Twelfth annual report from the analytical laboratories of Southall Bros. & Barclay (Limited).

J B.

Southall Bros. & Barclay,

(LIMITED).

TWELFTH ANNUAL LABORATORY REPORT.

BIRMINGHAM,

JANUARY, 1904.

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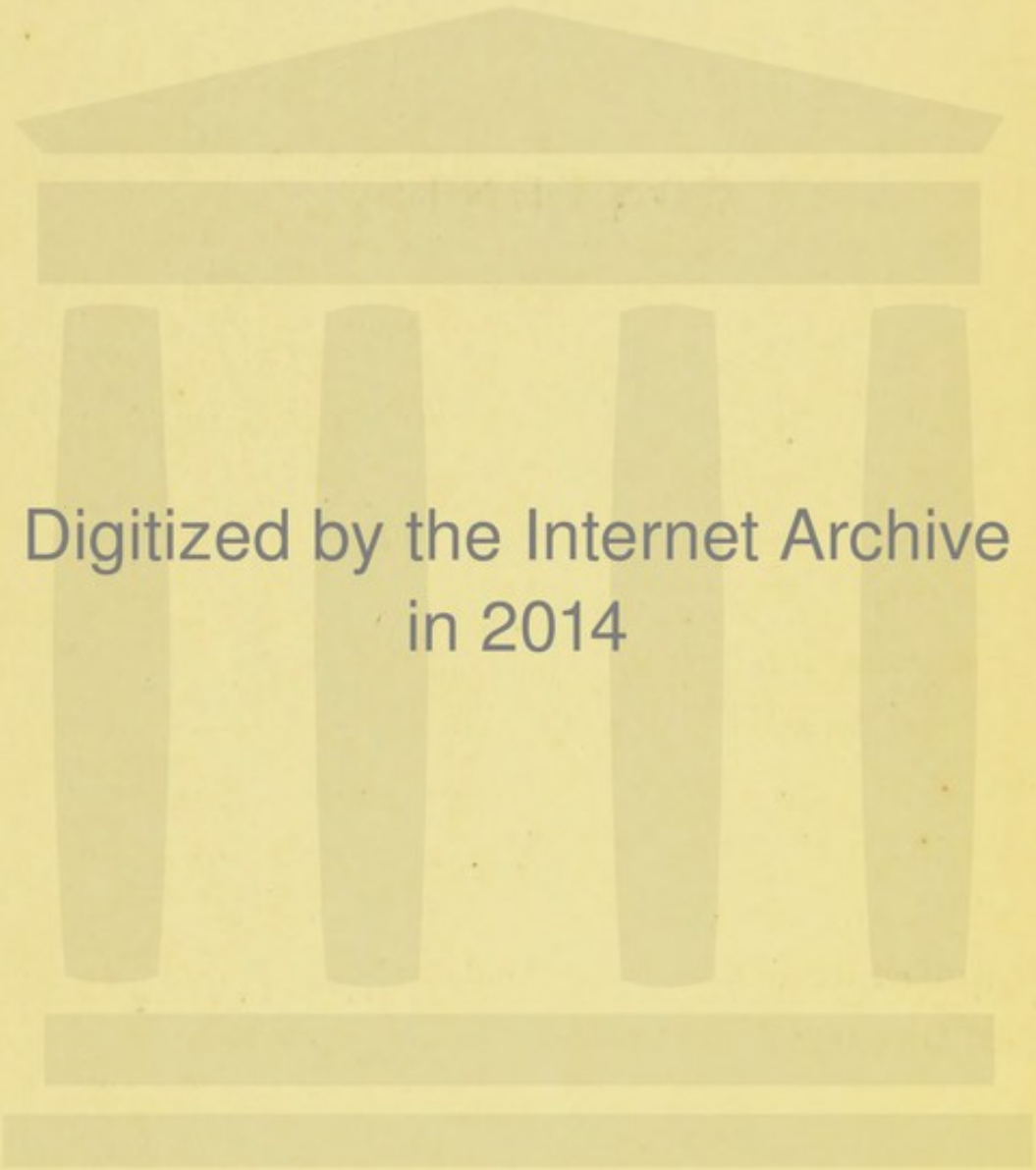

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PREFACE.

IN presenting this, our twelfth annual Laboratory Report, we feel sure that our friends will forgive a personal allusion to the great loss we have sustained during the past year by the untimely death of Mr. John Barclay. Athough so young, he had by his great ability and moral worth won for himself a unique position as an original investigator, and his name will ever be honourably associated with the study of pharmacology, not only in this country but throughout the civilised world. This was manifest by the expressions of grief and sympathy which were received from the most unexpected quarters.

He was a great enthusiast in the cause of pharmacy, and his constant endeavour was to place in the hands of physicians reliable remedies, instead of crude drugs and galencials prepared therefrom. The number of personal researches he made with that object were almost innumerable, and it will be our great aim to carry on his mission.

Amongst other qualities possessed by Mr. Barclay was his ability to teach and train the younger members of his staff, kindling in them an enthusiasm for their work. They learned under him to be painstaking and thorough, and it is a great satisfaction to us that at this time we are enabled to entrust the Analytical Department of our business to Mr. E. W. Mann, Pharmaceutical Chemist, F.C.S., who was 13 years as a pupil and assistant under him. In this matter we think it may be well to quote the following paragraph from the preface to the last edition:—

> "The Editor has pleasure in placing on record "the very valuable help which has been given to him "in the work by Mr. E. W. Mann, and the other "chemists of his staff."

It may be added that Mr. Mann had the entire charge of the Analytical Department in the years 1897-8, during the prolonged absence of Mr. Barclay at the Antipodes.

It is satisfactory to learn that an increasing interest is taken in these Annual Reports. The published result of the analyses of crude drugs and galenical preparations provides not only information, but is something in the nature of a challenge to those who are engaged in similar researches. It is consequently gratifying to be able to state that hearty commendations of them have been received both from the Press and many of the recognised leaders in pharmacy.

The work in our Analytical Laboratories continues to increase, the total number of samples examined during 1903 being 7,030, as against 6,755 in 1902.

The accompanying notes taken from our Laboratory Journal tell their own tale. Special attention has been given to Cod Liver Oil because of the inadequacy of the B.P. tests and the exceptional amount of adulteration which has obtained during the past year. Another instance of the faulty character of the B.P. tests is that for Copaiba, and it will be seen under the head of that drug that we have expended a considerable amount of labour and thought in the provision of a more reliable test.

CRUDE DRUGS, FIXED OILS, WAXES, etc.

THE figures given on the following pages are taken from our Laboratory Journal for 1903, and have been obtained as the result of the examination of very considerable numbers of samples of Crude Drugs, etc., procured through the ordinary commercial channels, and either tested for impurities or assayed for actual value for manufacturing purposes.

We would again further emphasize the fact that we strongly deprecate the adoption of any standard for Crude Drugs, since, as we have often pointed out, attempts to standardize them have been more or less futile. Our experience more than ever confirms our previously expressed opinion that all efforts in the direction of standardization should be expended upon Galenical Preparations, since, however variable the drugs they are prepared from may be, complete uniformity may in the case of such preparations be not only aimed at, but ensured.

It must, however, be remembered that in confining standardization to preparations it is necessary to include certain powdered drugs, such, for example, as Ipecac, Opium, etc., which either alone or in admixture with other substances are used for dispensing purposes.

Acetic Acid.—In our experience the solubility of Oil of Turpentine in an equal volume of Glacial Acetic Acid has proved valueless as a criterion of the strength of the latter. We have found that an acid titrating as low as 98 per cent. will give a clear solution with Oil of Turpentine.

Aconite Root.—Five samples of foreign root proved to be of poor quality. In each case the roots were largely crowned with stems instead of buds, and were frequently hollow. Yield of total ether-soluble alkaloid varied from 0·06 to 0·18 per cent., averaging 0·14.

Aloes, Socotrine.—Eight samples examined gave water soluble matter 25·8 to 52·8 per cent. Some of the lower grades were pasty and quite sour in smell.

Araroba.—Two samples gave Chloroform extractive 49·2 and 52·8 per cent. respectively.

Atropine Sulphate.—A sample examined during the year had a melting point of 200—205°C. Hyoscyamine Sulphate was suspected.

Beeswax.—Twelve samples of yellow wax, both English and foreign, gave :—

Specific gravity	0·965 to 0·971
Melting point	62·2°C to 63·5°C.
Normal KOH required for neutralization of free acid in 5 grammes	1·6 c.c. to 1·9 c.c.
Normal KOH (further) required for total saponification of 5 grammes	6·65 c.c. to 6·90 c.c.

We again find that bleached wax has a higher specific gravity and requires more caustic potash for saponification than the yellow wax.

Belladonna Root.—Six samples gave total alkaloid by titration 0·14 to 0·60 per cent., averaging, if we omit the sample giving 0·14, which is abnormally poor, 0·46, a figure we find remarkably constant as an average from year to year.

