ON THE WORK DONE BY PUBLIC ANALYSTS DURING 1879 UNDER THE SALE OF FOOD AND DRUGS' ACT.

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Read before the Society of Public Analysts, on 17th March, 1880.

THE returns which have been furnished, in response to the application of the Proprietors of THE ANALYST, by Members of our Society and by a few other Public Analysts who are not members, but who take an interest in this annual statement, enable me this year to lay before you much fuller statistics as to the amount of work which has been done under the Sale of Food and Drugs' Act during 1879, than has been possible in any previous year. These detailed results are shown in the annexed table.

In 1877 we received returns from 127 districts; in 1878 from 168 districts; while this year we have returns from 212 districts. There is an apparent increase in the number of samples analysed during 1879 of about 2,500 samples, but this is, probably, mainly due to the fact that there are so many more returns.

It is rather unsatisfactory to note that the general average shows a slight increase in the proportion of adulterated samples, the percentages shown by the returns of various years being as follows :—

In 1872	..	..	..	..	..	26·0	per cent.
1875 & 6	..	..	..	..	..	18·10	„
1877	..	..	..	..	..	17·70	„
1878	..	..	..	..	..	16·58	„
1879	..	..	..	..	..	17·25	„

I cannot trace out any special cause for this increase, and it will, therefore, be well to consider it first in reference to the different classes of samples. The total number of samples examined in these 212 districts has been 17,574. Omitting Somersetshire, as to which we have received no details, these samples have been divided as follows:—

Milk	..	..	..	6036	=	36·1	per cent.
Butter	..	..	..	969	=	5·7	„
Groceries	..	..	..	4197	=	25·0	„
Drugs	..	..	..	615	=	3·6	„
Wine	..	..	..	1615	=	9·7	„
Bread	..	..	..	1471	=	8·7	„
Water	..	..	..	1240	=	7·5	„
Sundries	..	..	..	629	=	3·7	„
				16,772		100·0	per cent.

The next point of interest, is to notice how the various classes stand as regards the percentages of adulteration, as compared with those which were shown by the same classes of goods in the previous years, the percentage in each class being calculated on its own class total, and not on the general total of samples analysed.

			1877	1878	1879
Milk	..	..	26·07	18·38	22·06
Butter	..	..	12·49	13·23	13·93
Groceries	..	..	13·00	12·89	11·73
Drugs	..	..	23·82	35·77	26·66
Wine, &c.	..	..	47·00	29·31	28·30
Bread	..	..	6·84	2·97	4·62
Water.. }					21·45
Sundries }	..	..	21·63	14·98	10·17

From these figures it will be seen that wines and spirits, which occupied the worst place in 1877, with 47 per cent., and fell in 1878 to 29·3 per cent, now shows the worst place of all, 28·3 per cent. being adulterated. Of course this includes, as before, those samples of spirits which were returned as watered, but as a limit has been laid down by The Sale of Food and Drugs' Amendment Act, which is lower than had been previously customary in many districts, I think we must come to the conclusion that the degree to which the spirits were adulterated was probably considerably greater during 1879 than in 1878.

Next on the list come drugs, showing 26·66 per cent. adulterated, as against 35·77 in the previous year. The difference is very great, but it must be borne in mind that this year comparatively few samples of violet powder are included, and the result is, therefore, probably a more near approach to a fair average. Of course by this I do not mean a fair average of all the drugs sold, because the inspectors naturally purchase most frequently those kinds which are more likely to be inferior or impure. The most noticeable remark in the returns, as to drugs, is one relating to so-called quinine wine, which contained no quinine at all. This was in the County of Antrim.

Milk shows a considerably increased percentage of adulteration—3·68 per cent.

more than in 1878. It is difficult to trace this increase to any other cause than the extremely low fines which are generally thought sufficient in cases of milk adulteration. It really is a serious matter that more than 22 per cent. of the samples of milk purchased by inspectors, who are in almost every case well known and recognised, should turn out to be adulterated, even when judged by the low limit adopted by the Society. Two cases which have been reported appear of some special interest here. In one case at Margate, Mr. Harvey tells us that the defendant pleaded that the milk was taken from a particularly poor cow, and the case was adjourned in order that the inspector might procure a sample from this cow. This was done and the sample was analysed, with the result of solids not fat 9·46 ; fat 2·75, and the defendant was, in consequence, heavily fined, as he deserved.

