity, and 2lbs more were added and melted in a few minutes. In another experiment three crucibles full of soda lime holding about 1lb each were successively ignited to full red heat in sixteen minutes.

Messrs. Townson & Mercer have recently issued a new catalogue of chemical and physical apparatus. The book is well illustrated and the contents arranged in alphabetical order. We feel sure that a catalogue of this description will find favor with all requiring scientific apparatus. There are several new and useful instruments given, and also a series of sets of apparatus for the analysis of water, milk, tea, coffee, &c.

Messrs. M. Jackson & Co. have also issued a new list in book form, comprising a large number of pieces of apparatus for scientific purposes, and we note specially the catalogue of electrical galvanic and magnetic apparatus; also the sets for the Science and Art Department, and some comprehensive and well arranged sets for popular lectures. The list of apparatus for experiments in heat is most carefully got together.

These books are indeed a great improvement upon the usual price lists of apparatus, and will be very serviceable to analysts.

Mr. R. Oxland has been appointed Public Analyst for the Borough of Plymouth.

Mr. W. Pearce has been appointed Public Analyst for the Borough of Maidenhead.

Dr. Muter one of the Vice-Presidents of the Society of Public Analysts has been appointed Public Analyst for the Borough of Tenterden.

Dr. Thompson has been appointed Public Analyst for the Borough of Leamington.

#### THE ADULTERATION OF FOOD AND DRUGS.

SOME questions having been raised before the magistrates in Petty Sessions in Cumberland as to the power of the magistrates to convict in adulteration cases in which the adulterated article had been purchased by the officer acting on behalf of the local authority, Mr. Dunne, Chief Constable of the county, wrote to the Local Government Board, and has received the following reply:—

“Local Government Board, Whitehall,

“23rd November, 1878.

“Sir,—I am directed by the Local Government Board to advert to your letter of the 22nd ultimo, in which you request to be furnished with advice as to the course which should be adopted by the officers appointed to carry out the provisions of the Act 38 and 39 Vic., cap. 63, in view of the decision of the Queen's Bench Division of the High Court of Justice in a case to which your attention has been drawn.

“The Board presume that you intend to refer to certain expressions attributed to the Lord Chief Justice by some of the newspapers, in the case of ‘Sandys v. Small,’ to the effect that an officer appointed by a local authority to obtain samples could not be considered prejudiced by the purchase of adulterated articles procured under the orders of the local authority. The Board must, however, point out that the authorized report of that case (see ‘Law Reports’ 3, Q. B. Div., 449) does not contain the words in question, and, as a matter of fact, the case itself was decided upon quite a different ground.

“It should be further stated that in ‘Sandys v. Markham,’ reported in the *Justice of the Peace* 41, page 53, which was a case in which adulterated mustard had been purchased by an inspector for analysis, Mr. Justice Lush, in relation to the precise point referred to in your letter, distinctly said that ‘if the purchaser did not get pure mustard, as he was entitled to, prejudice must be presumed.’

“The Board may add that several of the police magistrates in the metropolis, adopting the opinion of Mr. Justice Lush, have not hesitated to convict in cases where the purchase has been made not for consumption but for analysis, and the Board themselves entertain no doubt that this is the correct view.

“I am, Sir, your obedient servant,

“WALTON J. SENDALL, Assistant Secretary.

“To Mr. J. Dunne, Chief Constable of Cumberland and Westmoreland, Carlisle.”

AN ANALYST FOR DORSET.—The question of appointing an analyst for this county was discussed at a recent meeting of the Dorchester Town Council. It appears the county authorities have suggested the appointment of Mr. Comyus Leach, a medical gentleman, of Sturminster Newton, as analyst for the whole of Dorset, and they want the boroughs to fall in with the proposal, so that there may be a joint appointment. A communication from the county on the subject having been read, various opinions were expressed. The retiring Mayor (Dr. Aldridge) suggested that the office, which might prove very valuable, should be thrown open to public competition. Mr. Alfred Pope (the Mayor elect) expressed a strong opinion that the analyst for the county, should reside at a more comestable place than Sturminster, and in this several other councillors agreed. It was thought Dorchester would be a more central place of residence. The question was allowed to stand over, and is to receive further consideration.

A motion has been carried, on the recommendation of one of the Bermondsey vestrymen, to the effect that when the certificate was received from the analyst, the names of tradesmen from whom samples for analysis were obtained should be read at the vestry meetings, and subsequently published, as it was only fair that the ratepayers should know the honest shopkeepers as well as the dishonest.

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### NOTES OF THE MONTH.

The "Prejudice of the Purchaser," question has given a splendid loophole to those local authorities where the vested interest of adulteration is strongly represented, for escape from the necessity of enforcing the Act. Letters from all parts have poured in upon us this month, showing the eagerness with which the point has been seized, and we must apologise to our correspondents for not inserting them, owing to the large amount of space demanded by the proceedings of the Society itself, which, of course, must take precedence.