Benzoin (Siam).—We give figures relating to the examination of four samples of, reputedly, Siam Benzoin. The two latter, however, possessed physical properties decidedly akin to those of the Sumatra variety, and the chemical examination seems to bear this out. The point is important in view of the great disparity in price :—

Solubility in 90 per cent. alcohol	86·4, 85·8, 79·0, 84·9	per cent.
Balsamic Acids, calculated as Benzoic, Free ...	3·25, 3·43, 5·97, 8·01	,,
Combined	20·68, 19·35, 14·29, 14·22	,,

Benzoin (Sumatra).—Our experience of this drug during the past year is such as to entirely confirm our remarks in our last report, both as regarding the yield of alcohol soluble matter in the Sumatra variety and also with respect to the percentages of free and combined Balsamic Acids which should be present in the drug, and upon which our standard for Compound Tincture of Benzoin to an extent depends (see page 34). Twenty-one samples were examined during the year, and gave the following results as averages :—

Solubility in 90 per cent. alcohol	70·7 per cent.
Balsamic Acids calculated as Benzoic, Free	8·90 ,,
Balsamic Acids calculated as Benzoic, Combined	12·40 ,,

The Balsamic Acids were determined by the method proposed by Barclay and Mann (*The Chemist and Druggist*, March 15, 1902).

Cannabis Indica.—Four samples examined gave :—

Solubility in alcohol (90 per cent.)	10·7 to 12·0 per cent.
Resin	6·4 to 7·2 ,,

Carnauba Wax.—Five samples were examined during the year. Four of them gave the following results :—

Specific gravity	0·996 to 1·007
Melting point	83° to 85°C.
Saponification value	75·4 to 88·6

The fifth sample had specific gravity 0·891, and proved to be a Cerasin of high melting point.

Castor Oil.—Many samples were examined. Specific gravities varied from 0·961 to 0·964. In all cases a yellowish brown and not blackish brown colour was obtained with the H_2SO_4 and CS_2 test.

Cetaceum.—Eleven samples examined had melting points ranging from 44° to 48°, and saponification value 101 to 129.

In one case the sample was somewhat rancid, the acidity present being greater than the B.P. test allows.

Cetaceum, Oil of.—The figures given below, obtained in the examination of four samples, show little deviation from the normal :—

Specific gravity	0·877 to 0·881
Saponification value	124·9 to 129·1
Iodine value	68·34 to 84·48
Non-saponifiable matter	34·59 to 37·22
Fat acids	60·32 to 63·26

Chinese Wax.—A single sample had a melting point of 82°C.

Coca Leaves.—Two samples of Peruvian leaves of good green colour, but much broken, gave total alkaloid 0·88 and 0·80 per cent. respectively ; two samples of the Bolivian variety, somewhat brown in colour, gave 0·46 and 0·34 respectively. Last year we alluded to the necessity for standardizing the fluid extract, we now give, page 35, the standard we have adopted for the present for this galenical.

Cocaine Hydrochloride.—A specimen of this salt was observed to give a distinct odour of benzene when a solution was made in water. The benzene had probably been used as a solvent in some stage of the manufacture, and had been occluded in the crystals since no odour was observed in the salt itself.

Cocoanut Oil.—We again find very little variation in the physical and chemical constants for this fat. We have not recently met with an adulterated sample, but much of the cheaper sort is not white enough in colour for pharmaceutical use.

The following are the limits obtained in the examination of 17 samples during the year :—

Specific gravity at 99° C.	0·868 to 0·872
Melting point	24° to 26°C.
Saponification value	256 to 265

Cod Liver Oil.—In view of the extremely high price of this oil and the great prevalence of adulteration, it was deemed advisable to examine the question of the tests for Cod Liver Oil. The following note, reprinted from *The Chemist and Druggist*, 1903 (2), p. 939, embodies the result of this research. We are still, however, at work upon this subject, and hope to publish further results during the coming year.

"This note consists mainly of a series of figures obtained by the examination of the various oils which have been by repute at one time or another used as adulterants of cod liver oil. The samples are authentic, and in most cases they were prepared from the fish under the supervision of our cod liver oil factory manager. The detection of adulteration in cod liver oil is difficult, because in most cases the adulteration does not consist in adding a foreign oil, but in the use of the livers of a whole catch of fish for preparing the oil. It is thus necessary to expect three, or even more, foreign oils in an adulterated cod liver oil. The Finmarken oil is more liable to this form of admixture than the Lofoten; during the Lofoten season the cod appear almost alone, very few other fish being found with them. In the Finmarken fishing, however, the cod are accompanied by large numbers of haddock, ling, and other fish.

Turning next to the tests for adulteration, specific gravity is practically no guide; with one or two exceptions the whole of the fish-oils would pass the specific-gravity test. The sulphuric-acid colour-test is a valuable test for detecting liver oils generally, but cod liver oil has by no means a monopoly of giving a violet colour with sulphuric acid. The albumen test cannot be considered of any real value; the ring of coagulated albumen is slow to appear, and may be obscured by the colour produced by the action of the acid on the oil.

The whole of the oils from the livers of the various fish were put through a series of tests, the results of which are given in the annexed table, but for the most part they are negative. The colour-test was then referred to; it consists in adding one drop of a cooled mixture of two parts of nitric and one part of sulphuric acids to

fifteen drops of the oil, which gives promising results. No oil that has as yet been met with, other than genuine cod liver oil, which gives the characteristic reaction—a vivid salmon-pink, not darkening to any considerable extent on standing. It is suggested that the test, after confirmation by other observers, should be recommended for inclusion in the B.P. monograph. It has the very great advantage of simplicity; all that is needed is a white pill-tile, a glass rod, and a mixture of the two acids. It is very desirable when using this test, as indeed with all colour tests, to compare a suspected oil with an oil of guaranteed purity. The two oils, brusmer and hoi, are not commonly known; the names are Norwegian, and the former is yielded by the *Brosmius brosme*, but the scientific name of the hoi we have been unable to discover."

TABLE OF FISH LIVER OIL CONSTANTS.

	Sp. Gr.	Iodine absorbed	Free Acid.	Saponification number.	Unsaponifiable.	Reichert Figure (2·5 g.)	H_2SO_4 Test, before stirring.	H_2SO_4 Test, after stirring.	$HNO_3+H_2SO_4$ Test, before stirring.	$HNO_3H_2+SO_4$ Test, after stirring.
Cod-liver Oil .. (Norwegian)	0·9262	147·79	0·36	184·1	7·74	2·0	red-brown, tinged violet	violet	orange-pink	vivid salmon-pink
Cod-liver Oil .. (Newfoundland)	0·9258	139·25	0·45	188·4	9·87	2·0	red-brown, tinged violet	violet	brownish pink	ditto, but not so vivid
Cod-liver Oil .. (Japanese)	0·9252	134·96	1·40	186·7	7·18	1·4	intense violet	intense violet, nearly black	bright violet	greenish brown
Whale Oil ..	0·9192	92·38	2·08	188·6	7·70	0·4	light brown	vandyke brown	pale brown	very pale pink
Shark Oil	0·9290	143·50	6·09	188·5	5·46	0·8	brown	red-brown	brown	brown
Haddock Oil ..	0·9318	160·00	2·67	191·2	2·42	1·1	orange-brown	brown	light-brown	orange
Coalfish Oil ..	0·9272	139·10	1·35	186·1	6·52	0·7	brown, tinged violet	violet	orange-brown	pale pink
Seal Oil	0·9275	123·40	2·79	194·5	3·60	2·5	dark brown	intense van-dyke brown	pale brown	pale orange
Dugong Oil ..	0·9203	66·60	2·39	197·5	3·74	2·5	orange	brown	pale orange	very pale brown
Ling Oil	0·9231	122·80	0·29	181·6	6·44	0·7	violet-brown	violet	light brown	pale brown
Menhaden Oil ..	0·9301	145·80	2·50	186·1	6·73	2·2	brown	brown	pink	light brownish pink
Hoi Oil	0·9186	116·60	0·18	164·7	15·06	1·8	orange, tinged violet	vivid violet	light brown	pale orange pink
Brusmer Oil ..	0·9222	130·11	0·13	180·4	4·92	1·9	violet	vivid violet	brown	pinkish orange

We may add to the above that out of twenty-four samples from different sources examined during the year, no less than eleven failed to answer the colour test there described.

Colza Oil.—Two samples examined gave specific gravity 0·9145, 0·915; saponification value 175·1, 174·7 respectively.

Copaiba. — The following note (reprinted from *The Pharmaceutical Journal*, March 21, 1903, p. 419) deals with the British Pharmacopœia tests for Copaiba, and is mainly concerned with the reliability or otherwise of the tests therein given to detect the presence of Gurjun Balsam. Some explanation may seem necessary for again taking up this subject, seeing that so much work has recently been done upon it. The primary reason was the difficulty experienced in obtaining parcels of Copaiba to answer the requirements of the B.P., but it also seemed advisable to have as many determinations of acid and ester figure as possible, seeing that the inclusion of these in a new B.P. monograph has been recommended.