In another case, Mr. Carter Bell refers to a defendant pleading that, owing to the deficiency of grass, &c., his cow had been fed entirely upon hay, and the plea was so far successful that the magistrates acquitted him ; whereupon the next defendant, determined not to be outdone, pleaded that his cows had been fed entirely upon *straw*, and, in consequence, he also was acquitted. Mr. Bell thinks this case suitable for investigation by the Society for Prevention of Cruelty to Animals.

Butter appears to show a continued increase of adulteration, the percentages for 1877, 1878, and 1879, respectively being 12·48, 13·23, 13·93, or an increase of almost exactly ·7 per cent. per year. It is, perhaps, hardly fair to attribute this to greater accuracy in butter analysis, because even in 1877 the methods were sufficiently well understood to make it certain that few adulterated samples would be passed as genuine ; while on the other hand, it is a notorious fact that the make of butterine has greatly increased during the past two years, and the figures point to the opinion that the sale of butterine under the name of butter has become more common. The number of samples examined during 1879—nearly 1,000, is sufficient to prevent any idea of an unfair average being drawn.

Groceries show a decided improvement on the two previous years, the reduction in the amounts of adulteration being 1·16 per cent., but still the present figure is far too high. Doubtless a large proportion is due to the sale of chicory and coffee under the name of coffee, and other similar practices, but even shutting out those samples, which are probably from this cause returned as adulterated, the remaining percentage is much greater than it should be.

Bread and flour again show a change for the worse ; in this particular case the increase may be more apparent than real, and is due partly to the improved method of analysis devised by Dr. Duprè, which, although it has unquestionably proved some samples to be genuine, in reference to which considerable doubt would otherwise have been felt, yet has on the other hand enabled the presence of alum in flour to be detected in some cases with absolute certainty where, without this process, suspicion only could have been entertained.

This year our correspondents have, at some trouble to themselves, separated the samples of water from the sundries. As we have so often pointed out before, water does not really belong to the work done under the Act by the Public Analyst, and should in no case be undertaken by him except for a separate and special fee or a larger salary than would otherwise be accepted, nor should he even then issue certificates on the forms provided for in the Schedule to the Act. It is, of course, quite right that the water analyses of the district for sanitary purposes should be done by the Public Analyst, but it is

undesirable that in any case he should view it as part of his official duty. In consequence of this separation of the waters, the sundries show the very considerable reduction in the percentage of adulteration of 4·81 per cent.

Considering next the proportion of adulterated samples of each class calculated on the total number found to be adulterated, we find that altogether there were 2978 samples adulterated, the description of which has been particularly reported to us, and these were divided as follows :—

The Milk Samples adulterated were	..	..	..	..	1332 or 44·72 per cent.
„ Butter	„	„	„	„	135 „ 4·53 „
„ Groceries	„	„	„	„	492 „ 16·52 „
„ Drugs	„	„	„	„	164 „ 5·52 „
„ Wines, &c.	„	„	„	„	457 „ 15·36 „
„ Bread	„	„	„	„	68 „ 2·28 „
„ Waters	„	„	„	„	266 „ 8·93 „
„ Sundries	„	„	„	„	64 „ 2·14 „
					2978 or 100·00 per cent.

Viewed in this way the table shows, as the table for the previous year did, that milk, butter and bread show a larger percentage of adulteration this year than they did before, the increase in the case of milk being 2·57 per cent.

The percentage of adulteration in different districts is of much interest. Norfolk nominally heads the list, but as the majority of the samples are waters, I will not take account of that here, but pass on to Margate, which really heads the list with 72 per cent. of adulterated samples—entirely milks. At this rate we may certainly commiserate the children who are fed on Margate milk. Southampton and Glasgow follow pretty closely with 60 per cent. adulterated, and South Shields shows more than 50 per cent. of adulteration, Derbyshire having 44 per cent. Bermondsey and St. George's, Southwark, each show 34 per cent., while in the adjoining district of Wandsworth, with the same analyst, the rate is only 8·25 per cent. Hampstead shows 6 per cent. and Lewisham 22 per cent., both of these places again having the same analyst. The City of London shows 30 per cent., although on the very small total of 49 samples, while the remaining Metropolitan districts which have been reported show an average of about 14 per cent., a figure which is pretty closely adhered to in Cheshire, Dublin County, Limerick County, Sligo County, Manchester, Cumberland, Brighton, Northumberland and Yorkshire generally, while in Staffordshire, Isle of Wight, Sussex, and Somersetshire, the percentage of adulteration is still less, averaging rather under 10 per cent.