One letter, however, from Mr. Edger is very instructive, showing that owing to the Magistrate's Clerk having adopted the point, proceedings have been rendered impossible on seven samples of bitartrate of potash which he has had submitted to him by his Inspector for Stockton, with the following results:—

No. 1	contained	Tartrate of Lime	...	...	...	...	8.4
		Sulphate of Baryta	...	...	...	...	1.24
		Silicious Matter	...	...	...	...	1.30
No. 2	"	Tartrate of Lime	...	...	...	...	4.80
		Bicarbonate of Soda	...	...	...	...	10.00
No. 3	"	Tartrate of Lime	...	...	...	...	6.30
No. 4	"	Tartrate of Lime	...	...	...	...	7.50
		Sulphate of Baryta	...	...	...	...	.60
		Silicious Matter	...	...	...	...	.46
No. 5	"	Tartrate of Lime	...	...	...	...	8.10
No. 6	"	Tartrate of Lime	...	...	...	...	8.10
No. 7	"	Tartrate of Lime	...	...	...	...	7.30

As a statement to that effect must, of course, be made in the quarterly report, without any test of it by proceedings, we publish it now so as to prevent the *Chemist and Druggist* blaming the analyst when it does so appear. Whether the presence of a reasonably small quantity of tartrate of lime in commercial cream of tartar is or is not permissible, is a question which would have to be decided before a court of law, but bicarbonate of soda clearly ought not to be found, and the mixture of barium sulphate would not be defended even by our contemporary. It is unfortunate that this clog upon the wheels of justice should have occurred in Stockton, both in the interests of the public, and of respectable Pharmacists who properly satisfy themselves of the reasonable purity of the articles they deal in.

We have received from Mr. Adams a very interesting statement of the results of the working of the Act in Kent, which shows how successful the Act really is in crushing out adulteration when properly enforced:—

Quarter ending	Samples received.	Percentage of Adulterated samples.
March, 1875 ... ..	109	23·85
June, 1875 ... ..	558	9·85
September, 1875 ... ..	507	4·53
December, 1875 ... ..	105	2·85
March, 1876 ... ..	none	—
June, 1876 ... ..	none	—
September, 1876 ... ..	none	—
December, 1876 ... ..	8	—
March, 1877 ... ..	none	—
June, 1877 ... ..	2	—
September, 1877 ... ..	none	—
December, 1877 ... ..	none	—
March, 1878 ... ..	137	13·14
June, 1878 ... ..	69	8·70
September, 1878 ... ..	65	13·84

So we see that given a fair and regular pressure of the Act we in one year reduce the percentage of impurity from 23·85 to 2·85. Then comes laxity and up goes the percentage to 13·14. The 137 visits of the inspectors produce their effect and down drops the percentage to 8·7, only, however, to rise to 13·84 when the pressure is again relaxed. If more of our members would take a similar amount of trouble many interesting statistics might be had to strengthen the hands of our recently-appointed Parliamentary Committee.

### RECENT CHEMICAL PATENTS.

The following specifications have been published during the past month, and can be obtained from the Great Seal Office, Cursitor Street, Chancery Lane, London.

1878. No.	Name of Patentee.	Title of Patent.	Price.
1281	C. Leach and T. Neal ... ..	Calcining Sulphate of Iron for Manufacture of Pigments	6d.
1347	J. B. White and A. Glover ... ..	Manufacture of Portland Cement ... ..	6d.
1361	E. G. Wheeler ... ..	Compressing Ammoniacal and other Gases	2d.
1384	F. Wirth ... ..	Manufacture of Tartaric Acid	4d.
1406	D. Walker ... ..	Distilling Alcoholic Spirits...	6d.
1417	S. Hallsworth and R. Bailes ... ..	Treating Sewage	2d.
1444	R. Siegler ... ..	Manufacture of Picric Acid...	2d.
1504	J. A. Wanklyn and W. Cooper ... ..	Determining Organic Matters contained in Solution	4d.
1523	F. Wirth ... ..	Manufacture of Sulphuric Acid	2d.
1626	W. Morgan Brown ... ..	Siliceous Compound	4d.
1674	B. H. Remmers ... ..	Treating Waste Liquors from Dye Works	2d.
1703	W. R. Lake ... ..	Sugar	2d.
2486	H. B. Gross ... ..	Soap	2d.
3237	E. A. Parnell ... ..	Manufacture of Zinc Oxide...	2d.

### BOOKS, &c., RECEIVED.

The Chemist and Druggist; The Brewers' Guardian; The British Medical Journal; The Medical Examiner; The Medical Times and Gazette; The Pharmaceutical Journal; The Sanitary Record; The Miller; The Anti-Adulteration Review; Journal of Applied Science; The Boston Journal of Chemistry; The Dairyman; The American Dairyman; The Practitioner.

*Funny Folks* has the following, *apropos* of the recent decision "that there can be no conviction for adulteration of whisky where the inspector, does not drink any, and so is not prejudiced." It is headed "A Martyr to Duty." *Inspector (to Analyst):* "Tosticated? Not't all! M-my duty to be pre-pre-ju-diced. Am pre-pre-pre-juiced. Thas all."