The following brief *résumé* of recent work upon this subject may be of interest:—

Dieterich (*P.J.*, 1899, 1, p. 321; 1900, 1, p. 227) gives acid and ester figures for a number of varieties of Copaiba and for Gurjun Balsam, but does not correlate his results by reducing with a factor to eliminate differences due to varying proportions of oil and resin.

Gehe and Co. (*P.J.*, 1903, 1, p. 312) give other figures on the same point.

E. Wightman Bell (*P.J.*, 1900, 2, p. 99) in a paper read before the British Pharmaceutical Conference, gives a number of very useful figures and also uses a "resin-factor" to make his saponification figures comparable. This factor and the method followed in obtaining acid and ester figures have been adopted in doing the work necessary for this note. Mr. Bell, however, obtains his factor from the total saponification figure, whereas if the acid figure alone is used the difference between Copaiba and Gurjun is much more marked. He also draws attention to the fact that the greater number of the samples examined gave colour reactions when tested according to official directions.

J. C. Umney and C. T. Bennett (*P.J.*, 1901, 1, p. 324), in suggesting an amended monograph for Copaiba, discard the colour test with nitric and sulphuric acids, but do not give any reasons for

doing so. They also give a figure for acid resins (equivalent to acid number 75·6) without regard to the percentage of oil that may be present except to say that it should not be more than 45 per cent. The points to be settled resolved themselves into the question, a Copaiba gives colour reactions when tested in the manner directed in the B.P., is this necessarily adulterated with Gurjun Balsam? To obtain an answer to this question a series of samples of Copaiba and a specimen of Gurjun Balsam were examined in various ways. It is, however, to be regretted that in the majority of instances it is not possible to specify to what particular variety of Copaiba the samples belong, but three of the commercial varieties are represented.

The methods used were briefly :—

1. Specific gravity.

2. Determination of resin. 1·5 Gm. of the balsam are heated to 100°-105° C. in flat glass dish until of constant weight. Time required is sixteen to twenty hours. It is necessary to observe constant conditions to get concordant results.

3. Brit. Pharm. colour tests (*a*) $H_2SO_4+HNO_3$, (*b*) $HC_2H_3O_2+HNO_3$.

4. Determination of acid and ester numbers with reduction of these figures to a resin factor by dividing the resin percentage by the acid or ester figure obtained. The method employed was, as mentioned above, that described by E. W. Bell, and consisted in titrating free acid in alcoholic solution with alcoholic semi-normal potash, esters being determined on same solution by adding a known excess of the alcoholic potash, boiling under reflux condenser for one hour, and titrating back with semi-normal hydrochloric acid, phenol-phthalein being used as indicator in both cases. Acid and ester figures represent the number of milligrammes of KOH absorbed by acids or esters respectively for one gramme of the balsam.

5. Iodine absorption. Hübl's method was first tried, but found unsatisfactory owing to the occurrence of secondary reactions, which rendered a sharp reading impossible. The method used by Dr. Wij (*Analyst*, vol. xxiv., p. 257) gave much better readings, but even in this case it was found necessary to use exactly identical conditions, excess of iodine (this must be at least three times that absorbed), to secure results in any way concordant. The results obtained are recorded, but are of negative value only.

The results obtained are given on the following page.

TABLE OF RESULTS OBTAINED BY THE EXAMINATION OF COMMERCIAL COPAIBAS.

Variety.	Sp. Gr.	Resin.	Character of Resin.	Colour Tests.		Acid Figure.	Ester Figure.	Resin Factor for Acid.	Resin Factor for Ester.	Iodine Absorbed.	Oil Factor for Iodine.
				$H_2SO_4+HNO_3$.	HA+HNO_3.						
(1) Origin not known..	993	54·2	Hard and brittle	Very distinct reddish purple	Very faint pink	77·9	5·2	0·696	10·42	266·9	0·172
(2) Maranham.....	985	61·7	Ditto	Faintest tinge of purple	No colour	80·5	8·5	0·766	7·26	220·3	0·174
(3) Maranham.....	990	60·2	Ditto	Distinct purple tinge	Ditto	85·1	3·8	0·708	15·84	233·5	0·171
(4) Maranham.....	982	54·2	Ditto	Tinged purple	Very faint pink	80·4	6·3	0·674	8·60	212·2	0·216
(5) Maranham.....	—	53·4	Ditto	Faint tinged purple	Faint pink	80·4	10·4	0·664	5·13	220·7	0·211
(6) Maracaibo.....	989	48·8	Ditto	Distinct purple	Distinct purplish pink	80·9	7·4	0·603	6·60	292·4	0·174
(7) Carthagena	971	53·4	Ditto	No colour	No colour	72·3	9·4	0·739	5·68	234·9	0·198
(8) Origin not known..	989	57·9	Ditto	Distinct purple tinge	Ditto	77·3	10·3	0·749	5·62	171·0	0·246
(9) Ditto	991	56·1	Ditto	Slight purple tinge	Slight pink	78·8	5·9	0·712	9·50	237·5	0·184
(10) Ditto	987	51·1	Ditto	Strong purple	Ditto	71·7	6·0	0·712	8·52	276·6	0·177
(11) Ditto	—	47·5	Ditto	Ditto	Distinct pink	71·3	6·8	0·666	6·99	305·6	0·172
(12) Ditto	989	57·2	Ditto	Tinged purple	Very faint pink	84·8	8·0	0·675	7·15	209·4	0·204
(13) Ditto	—	59·4	Ditto	Ditto	No colour	86·2	9·0	0·689	6·60	199·1	0·204
(14) Ditto	984	54·9	Ditto	Ditto	Ditto	83·4	14·6	0·660	3·76	214·4	0·211
(15) Ditto	985	55·9	Ditto	Faintest tinged purple	Very faint pink	85·5	7·7	0·654	7·26	218·7	0·202
(16) Ditto	—	58·0	Ditto	Ditto	Ditto	86·3	10·5	0·672	5·52	222·5	0·189
(17) Ditto	—	55·8	Ditto	Ditto	No colour	85·3	14·4	0·654	3·87	245·1	0·180
(18) Ditto	994	50·7	Ditto	No colour	Ditto	81·0	4·8	0·626	10·56	232·6	0·212
(19) Ditto	988	55·7	Ditto	Ditto	Ditto	83·9	5·8	0·664	9·60	223·2	0·198
(20) Gurjun Balsam....	957	30·5	Ditto	Very bright purple	Bright purple	7·0	6·6	4·36	4·62	311·6	0·223
(21) Copaiba No. 2 (containing 10% gurjun)..	—	58·6	Ditto	Very distinct reddish purple	Distinct purplish pink	72·6	8·7	0·807	6·73	228·6	0·181

It may be interesting to draw attention to the chief points brought out by this table :—

Specific gravity, all samples examined were practically within B.P. limits.

Amount of oil, two samples only (according to B.P. requirements) were slightly deficient.

Colour tests, action of a mixture of sulphuric and nitric acids on a carbon bisulphide solution of the balsam. Three only of the samples could be described as giving no violet colour ; in the remaining sixteen colours varying from a faint tinge to a strong violet were obtained. Action of glacial acetic and nitric acids on the balsam : Nine samples by this test gave no reaction, the remainder usually giving depths of colour corresponding with those obtained by previous test.

Acid number reduced to resin factor. It will be noticed that the figures obtained for Copaiba samples vary within certain fairly well-defined limits—0·600 to 0·770 will include the whole. Gurjun Balsam itself gives the very striking figure of 4·36.

Ester value, iodine value, these were found to be too variable and not sufficiently well defined from those obtained from Gurjun to admit of any use being made of them.

Having regard to the high figure given as resin-acid factor by the sample of Gurjun Balsam and the comparatively small variation exhibited by the samples of Copaiba, it would seem to be scarcely reasonable to regard as adulterated sixteen out of nineteen of these latter, all procured from importers, etc., in the ordinary way, but they must be so regarded if the colour tests of the Pharmacopœia are to be applied and their indications accepted.

Cream of Tartar.—We have recently met with a considerable number of samples of low grade, which we suspect to contain Potassium Acid Sulphate. Such an addition gives of course a high reading with the B.P. titration test, but is readily detected by the application of the former ignition test, with titration of the resulting carbonate. We continue to apply both tests to all samples examined.

Many samples have been met with containing somewhat large proportions of lead, but it is now not difficult to obtain parcels of Cream of Tartar almost lead free. Samples examined gave, with the exception of one case where the amount was very large indeed, ·0005 to ·005 per cent. of lead.