From these we pass to the counties and towns in which very few samples have been analysed, so few, in fact, as to render the Act nugatory. There are fourteen counties, towns, and districts, having a gross population of very nearly one million, in which only 66 samples were submitted for analysis, or an average of less than 5 per place. These are Chesterfield, Montgomery, Carlow County, Cavan, Waterford County, Macclesfield, Ramsgate, St. Martin's, Carmarthen Borough, Chichester, Newington, Bury St. Edmund's, Ipswich, and Radnor County. In this respect the returns seem worse than last year.

Referring to another feature in the table, it appears that in Andover, Barnsley, Stalybridge, Wenlock, Lancaster, Helmsburgh, Falmouth, Launceston, Penzance, Truro, Ashton-under Lyne, Pontefract, Richmond, Ripon, Wakefield, Deal, Faversham, Sandwich,

Ryde, Stratford-on-Avon, Warwick, Gloucester, Hereford, Falkirk, Stirling, Airdrie, Stewarton, Brecon Borough, Cardigan, Neath, Pembroke, Tenby, Tenterden, Suffolk, Penryn, Berwick, Durham, Tynemouth, Maidenhead, Monmouth, Droitwich, New Radnor, Birkenhead, Kilmarnock, Rutherglen and Sutherlandshire, or altogether 2 counties and 44 towns, with a population of about 1,000,000, no samples whatever have been analysed. In the table for 1878 there were 37 places in this condition; therefore the number has apparently increased by 9 during the year, and this notwithstanding the action which the Local Government Board have been taking to compel authorities to enforce the Act. It is well to point out here that it is the duty of every Public Analyst in accordance with the Act to make a quarterly report to the authority appointing him, even when he has received no samples for analysis, and this authority or their clerk are bound to forward copies of each year's quarterly reports to the Local Government Board. By this means the central authorities are kept informed year by year, and unfortunately not oftener, of the neglect of the officials in those districts who have so far complied with the Act as to appoint an analyst, but do not seem inclined, unless pressure is put upon them from higher quarters, to do anything more.

After the President had thanked Mr. Wigner for the trouble he had taken in compiling the returns,

Dr. Dupré said that, as Public Analysts were aware, the Inland Revenue Report for the year ending March, 1879, had recently been published. It included the Report of the Principal of the Somerset House Laboratory, who stated that 21 samples were referred to that department by magistrates under the Sale of Food Act. In 8 of these cases he came to a conclusion different from that of the Public Analysts, and he gave two instances which he thought of sufficient interest to describe. One was a sample of flour which had been stated to be adulterated with alum, and although he agreed with the Public Analyst as to the amount of alumina present, he could find no evidence of its existence as alum, but "on the contrary, the results of the experiments conclusively pointed to the absence of alum, and the unusual amount of silica found indicated that the alumina was present as an impurity in the form of clay." He (Dr. Dupré) would like to point out in regard to this that at the time the Inland Revenue certificate said nothing whatever about silica; and still less about its relation to the amount of clay present. Indeed, up to the present he (the speaker) had believed that the relation between silica and clay in flours, and its bearing on the estimation of alum in flour and bread, was first pointed out by himself some time afterwards. The next was a whisky case, where some Public Analyst reported it to have consisted of diluted alcohol coloured with burnt sugar. They did not agree with this, and stated that "we found that the sample was what is known as neutral spirit, or patent still whisky, which had been coloured and flavoured with wine. This is a kind of whisky which is almost entirely free from fusel oil, and consequently, while more deficient in character than some whiskies, is yet less dangerous to the health of the consumer." He (Dr. Dupré) said it was absolutely impossible for any chemist when dealing with a weak spirit free from fusel oil, to state positively that he was not dealing with alcohol which had been diluted and flavoured. The Inland Revenue chemists could therefore have had no chemical reasons for upsetting the analyst's certificate. The utmost they could have said was that it might be diluted alcohol flavoured, as stated, but that it also might be weak spirit free from fusel

oil flavoured with wine. How, even in this latter case, it could be called whisky, he failed to see. In a subsequent part of the Report relating to beer, the Principal referred to a case where a brewer was prosecuted for having added sugar to the wort. One of the members of the Society appeared against the Inland Revenue chemists, and had examined a sample of the wort which was several months old, and although it had altered very slightly or not at all, still there was that objection to it. This analyst stated that there was no cane sugar in it, and the Inland Revenue Chemists remarked: "In this the chemist who analysed it was no doubt right as the sample was then three months old, but he added the very remarkable statement that the sample was as fresh and undecomposed as when first brewed, and that if cane sugar had ever been used, it must have been found by him. In this evidence there must have been a serious mistake, as all who know anything of the composition of malt wort are aware that when it is bottled and kept under ordinary circumstances, it will only remain for a very short time without undergoing decomposition, the first effect of which is to invert the cane sugar, if any be present." If this sentence has any meaning, it implied that after the cane sugar had been inverted it could not be found out whether cane sugar had ever been added to the malt wort or not, whereas that was an entire mistake. Cane sugar, after it has been inverted, turns to the *left*, about one-sixth as strongly as maltose turns to the *right*. Maltose reduces Fehling's solution about two-thirds as much as invert sugar. A combined optical and chemical test would therefore readily show the presence or absence of invert sugar. But chemical test alone would suffice. If when dealing with pure maltose it was estimated chemically, and then converted into dextrose by heating with an acid, 100 parts became 150.

When dealing with maltose, plus a certain quantity of cane sugar, the 100 became rather more than 150 after heating with acid, because the maltose which gave 100 was alone measured in the first instance, and that was made into 150, in addition to which the cane sugar, not estimated at first, became invert sugar, which of course reduced a certain proportion of copper solution. Therefore, in the presence of cane sugar, 100 of maltose will make more than 150 of dextrose.

If dealing with maltose, plus a certain amount of invert sugar, the 100 measured chemically was made into less than 150, because the 100 measured chemically consisted of a certain quantity of maltose and a certain proportion of invert sugar, and only the maltose was converted, which is assumed to be less than 100, into its proportion as to 150.

If, then, in a wort which had been kept the sugar on conversion into dextrose increased in the proportion of 100 to 150, they were perfectly justified in stating that that wort did not then contain, and could never have contained, any appreciable amount of cane sugar.

Dr. Bartlett pointed out that it was unusual to have a considerable amount of inverted dextrine where the solids of beer were entirely composed of malt, but this was not always the case. There was now a large sale of other saccharine matters, and he was acquainted with brewers who used cane sugar or invert sugar, and that takes the place of malt extract; how then would come out the calculation laid down by Dr. Dupré? He meant that, if in the first instance that the solids were composed of malt extract one-third, and cane sugar two-thirds, there he thought the ground laid down for calculation by Dr. Dupré disappeared. He thought the matter was of considerable importance, and one very likely to crop up before the members of that Society.

TABULATED STATEMENT SHOWING THE WORK DONE BY PUBLIC ANALYSTS, UNDER THE SALE OF FOOD AND DRUGS' ACT, DURING THE YEAR 1879.

Compiled specially for THE ANALYST.