Dragon's Blood.—Several samples have been examined. Colophony being suspected, they were treated with cold turpentine. In most cases this dissolved a small quantity of hard red resin, but in one instance a considerable amount of a softish yellow resin was obtained, smelling suspiciously of Colophony.

Elaterium.—A single sample of English Elaterium gave alcohol (90 per cent.) soluble 56·2 per cent., Elaterin 25·6 per cent.

Ergot.—Water-soluble matter in five sound samples varied from 15·72 to 18·00.

Eucalyptus Gum.—A single sample gave 88·2 per cent. soluble in water.

Ginger.—There has recently been re-published in Chattaway's *Digest of Researches and Criticisms* a requirement of A. R. Bennett's that ginger "should not yield less than 5 per cent. of resin to 90 per cent. alcohol." We would wish to entirely dissent from any such standard, which we consider would have the effect of excluding the best Jamaica and Cochin ginger.

We repeat here the figures given last year for alcohol (90 per cent.) soluble matter in high-class Jamaica and Cochin gingers. They were 4·35 and 4·57 respectively, while a specimen of African ginger gave no less than 9·93.

Glucose (Liquid).—The only sample tested gave 43·2 per cent. of real Glucose, and was free from arsenic.

Glycerine.—Many samples were tested and all of them proved equal to the British Pharmacopœia requirements. In no case could arsenic be detected by the official test.

Hydrocyanic Acid.—Stock obtained from outside sources as "Scheeles" varied from 4·01 to 4·88 per cent. of HCN. We invariably make our acid exact 4 per cent. before passing into stock.

Hyoscyamus Indian.—A sample parcel of this recently introduced addition to the materia medica (Hyoscyamus Muticus) assayed at 0·37 per cent. total alkaloids by titration. We have introduced during the past year a standardized tincture of this drug (see page 35), in order that it may be submitted to therapeutic trial side by side with the tincture of the English plant.

Insect Powder.—A batch of powder ground by ourselves from the finest buds gave when assayed by Durrant's method 8·93 per cent. of oleo-resin of a fine greenish yellow colour. This is an exceptionally high figure, and a powder yielding so much should possess stupefying powers to a very high degree.

Ipecac Root.—With regard to our remarks of last year concerning the lack of a satisfactory and accurate means of determining the relative proportions of emetine and cephaeline in Ipecac root and its preparations, we are very glad to see that this subject has been thoroughly reinvestigated by Mr. A. G. C. Paterson (*P.J.*, 1903, 2, p. 73), and it is interesting to note that his conclusions bear out entirely what we said last year, that up till that time "no satisfactory method for the separation and determination of the two alkaloids in the root has been given." In view of the considerable sales of Carthagena root at a lower price than the official, we hold the matter to be one of considerable importance, and we hope to be able to give Mr. Paterson's method a thorough trial during the coming year. A sample examined during the year, labelled Bahia Ipecac, proved to be a light coloured root, with shallow undulations, probably the root of *Ionidum Ipecacuanha*. The powder was free from starch and gave no indications of the presence of any alkaloid.

We would again record our opinion that Powder of Ipecac being to all intents and purposes a preparation should be required to contain a definite percentage of alkaloid (preferably emetine).

Iron, Reduced.—Five samples examined gave percentages of metallic iron varying from 71·2 to 89·7.

Jalap.—Five samples assayed for total resin gave 7·2 to 11·0 per cent., the resin in each case answering the tests of the Pharmacopœia.

Kamala.—A single specimen, examined microscopically, with satisfactory results, gave 6·44 per cent. of ash.

Kino.—Water-soluble matter on one fairly bright sample 81·4 per cent.

Myrrh.—Ten samples were examined, and yielded to alcohol (90 per cent.) soluble matter varying from 18·8 to 24·8 per cent.

Nut Oil.—Two samples gave:—

Specific gravity	0·921, 0·916
Saponification value	190·5, 200·1
Free fatty acid (as oleic)	6·71, 2·05

It is highly necessary, having regard to the uses of this oil for cosmetic preparations, etc., that the free fatty acid (an indication of rancidity) should be as low as possible.

Olive Oil.—In this case, again, the question of amount of free fatty acid crops up. We consider that an edible oil of high-class quality should not contain more than 1 per cent. of free fat acid; an oil suitable for ordinary pharmaceutical purposes may contain up to 4 per cent.

Free fatty acid in a large number of samples examined ranged from 0·61 to 8·83 per cent.

Again we have to note that some of the samples of undoubted purity gave a brown reaction with the official test for Cotton Seed Oil.

Opium.—Five samples of very varying quality gave Morphine 6·04 to 10·30 in the moist drug.

Palm Oil.—We find very great difficulty in procuring Palm Oil of low free acid content, and consequently free from the excessive tendency to bleach that characterises most oils.

Free fat acid in samples examined, 16·8 to 63·3 per cent.

Peruvian Balsam.—When tested in the manner directed by the B.P., samples gave :—

Ether residue ... ... 56·8 to 60·4 per cent.
Saponification value of Ether residue...232·7 to 241·4 ,,

Pilocarpine Nitrate.—We still experience very great difficulty in obtaining specimens of this salt to correspond with the correct melting point for the pure salt, as given by Jowett. Out of several samples examined during the year we have met with melting points as low as 139° and 150°, the highest reaching 161°. It should be noted that these are only approximate figures, the melting points are by no means sharply defined, especially is this so with the more impure samples.

Podophyllum Root (Indian).—A small packet of the root of Podophyllum Emodi, obtained from India as a specimen, yielded 8·96 per cent. resin.

Podophyllum Resin.—A communication made to one of the trade journals during the year somewhat impeached the Podophyllin of commerce, alleging a deficiency in the amount soluble in alcohol. As we ourselves had no difficulty in manufacturing the resin to answer the Pharmacopœia requirements of "soluble or nearly so in alcohol 90 per cent.," we were inclined to wonder whether the soluble or the insoluble matter had been determined to arrive at the amount soluble in alcohol. If the former, then the moisture which we find to be always present in the commercial resin must be taken into account, and would possibly make up the deficiency. An examination of five trade samples gave percentages of moisture ranging from 2·57 to 5.41.

Saccharin.—All samples of "550" Saccharin tested answer the British Pharmacopœia requirements; "330" Saccharin, however, does not do so.

Scammony Root.—Five samples assayed for total resin gave 9·56 to 10·36 per cent, averaging 10·0. This bears out our remark of last year that good quality Scammony Root should yield at least 8·5 per cent. of resin, although we are far from recommending the adoption of any standard for this or other crude drugs, holding, as we do, the view that crude drugs of low content of active principle have their legitimate uses, provided always that the preparations made therefrom answer the B.P. and all other reasonable tests.

Slippery Elm Bark.—We have again had occasion to condemn a sample of this bark in powder, which proved on microscopical examination to be largely adulterated with wheat flour or starch, and gave very poor results indeed when tested against a powder of our own grinding by the method we referred to last year.

Stavesacre Oil.—Several batches of this oil of our own manufacture examined gave percentages of total alkaloid ranging from 1·93 to 2·59.

Storax.—Three samples of commercial Storax were examined with the following results:—

Solubility in 90 per cent. Alcohol		... 70·84	74·84	74·64
Balsamic Acids as Benzoic	Free	... 2·04	1·72	1·75
	Combined	9·66	18·31	19.97

Tartaric Acid.—Thirty-one samples tested during the year continue to show considerable improvement as regards the amount of lead present, although even now batches are occasionally met with containing an excessive proportion.

Amount actually found ranged from 0·010 to 0·0009, averaging about 0·0025.

Terebene.—We still find it impossible on the large scale to prepare Terebene to answer the requirements of the B.P. A large batch manufactured very carefully from American turpentine had practically no rotatory power. Specific gravity was 0·852, and 88 per cent. distilled between 165° and 180°C.

CONTRIBUTIONS TO THE ASH QUESTION WITH REGARD TO DRUGS.

RECENT discussion on this subject has revived the interest caused by the publication of our own report last year containing the results of a large number of ash determinations. Our own view of the question is that the application of standards or, better, of limits for ash to *ordinary* entire drugs is in the majority of cases of very little value. A pharmacist has little difficulty in determining for himself whether a certain drug is clean and free from sand and dirt, and if it is so and corresponds to the official description in other respects, then the question of mineral matter is comparatively unimportant.

Of course, in a few instances, such as Crocus or Coccus Cacti, the value of the drug renders actual sophistication with mineral matter practicable, and the ash content becomes of importance.

Turning to powdered drugs, it is obvious that extraneous mineral matter cannot be detected by the naked eye, and the determination of ash becomes of great value.

We give below a series of figures obtained during several years past by the examination for mineral matter of a very large number of drugs and of powdered drugs. The drugs were in all cases genuine, and the powders were ground in our own mills from authentic parcels.

We are well aware that the figures given for ash-yield of some of the powders are materially higher than those published for the entire drugs, but we hold very strongly the view that in fixing standards or limits for ash-yield the authorities must be prepared to admit ordinary commercial powders; that is, powders ground from sound drugs after reasonable care has been taken to ensure freedom from extraneous matter.

To such powders our figures relate, and not to samples specially cleaned or subjected to processes which are impracticable on the large scale.

It has been objected that varying amounts of moisture will cause considerable differences in the ash-yield. If, however, the ash limit be applied to the powdered drug, we think that the variation in moisture will not be such as to cause any appreciable variation in ash-yield.

TABLE showing ash-yield per cent. yielded by various drugs of good quality, and by powders ground in our own mills, such powders being in most instances ground from other parcels of drugs than those represented by the entire drug.

(The figures in italics are new figures added to the table as the result of this year's work.)

	Whole drug.	Powder from own mills.
Acaciæ gummi ..	2·74	2·99
	2·80	3·18
	2·73	
Aconiti radix (Anglic) ..	1·96	
(Exotic) ..	4·51	7·65
	3·16	
	2·63	
	3·91	
Aloe Barbadensis ..	1·73	1·51
	1·17	2·58
Aloe Socotrina	2·08	2·09
	0·77	
Aloe Uganda	0·59	
Aloinum	*1·04*	
Ammoniacum	1·99	
	8·43	
	2·69	
Anethi fructus	7·73	
	7·82	
Anisi fructus	7·70	8.30
		10·78
		8.89
		9·55
(Spanish) ..	*6·04*	
(Russian) ..	*14·82*	
Anthemidis flores ..	5·72	6·28
	5·78	
	5·54	
	5·54	
	5·51	
	3·95	

	Whole drug.	Powder from own mills.
Araroba	2·53	
	1·62	
Arnicæ rhizoma ..	7·08	
	5·08	
Aurantii cortex ..	5·17	
	4·54	
	6·06	
	3·46	
Belladonnæ folia ..	12·82	10·85
	8·46	*8·63*
Belladonnæ radix ..	9·26	5·29
	5·08	
	5·73	
	10·22	
	4·13	
	5·56	
	4·47	
Benzoinum	0·92	
Balsamum Tolutanum ..	0·40	
	0·36	
	0·34	
	0·39	
Buchu folia	4·71	4·04
	8·36	*4·18*
Calumbæ radix	4·72	6.97
	4·53	*6·44*
Cambogia	0·38	1·81
Cannabis Indica ..	15·56	14·92
	13·12	

	Whole drug.	Powder from own mills.
Cantharis	.. 5·08	7·63
	5·25	*5·31*
,, (Chinese)	.. *4·01*	
Capsici fructus ..	.. 5·37	6·06
	3·65	*4·68*
Cardamomi fructus	.. 4·50	
	5·12	
Cardamomi semina	.. 7·53	
	3·49	
	3·70	
		7·01
Carui fructus ..	.. 6·20	6·74
	5·76	6·20
	4·49	
Caryophyllum ..	.. 4·62	4·66
	5·37	
	6·01	
Cascara Sagrada..	.. 5·51	
	6·09	
Cascarilla	.. 8·27	
Cassiæ pulpa ..	.. 2·57	
Catechu	.. 3·38	5·34
Chirata	.. 4·01	3·09
Chrysarobinum ..	.. 0·11	
	0·16	
Cimicifugæ rhizoma	.. 6·21	
	5·14	
Cinchonæ rubræ cortex..	1·36	5·20
		2·83
Cinnamomi cortex	.. 4·94	4·75
	4·17	
		4·47
Cocæ folia (Bolivian)	.. 4.02	
(Peruvian)	.. 8·08	
		6·54
Coccus	.. 3·41	9·49
		8·91
Colchici cormus ..	.. 1·85	2·91
		1·98
Colchici semina ..	.. 4·02	5·25
		6·92
Colocynthidis pulpa	..12·00	
	10·10	
	12·40	
	11·40	
	11·20	
	11·70	
	11·20	
	11·70	
Conii folia ..	..15·14	
	5·36	*11·89*
Conii fructus ..	.. 5·53	
	6·27	
Coriandri fructus	.. 4·06	
	4·93	
	4·05	*5·17*
	3·60	
	4·10	
Cubebæ fructus ..	.. 6·42	7·32

	Whole drug.	Powder from own mills.
Cuspariæ cortex ..	.. 8·02	
	7·29	
Cusso	.. 9·40	
	9·84	
Digitalis folia ..	..11·21	9·39
	9·80	*6·35*
	10·90	
Elaterium ..	.. *4·20*	
Ergota	.. 3·19	3·25
	2·82	4·10
	2·92	2·69
	3·07	4·31
	3·70	3·14
Eucalypti gummi ..	0·17	
Euonymi cortex ..	.. 8·96	
	8·56	
Filix mas	.. 3·27	
	2·85	
Fœniculi fructus	.. 8·46	10·79
	7·22	
Galbanum ..	.. 4·45	
	4·38	
Galla	.. 1·76	1·75
		1·67
Gelsemii radix ..	.. 1·57	
	1·79	
	1·48	*2·08*
Gentianæ radix ..	.. 2·43	4·53
	3·54	
	2·67	*4·16*
Glycyrrhizæ radix	.. 4·47‡	3·30
	4·85	
	2·04	
	3·66	
Granati fructus cortex ..	*2·23*	
Granati cortex ..	.. 5·99	
	6·08	
Guaiaci lignum ..	.. 1·05	
	1·29	
Guaiaci resina ..	.. 0·60	2·50
Hæmatoxyli lignum	.. 1·58	
	1·29	*1·81*
Hamamelidis cortex	.. 3·42	
	2·94	*4·06*
Hamamelidis folia	.. 5·54	
	4·32	
	4·51	
Hemidesmi radix	.. 3·76	
	3·59	
Hydrastis rhizoma	.. 4·35	
	5·28	*9·23*
Hyoscyami folia (Exotic)	21·91	
(Anglic)	14·02	
	8·72	*12·83*

‡ Not decorticated.

	Whole drug.	Powder from own mills.
Ipecacuanhæ radix	2·38	2·23
	2·12	2·65
	2·45	2·03
	2·69	2·19
	2·38	3·38
		2·72
		2·59
		3·29
		2·55
		2·88
		2·49
Jaborandi folia	4·54	
	4·63	
	4·16	
	4·01	
Jalapa	4·31	3·78
	3·33	
	3·46	
	3·61	
	3·62	
	2·39	*3·49*
Jalapæ resina	0·22	
Kino	0·80	
Krameriæ radix	2·51	4·37
	2·68	*3·71*
Laurocerasi folia	6·21†	
	4·96†	
Limonis cortex	3·66	
	3·50	
Lobelia	3·37	9·48
	4·68	
	3·84	
	3·33	*6·94*
Lupulin	13·42	
Lupulus	6·90	
	7·46	
	8·69	
Mezerei cortex	3·09	
	2·70	
Myristica	1·91	2·46
	1·68	
	1·52	*2·19*
Myrrha	2·58	5·82
	6·69	10·72
Nux Vomica	1·13	2·45
	1·11	*1·73*
Opium	3·77	7·18
	6·34	4·52
	3·61	
	2·77	
Papaveris capsulæ	11·28	
	8·63	
	7·56	

	Whole drug.	Powder from own mills.
Pareiræ radix	2·49	
	3·13	
Physostigmatis semina	3·11	
	2·97	
Pimenta	2·82	3·55
	3·61	*3·79*
Piper nigrum	3·26	6·32
	3·41	*5·01*
Podophylli rhizoma	3·16	
	2·41	
Pruni Virginianæ cortex	2·96	
	2·53	
Pterocarpi lignum	1·52	
	1·40	
Pyrethri radix	3·89	
	5·01	
Quassiæ lignum	2·51	
	2·31	
Quillaiæ cortex	7·99	8·19
	6·38	*8·44*
Rhei radix	4·93	8·80
	7·27	10·01
		10·69
Rhei Radix (Anglic)	7·19	7·85
Rosæ Gallicæ petala	1·84	
	3·11	
	2·40	
	3·34	
Sambuci flores	10·20	
	9·10	
Sarsæ radix	6·02	
	8·02	
(Mexican)	10·46	
(Honduras)	5·75	
(Lima)	5·12	
Sassafras radix	0·77	
	2·29	*1·32*
Scammoniæ radix	9·12	
	12·65	*7·13*
Scammonium	3·42	
Scilla	2·08	2·51
	2·15	*2·38*
Scoparii cacumina	2·26	
	2·39	
Senegæ radix	4·26	4·24
	2·94	*4·12*
Senna Alexandrina	7·88	8·61
	8·55	
	8·15	
Senna Indica	8·35	9·45
	7·33	
	8·67	
	6·82	
	7·71	
Serpentariæ rhizoma	5·76	10·13
	9·10	

† Dried.