	ANALYST FOR	Milk, Butter-milk and Cream.		Butter.	Groceries.	Drugs, &c.	Wines, Spirits, and Beer.	Bread and Flour.		Waters.	Sundries.		Total.		REMARKS.				
		No. Analysed.	No. Adulterated.					No. Analysed.	No. Adulterated.		No. Analysed.	No. Adulterated.	No. Analysed.	No. Adulterated.		No. Analysed.	No. Adulterated.		
M. A. ADAMS	Kent	38	5	70	8	146	41	1	..	84	31	4	..	..	12	..	355	85	Act only in operation last three months. Nearly all the milks were ordered to be examined because of the prevalence of scarlet fever and cattle disease.
A. H. ALLEN	Barnsley	..	..	1	..	4	..	..	..	..	..	2	1	..	..	..	7	1	
"	Chesterfield	13	8	..	..	6	..	4	2	..	28	12	..	..	1	..	54	24	
"	Derbyshire (N.)	23	8	12	1	..	..	6	1	..	..	..	..	..	..	..	68	10	
"	Sheffield	34	14	38	8	108	38	53	24	27	4	16	..	..	3	..	279	88	
A. ANGELL	Yorkshire (W.R.)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
"	Andover	..	..	9	2	36	1	..	..	14	2	..	..	..	..	..	59	5	
"	Guildford	56	5	35	1	68	4	14	7	21	2	12	..	..	15	5	221	24	
"	Hants	2	..	1	..	4	1	2	..	6	1	1	..	..	2	..	18	2	
"	Newport, I. W.	4	..	..	..	3	..	1	..	..	..	9	..	..	..	..	17	..	
A. ASHEY	Grantham	4	1	..	..	..	..	..	..	..	..	9	..	..	..	..	11	1	
J. J. BANCROFT	Denbigh (County)	4	1	..	..	..	..	..	..	..	..	7	..	..	..	..	11	1	
A. W. BARCLAY	Chelsea	23	5	27	1	189	16	10	1	16	3	36	..	13	..	6	..	320	26
J. BAYNES	Boston	27	4	1	..	2	..	2	..	..	..	11	3	..	..	..	11	3	
"	Hanley	27	4	1	..	2	..	2	..	..	..	6	..	..	6	4	44	8	
"	Hull	22	..	1	..	..	..	..	..	..	..	18	3	..	..	..	36	3	
"	Scarborough	11	..	..	..	4	..	2	2	..	2	1	3	..	3	..	25	3	
"	York (E.R.)	16	5	7	1	88	15	15	8	4	..	..	..	..	3	2	133	31	
J. CARTER BELL	Cheshire	247	33	11	1	141	28	20	3	116	55	62	..	75	..	19	14	691	134
"	Congleton	1	1	1	..	..	..	..	..	..	..	3	..	..	..	..	4	1	
"	Glossop	1	1	1	..	..	..	..	..	..	..	..	..	..	..	..	2	1	
"	Salford	281	78	19	4	28	3	12	..	52	12	133	7	2	..	15	2	542	106
"	Stalybridge	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
A. J. BERNAYS	St. Giles', Camberwell	99	26	12	..	26	1	27	8	7	..	29	..	..	13	..	213	34	
"	St. Saviour's, Southwark	51	11	..	..	25	1	4	..	18	..	5	..	..	..	..	103	12	
J. W. BIGGART	Greenock	14	4	4	1	12	..	..	..	..	..	2	..	..	1	..	33	5	
"	Port Glasgow	11	1	..	..	..	..	..	..	..	..	..	..	..	..	..	11	1	
T. P. BLUNT	Montgomery (County)	..	..	..	..	1	..	..	..	..	..	..	..	5	..	..	6	..	
"	Shropshire	6	..	..	..	..	..	..	..	1	..	..	..	11	..	..	18	..	
"	Wenlock	16	2	3	..	24	3	12	5	4	1	4	..	..	2	..	65	11	
A. WYNTER BLYTH	Devon	50	27	23	13	3	2	..	..	22	17	..	..	..	..	..	98	59	
J. BRIERLEY	Southampton	25	3	8	..	..	..	2	..	..	..	18	..	1	1	..	54	4	
J. CAMPBELL BROWN	Blackburn	302	42	30	1	163	24	18	3	163	50	55	2	67	40	51	..	849	162
"	Lancaster (Borough)	161	32	7	2	60	30	21	..	..	..	..	..	60	..	..	..	309	64
"	(County)	8	4	9	3	29	10	..	..	..	..	..	..	..	..	..	..	46	17
C. CAMERON	Carlton (County)	5	5	..	..	..	..	..	..	1	..	..	..	3	..	..	..	9	5
"	Cavan	1	1	..	..	80	1	..	..	20	5	..	..	8	..	..	109	7	
"	Clare	42	23	..	..	97	12	..	..	15	..	8	..	6	..	34	2	202	37
"	Down	405	85	1	..	158	6	..	..	..	..	..	..	8	..	..	603	91	
"	Dublin (City)	421	33	..	..	..	..	..	..	..	..	42	..	..	..	..	463	33	
"	(County)	11	8	..	..	7	..	..	..	1	..	..	..	9	..	..	28	8	
"	Galway	29	11	..	..	21	5	..	..	5	..	6	..	17	..	..	78	16	
"	Kerry	21	2	..	..	7	..	..	..	5	2	..	..	9	..	..	42	4	
"	Kildare	11	3	..	..	..	..	..	..	3	..	1	..	3	..	..	18	3	
"	Kilkenny	6	6	..	..	..	..	..	..	..	..	..	..	7	..	..	13	6	
"	Leitrim	41	5	..	..	3	1	7	5	5	..	..	..	28	..	..	84	11	
"	Limerick (City)	34	27	..	..	1	1	..	..	1	1	1	1	20	..	..	56	30	
"	(County)	6	5	..	..	3	1	..	..	7	4	4	..	17	..	..	37	10	
"	Mayo	6	5	..	..	3	1	..	..	7	4	4	..	17	..	..	5	4	
"	Meath	4	3	..	..	..	..	..	..	6	..	..	..	25	..	..	36	1	
"	Monaghan	24	19	..	..	5	..	..	..	4	..	..	..	13	..	..	46	19	
"	Queen's	29	6	..	..	39	14	..	..	54	7	22	..	13	..	..	157	27	
"	Roscommon	12	3	..	..	..	..	1	1	4	..	..	..	23	..	..	40	4	
"	Sligo	1	..	..	..	..	..	..	..	..	..	1	..	16	..	..	17	..	
"	Tipperary	7	5	..	..	..	..	..	..	1	1	..	..	5	..	..	6	..	
"	Waterford (City)	14	4	..	..	..	..	..	..	3	2	..	..	8	..	..	23	4	
"	(County)	5	1	..	..	..	..	..	..	..	..	..	..	18	..	..	26	3	
J. CLARK	Westmeath	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
"	Wexford	7	5	..	..	..	..	..	..	1	1	..	..	20	..	..	28	6	
"	Wicklow	14	4	..	..	..	..	..	..	..	..	1	..	8	..	..	23	4	
"	Dumbarton	5	1	..	..	..	..	..	..	3	2	..	..	..	..	..	26	3	
J. CLARK	Helmsburg	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
"	Paisley	1	..	..	..	..	..	1	..	..	..	..	..	..	1	1	3	1	
J. H. COLLINS	Cornwall	..	..	1	..	3	1	..	..	4	2	2	2	..	..	..	12	5	
"	Falmouth	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
"	Helston	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
"	Launceston	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
"	Penzance	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
"	Truro	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
M. CORNER	Mild End Old Town	4	1	..	..	16	2	..	..	..	..	6	..	..	2	..	28	3	
W. G. CROOK	Norwich	4	2	..	..	..	..	..	..	..	..	..	..	41	35	2	1		