	Whole drug.	Powder from own mills.
Sinapis albæ semina	4·05	
Sinapis nigrae semina	4·31	
	4·18	
Sinapis		*4·22*
		3·57
		4·15
		4·32
		4·32
Staphisagriæ simina	13·26	11·69
	12·35	*15·13*
Stramonii folia	20·18	22·02
	19·31	
	13·97	
	16·45	*24·81*
Stramonii semina	2·44	
	2·04	
Stophanthi semina	3·78	
	3·51	
Sumbul radix	6·09	
	4·19	
Tamarindus	2·42	
Taraxaci radix	3·20	
	4·23	
Tragacantha	1·98	2·07
	1·73	2·21
	3·24	

	Whole drug.	Powder from own mills.
Uvæ Ursi folia	2·45	
	2·54	
Valerianæ rhizoma	11·61	17·44
	11·02	
	7·67	
	13·23	
Zingiber	4·11	3·02
	2·43	3·78
	2·37	5·23
	2·57	6·27
	2·50	4·03
	4·89*	5·91
	5·29*	
	4·11*	
	4·35*	
	3·51	
	4·38	
	5·43	
	4·58*	
	4·13	
	7·37*	
	4·24	

* Bleached.

ESSENTIAL OILS.

All rotation figures given refer to observations made with a 100 mm. tube.

Aniseed.—Three samples were examined having specific gravities of 0·976 to 0·981 at 20°C., and normal in other respects.

Cajuput.—Twelve samples gave specific gravities ranging between 0·919 to 0·9225; all samples when tested qualitatively with Phosphoric Acid gave satisfactory Cineol reactions.

We have not found any appreciable variation in the average specific gravity of this oil for many years.

Caraway.—A single sample of English oil gave:—

Rotation	+79°
Specific gravity	0·907

Distillate above 200°, 54 per cent.

Two samples of foreign oil were of very low specific gravity, and proved to be practically destitute of Carvol.

Carvol.—Two samples of the pure substance which is official in the German Pharmacopœia gave:—

Specific gravity	0·964, 0·963
Rotation	58.9°, 58·85°

Both distilled entirely above 220°C.

Cassia.—Two samples examined for Cinnamic aldehyde gave 70·2 and 74·0 per cent. Their respective densities were 1·061 and 1·062.

Cinnamon.—A single sample had specific gravity 1·037, and contained 88·6 per cent. of Cinnamic aldehyde when tested by the Sodium Bisulphite method.

Clove Oil.—Analysis of several samples gave the following limits:—

Specific gravity...	1·0495—1·054
Eugenol	80 to 88 per cent.

(Determined by Caustic Potash method).

Cubebs.—Specific gravities of three batches of oil distilled by ourselves ranged from 0·916 to 0·924.

There seems no doubt but that 0·915 might safely be fixed as the lowest limit for genuine Cubeb Oil. We have never yet experienced a properly distilled and bulked oil with a density less than 0·915.

Dill.—Two samples of oil examined gave the following results:—

Specific gravity	0·907, 0·911
Rotation	77·2°, 75·0°
Distillate above 220°C.	29·0, 36·0 per cent.

Eucalyptus.—Thirteen samples were tested during the year, twelve of which fell within the official tests. The remaining sample gave:—

Specific gravity	0·910
Rotation	−17·5°
Qualitative Phosphoric Acid test ...	Very unsatisfactory.

The oil gave no reaction for Phellandrene, and would appear to have been partially deprived of Cineol.

Two samples of the Oil of Eucalyptus Citriodora had a pleasant Citronella-like odour, and specific gravity in each case 0·874.

Fennel.—Four samples have been examined during the year, the results obtained being as follows:—

Specific gravity ...	... 0·8825, 0·970, 0·967, 0·966
Rotation	... −5·4°, +15·32°, +15·51, +15·22°
Solidifying point...	below −11°C., +6°C., +4·5°C.,+1°C.

The former of these samples had probably been almost entirely deprived of Anethol by freezing.

Gaultheria.—Two samples, of specific gravity 1·183 and 1·188, gave on saponification 98·82 and 99·49 per cent. of Methyl Salicylate respectively.

A parcel of the Synthetic Methyl Salicylate assayed at 99·83 per cent. pure ester.

Lavender.—Twelve samples of foreign oils of various qualities were examined and gave the following results:—

Specific gravity	...	...	0·876 to 0·8885
Linalyl Acetate	...	...	6·67 to 27·98 per cent.

We find that nearly all the foreign Lavender Oils tested during the year show a distinct falling off in ester content as compared with the figures of previous years.

Lemon Oil.—Several samples examined gave specific gravities ranging from 0·857 to 0·859; in all cases the rotations observed were within the limits officially prescribed.

Concerning the question of Citral content in view of the differences between leading authorities as to what is a proper percentage of Citral in a high-class lemon oil, we have ceased to guarantee our oils to contain any definite proportion of Citral, simply guaranteeing them as pure lemon oils. An accurate and easily applied method for determining the Citral content appears to us a desideratum.

Lemongrass.—A sample examined during the year gave the following curious results:—

Specific gravity	...	...	...	0·887
Aldehyde	...	...	...	... about 25·5 per cent.
Rotation	...	...	...	... +21°

Not soluble in three volumes of 70 per cent. alcohol.

Evaporated on a water-bath until of almost constant weight 10·3 per cent. of a brown, hard, resinous substance was obtained. The adulteration, which would appear to be with crude resin spirit or something of a similar class, is a peculiar one, but clumsy in the extreme, the simple solubility test at once betraying it.

A normal sample recently examined gave specific gravity, 0·9035; Aldehyde, 80·5 per cent.; Rotation, −3·1°, and was easily soluble in three volumes of 70 per cent. alcohol.

Orange Oil. — Samples of Oil of Sweet and Bitter Orange gave :—

	Sweet.	Bitter.
Rotation	+95°	+88·8°
Specific gravity	0·847	0·854

Pennyroyal.—Five samples were examined with the following results :—

Specific gravity	0·937— 0·938	0·893—0·8945
Rotation	+19·8°—+20·4	–8·8° —
Behaviour with 70 % alcohol ...	Soluble 1 in 2.	Insoluble.

The latter two samples were obviously grossly adulterated, probably with oil of turpentine.

Peppermint.—Two samples of English oil gave very similar figures :—

Specific gravity	0·904, 0·904
Menthyl Acetate	5·56, 5·84
Free Menthol	55·07, 54·20

Three parcels of partially dementholized Japanese oil gave :—

Specific gravity	0·896 to 0·899
Menthyl Acetate	9·25 to 11·32
Free Menthol	44·33 to 48·70

Petitgrain.—A single sample had specific gravity, 0·887; Linalyl Acetate, 41·3 per cent., and was soluble in two volumes of 80 per cent. alcohol.

Rosemary.—Four samples of foreign oils gave specific gravities ranging from 0·900 to 0·913; rotatory power from +5·98° to +10·26°.

Rue.—Considerable difficulty has been experienced in obtaining genuine samples of Oil of Rue, two examined during the last twelve months gave :—

Specific gravity	0·861, 0·8452
Solidifying point	... below –5°C., +4·5°C.

The latter is probably fairly pure, although not absolutely so; the former is grossly adulterated, being little better than oil of turpentine disguised.

Savin.—In this case again we meet with foreign oils very largely adulterated with turpentine, two typical instances are given below:—

	English.	Foreign.
Specific gravity	0·932 ...	0·882
Rotation	+48·2° ...	−16·8°

Sandal Wood Oil.—Six samples of East Indian Oil examined showed little deviation from the normal constants.

Specific gravity	0·973 — 0·978
Rotation	−16·25° — −18·60°
Santalol	91·14 — 97·69 per cent.

A sample of West Indian Sandal Wood Oil, which is derived from Amyris balsamifera, (Burseraceæ), gave the following results:—

Specific gravity	0·966
Rotation	+28·5°
Alcohol (Santalol?)	48·37 per cent.

Turpentine.—The high price and scarcity of Oil of Turpentine has caused a variety of substitutes to be put forward, some as No. 1 below, very ingeniously constituted to reproduce certain of the physical constants of the true. We give figures obtained in the examination of two of these:—

	No. 1.	No. 2.
Specific gravity ...	0·864	0·836
Rotation	+16·1°	—
Distilling above 165°...	Almost entirely.	51 per cent.

The behaviour on distillation was sufficient in each case to detect the sophistication.

Wormseed, American.—Two samples examined possessed the following characters:—

Specific gravity	0·964, 0·9715
Rotation	−4·7°, −4·9°

Entirely soluble in ten volumes of 70 per cent. alcohol.

GALENICAL PREPARATIONS, etc.

IT will be remembered that as the result of many years' work and research, we published last year a list of standards that we have adopted for Galenical Preparations. The list, we believe, is the fullest collection of standards yet published, and includes practically all the preparations of the British Pharmacopœia. Any further researches on our part in the matter of standardization will be devoted to the improvement of our existing standards, especially with a view to replacing wherever possible the "total solids" figure for one representing a more definite principle.

It was with this end in view that we worked out our method for standardizing Tinct. Benzoin. Comp. to contain definite amounts of Balsamic Acids, and we have this year adopted a standard of 0·5 per cent. total alkaloids for Extractum Cocæ Liq.

The following short notes of matters of interest that have come under notice during the year may prove acceptable.

Belladonna, Green Extract.—As is our usual custom, the whole of the extract, prepared from several tons of the finest herb, was carefully bulked and assayed. The herb appeared to be in excellent condition, and it was a matter of very great surprise to us to find that the extract yielded but 0·87 per cent. total alkaloid by titration. That we were not alone in this matter was proved by procuring a sample from another leading manufacturer, which, on assay, gave a figure practically the same as our own.

It will be remembered that last year our batch of extract assayed at 1·5 per cent., and we think it would be difficult to find a more cogent reason for the necessity of either standardizing or else replacing the official green extract by a standardized alcoholic extract of the leaf.

Bilberries, Fluid Extract of (Ext. Myrtillorum Liq.)—In response to numerous requests for a preparation of the common Bilberry, we have introduced the above during the past summer. It is an agreeable and elegant preparation of the fresh fruit, the strength being one part in one part fluid.

Benzoin, Compound Tincture.—With regard to the question of extractive in this tincture, we were glad to see that Dr. Hill's view that the tincture should contain 180 grammes of total solids per litre, has been ably supported by Wright in a paper read before the British Pharmaceutical Conference.

In our last report we reprinted a paper from our laboratories, which proved that a tincture prepared strictly according to the B.P. directions, could not possibly contain less than 180 grammes per litre, and although we do not ourselves work to an extractive standard in this tincture, yet we find that when the amount of Balsamic Acid present answers our requirements, there is invariably present extractive in excess of the 180 gramme standard.

Blaud's Pill.—The question of amount of ferrous carbonate present in the pill sold indifferently as Blaud's, or Iron Pill, has much exercised the minds of chemists during the present year.

For ourselves we have never had any difficulty in preparing a pill to answer the Pharmacopœia requirements, and to keep its ferrous iron unchanged for any reasonable length of time.

During the present year no less than forty-eight batches of Blaud's Pill have been tested by us before issuing. In every case the amount of Ferrous Carbonate present was well over 20 per cent.

Through the kindness of one of our friends we were enabled to test a sample of coated Blaud's that had been in stock at least $2\frac{1}{2}$ years. Ferrous Carbonate content was 21·0 per cent.

Camphor Liniment.—Each batch of this liniment prepared on the large scale is assayed. Camphor found present varied from 21·14 to 22·21 per cent. The proportions given in the British Pharmacopœia require 21·59 per cent.

Cocæ Ext. Liq.—We have temporarily adopted a standard of 0·5 per cent. total alkaloids for this preparation, but we are making experiments with the method for determining Cocaine recently published by Garsed (*P. J.*, 1903, 2, p. 784), with a view to arriving at a correct standard for the amount of the pure alkaloid in the fluid extract.

Colchicum Ext.—Two samples of considerable batches of this year's preparation yielded 0·88 and 1·97 per cent. respectively of total alkaloids.

Colchicum, Acetic Ext.—Two similar quantities of this extract, which, although no longer official, still meets with considerable use, gave 1·00 and 1·35 per cent. respectively.

The variation in alkaloidal strength shown in these two extracts is extreme, and confirms the opinion we have often expressed that the "green" extracts of the British Pharmacopœia are as a class unreliable, and should either be improved by standardization or else replaced by alcoholic standardized extracts. In this particular instance an alcoholic or acetic extract of the seeds or dried corms might be readily prepared and standardized.

Henbane, Extract of.—This year's extract, bulked and assayed, gave a figure very similar to that of last year, viz., 0·12 per cent. total alkaloid by titration.

Hyoscyamus Muticus, Tincture of (Standardized).—As referred to in our section on Crude Drugs, we have prepared a Tincture of Egyptian Henbane, standardized to contain 0·05 per cent. total alkaloid by titration.

This drug, which averages about six times the strength of alkaloid as found in the indigenous drug, has given rise to some discussion during the year, and its tincture has been held to possess advantages over the official one. Instead of reducing the amount of drug used to the proportion necessary to give a tincture of similar alkaloidal strength to that of the British Pharmacopœia, we have preferred to use the full amount ordered and to obtain a tincture some six times as strong and with a proportionately small dose.

Mercury Ointment.—In view of recent activity on the part of Food and Drugs Inspectors in the matter of this ointment we have made an assay of each batch prepared during the year; a very large number were tested and the metallic mercury found ranged from 47·8 to 49·9 per cent.

Squills, Oxymel of.—In view of the recent discussion regarding this preparation, it will be, perhaps, interesting to recall the standard we published last year for the Pharmacopœia pre-preparation, viz., Acetic Acid 2·0 per cent., specific gravity, as directed by the Pharmacopœia, 1·320.

Squills, Vinegar of. — Three samples examined during the year yielded total solids ranging from 8·4 to 9·7 per cent.

Strychnine Hydrochloride.—Recently a sample of Liquor Strychninæ was submitted to us on account of the formation of more or less tabular crystals. No similar crystals were obtainable when a batch of Liquor Strychninæ was prepared from the same bulk of the salt, nor was crystallization induced by the addition of acid.

When a few of the original crystals were separated it was found that a strong reaction for sulphate was obtained, the crystals being as a fact Strychnine Sulphate.

The cause of the trouble ultimately turned out to be the use of tap water containing Calcium Sulphate to prepare the liquor. Interaction had taken place, and the less soluble Salt of Strychnine the sulphate had crystallized out.

The point is interesting, both from a scientific aspect, and also because any deposits or crystals in solutions containing strychnine are a source of danger.

TABLE

SHOWING SUGGESTED STANDARDS, RANGES

OF SPECIFIC GRAVITY, ETC.,

FOR

GALENICAL PREPARATIONS.

Name of Preparation.	Range of Specific Gravity.	**STANDARD.** (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol.	Remarks
Acetum Cantharidis	1·066 to 1·072			
,, Ipecacuanhæ	0·991 to 0·993	3·62 HA. 0·1 total alkaloid	11 to 12·5	
,, Scillæ	1·035 to 1·040	8·0 4·0 acetic acid		
Collodium	0·775 to 0·782	2·0		
,, Flexile	0·790 to 0·797	6·5		
Decoctum Aloes Compositum	1·001 to 1·004	5·6	16 to 17	
,, Granati Corticis Conc.		30·0		
,, Hæmatoxyli Conc.		3·0		
Extractum Belladonnæ Liquidum	0·896 to 0·912	*0·75 total alkaloid	72·0 to 75·0	
,, ,, Viride		1·0 total alkaloid		
,, Cascaræ Sagradæ Liquidum ..	1·070 to 1·080	26·0	17·0 to 18·0	
,, Cimicifugæ Liquidum	0·890 to 0·900	12·5	74 to 78	
,, Cinchonæ Liquidum	1·115 to 1·150	*5·0 total alkaloid	10·5 to 12·0	
,, Cocæ Liquidum	1·004 to 1·014	0·5 total alkaloid	45·5 to 49·5	
,, Colocynthidis Compositum† ..		20 ether soluble		
,, Ergotæ Liquidum	1·020 to 1·027	15·0	31·5 to 32·5	
,, Filicis Liquidum	1·000 to 1·019			
,, Glycyrrhizæ Liquidum	1·140 to 1·150	42·0	16·0 to 18·0	
,, Hamamelids Liquidum	1·025 to 1·050	21·0	33 to 34	
,, Hydrastis Liquidum	1·025 to 1·040	20·0	37·5 to 38·5	
,, Hyoscyami Viridi		0·1 total alkaloid minm.		
,, Ipecacuanhæ Liquidum	0·885 to 0·910	*2·00 to 2·25 total alkaloid	75·0 to 79	
,, Jaborandi Liquidum	1·020 to 1·040	20·0	33 to 34	
,, Jalapæ		20 resin insoluble in ether		
,, Nucis Vomicæ Liquidum ..	0·950 to 0·970	*1·5 strychnine	57·5 to 61·5	
,, Opii Liquidum	0·985 to 0·990	*0·75 morphine	17·5 to 18·5	