Mr. Hehner said he was not ashamed to own that he was the chemist alluded to in the malt wort case, and would first like to say that it was not, as might perhaps be supposed, a Public Analyst case, but one in which he was engaged privately. With regard to the case itself, there was certainly a doubt about the identity of the sample, but that must be attributed to the Excise officers themselves, who bottled the samples without securing the cork by any seal. His sample was taken by the inspectors whilst it was very hot, and it therefore had a chance of keeping some length of time. It possessed the same specific gravity, the same acidity, and so on, as the Inland Revenue chemists' sample, and he believed, that as far as the chemical evidence went, the samples were identical. It would have been practically impossible for the brewer to substitute for the original sample, had it been sugared, another genuine one, showing practically the same gravity, acidity, &c. The difference was chiefly in the interpretation of the results. The Inland Revenue chemists, as far as he could learn, simply took a measured quantity of the wort and boiled it for a few minutes with a drop or two of acid, any increase in the copper reducing power being taken to represent cane sugar, the dextrine and maltose not being supposed to undergo any change. From a large number of experiments made by him upon pure malt worts of different strength, and obtained under widely different conditions, Mr. Hehner could, however, state most positively that some inversion invariably took place even after a very short time of heating and with very little acid, and in exceptionally strong worts, such as the one forming the foundation of the case, this inversion might amount to several percentages calculated as cane sugar. At the same time he would admit that cane sugar was inverted with extreme facility, whilst the total inversion of malt worts was a very difficult matter, even when 10 per cent. of strong hydrochloric acid were employed. He still believed that the sample was perfectly genuine, and that, anyhow, the presence of cane sugar had by no means been conclusively proved. The Excise Chemists ridiculed the proposition that the cane sugar should have been separated from the wort in the crystallised state and produced as *corpus delicti*, and said this was quite impossible. Mr. Hehner, however, said it had been done in other cases, and he himself was ready to do it. What grounds the Inland Revenue Chemists had for saying in their Report that he had made a serious mistake he could not understand, especially as at the hearing of the case they disputed the identity of the sample. He still adhered to the opinion he expressed at the time—though then, perhaps, too strongly—that the brewer had been subjected to a grievous wrong.