Extractum Pareiræ Liquidum	1·050 to 1·065	22·5	20 to 22
,, Sarsæ Liquidum	1·080 to 1·090	20·0 (without Glycerine)	15 to 17
,, Strophanthi ‡		4·0 strophanthin	
,, Taraxaci Liquidum	1·070 to 1·090	25·0	16 to 20
Glycerinum Acidi Borici	1·345		
,, ,, Carbolici	1·230		
,, ,, Tannici	1·288 to 1·292		
,, Aluminis	1·288 to 1·292		
,, Boracis	1·280 to 1·295		
,, Pepsini	1·190 to 1·200	1 fluid dr. should dissolve 12,000 grains hard boiled white of egg.	
Infusum Aurantii Conc.		10·2	
,, ,, Compositum Conc. ..		7·2	
,, Buchu Conc...		6·0	
,, Calumbæ Conc.		3·5	
,, Caryopylli Conc.		5·0	
,, Cascarillæ Conc.		2·0	
,, Chiratæ Con.		4·5	
,, Cinchonæ Acidum Conc.		total alkaloid?	
,, Cuspariæ Conc.		8·0	
,, Digitalis Conc.		1·6	
,, Gentianæ Compositum Conc. ..		6·0	
,, Krameriæ Conc.		8·0	
,, Lupuli Conc.		7·0	
,, Quassiæ Conc.		0·25	
,, Rhei Conc.		10·0	
,, Scoparii Conc.		15·0	
,, Senegæ Conc.		10·0	
,, Sennæ Conc...		14·0	
,, Serpentariæ Conc.		4·5	
,, Uvæ Ursi Conc.		10·0	
Linimentum Aconiti	0·865 to 0·875	0·25 total ether soluble alkaloid	78·0 to 80·0
,, Belladonnæ	0·880 to 0·900	*0·375 total alkaloid	69·0 to 72·0

* Officially Standardized. † Scammony resin. ‡ *P.J.*, 1898 (2), p. 665.

Name of Preparation.	Range of Specific Gravity.	**STANDARD.** (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol.	Remarks.
Linimentum Camphoræ	0·924 to 0·927	21·5 camphor		
,, ,, Ammoniatum ..	0·866 to 0·872		57·0 to 58	
,, Saponis	0·895 to 0·900		62 to 64·0	
Liquor Calumbæ Conc.	0·990 to 0·996	4·25	19·0 to 21·0	
,, Chiratæ Conc.	1·000 to 1·010	5·5	18·0 to 19·0	
,, Cusparæ Conc.	1·005 to 1·015	10·0	18·0 to 19·0	
,, Hamamelidis	0·980 to 0 985		16·0 to 18·0	
,, Iodi Fortis	1·010 to 1·025	11·5 iodine	76·0 to 77·0	
,, Krameriæ Conc.	1·015 to 1·025	10·0	18·0 to 19·0	
,, Picis Carbonis	0·855 to 0·865	2·5		
,, Quassiæ Conc.	0·975 to 0·980	0·30	18·0 to 19·0	
,, Rhei Conc.	1·020 to 1·030	12·5	18·0 to 19 0	
,, Sarsæ Compositus Conc	1·030 to 1·040	15·0	18·0 to 20·0	
,, Senegæ Conc...	1·015 to 1·025	12·5	18·5 to 22·0	
,, Sennæ Conc.	1·040 to 1·060	17·5	18·0 to 19·0	
,, Serpentariæ Conc.	0·990 to 1·000	5·0	18·0 to 19·0	
Mistura Sennæ Co.	1·110 to 1·118	16·5	14·4 to 16·6	
Oxymel	1·320*	4·4 acetic acid		
,, Scillæ	1·320*	2·0 acetic acid		
Pulv. Glycyrrhizæ Comp.		9·0 sulphur		
,, Rhei Comp.		68 to 70 ash		
Succus Belladonnæ	0·980 to 0·990		18·0 to 22·0	
,, Conii	0·980 to 0·990		18·0 to 22·0	
,, Hyoscyami	0·980 to 0·990		18·0 to 22·0	
,, Scoparii	0·980 to 0·990		18·0 to 22·0	
,, Taraxaci	0·995 to 1·000			
Syrupus Aromaticus	1·148 to 1·156			
,, Aurantii	1·270 to 1·280			
,, Calcii Lactophosphatis	1·310 to 1·320			
,, Cascaræ Aromaticus	1·110 to 1·125			

Syrupus Chloral	1·315 to 1·320		
,, Codeinæ	1·320 to 1·328	[each fluid dr.	
,, Ferri Phosphatis	1·270	*Fe_3 $(PO_4)_2$—1 gr. in	
,, ,, Phos. c. Quin. et Strych. ..	1·275 to 1·285		
,, Glucosi	1·363 to 1·370		
,, Hemidesmi	1·325 to 1·330		
,, Limonis	1·290 to 1·300		
,, Pruni Virginianæ	1·300 to 1·320		
,, Rhei	1·310 to 1·320		
,, Rosæ	1·325 to 1·330		
,, Scillæ	1·330 to 1·335		
,, Sennæ	1·280 to 1·290		
,, Tolutanus	1·330 to 1·335		
,, Zingiberis	1·300 to 1·310		
Tinct. Aconiti	0.890 to 0.897	0·02 total ether soluble alkaloid	68·0 to 70·0
,, Aloes	0·970 to 0·985	8·5	38·0 to 41·0
,, Arnicæ	0·890 to 0·894	0·6	68·8 to 69·8
,, Asafetidæ	0·914 to 0·920	10·0	56·0 to 62·0
,, Aurantii	0·880 to 0·890	2·0	72·5 to 76·0
,, Belladonnæ	0·912 to 0·920	*0·05 total alkaloid	60·0 to 61·0
,, Benzoini Comp.	0·900 to 0·905	About 5·0 total balsamic acids, of which about 2·0 are free and 3·0 combined.	68·5 to 72·5
,, Buchu	0·930 to 0·935	4·0	56·0 to 57·0
,, Calumbæ	0·920 to 0·925	0·8	56·0 to 58·0
,, Camphoræ Comp.	0·915 to 0·920	*0·05 morphine	56·0 to 59·0
,, Cannabis Indicæ	0·844 to 0·850	4·0	83·0 to 86·0
,, Cantharidis	0·835 to 0·838	0·25	87·0 to 89·0
,, Capsici	0·890 to 0·897	1·50	67·5 to 69·5
,, Cardamomi Comp.	0·945 to 0·950	6·50	54·0 to 56·0
,, Cascarillæ	0·900 to 0·905	1·6 resin	62·5 to 67·5
,, Catechu	0·972 to 0·978	14·5	51·0 to 53·0
,, Chiratæ	0·920 to 0·924	0·8	56·0 to 58·0
,, Chloroformi et Morph. Comp. ..	1·010 to 1·020		52·0 to 54·0

* Officially Standardized

Name of Preparation.	Lange of Specific Gravity.	**STANDARD.** (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol).	Remarks.
Tinct. Cimicifugæ	0·922 to 0·928	2·0	57·0 to 59·0	
,, Cinchonæ	0·915 to 0·925	*1·0 total alkaloid	63·0 to 64·5	
,, Cinchonæ Comp.	0·915 to 0·921	5·00 *0·5 total alkaloid	62·0 to 68·0	
,, Cinnamomi	0·900 to 0·904	2·4	66·0 to 68·0	
,, Cocci	0·950 to 0·955	2·5	42·0 to 44·0	
,, Colchici Seminum	0·945 to 0·955	0·075 total alkaloid	42·0 to 44·0	
,, Conii	0·895 to 0·900	0·09 total alkaloid	66·0 to 68·5	
,, Croci	0·924 to 0·928	3·00	56·0 to 58·0	
,, Cubebæ	0·840 to 0·845	2·0 oleo-resin	83·0 to 85·0	
,, Digitalis	0·928 to 0·934	3·6	53·0 to 57·5	
,, Ergotæ Ammon.	0·932 to 0·939	4·0	48·0 to 52·0	
,, Ferri Perchlor	1·085 to 1·088		18·0 to 21·0	
,, Gelsemii	0·917 to 0·925	0·025 total alkaloid	57·0 to 59·0	
,, Gent. Comp.	0·964 to 0·968	5·0	42·5 to 43·5	
,, Guaiaci Ammon.	0·894 to 0·900	15·0	69·0 to 71·0	
,, Hamamelidis	0·950 to 0·954	2·0	42·0 to 44·0	
,, Hydrastis	0·920 to 0·926	2·5	56·0 to 58·0	
,, Hyoscyami	0·950 to 0·965	0·008 total alkaloid	40·5 to 42·5	
,, Iodi	0·878 to 0·882	*2·5 iodine	84·0 to 86·0	
,, Jaborandi	0·950 to 0·960	0·048 total alkaloid	42·0 to 44·0	
,, Jalapæ	0·905 to 0·910	*1·5 resin	65·0 to 67·0	
,, Kino	0·992 to 0·996	5·0 kino-tannic acid	43·0 to 44·5	
,, Krameriæ	0·934 to 0·938	5·0	56·0 to 58·0	
,, Lavand Comp.	0·836 to 0·840	0·6	86·5 to 88·5	
,, Limonis	0·880 to 0·888	2·0	67·5 to 71·5	
,, Lobeliæ Æther	0·810 to 0·816	0·07 lobeline	58·0 to 60·0	
,, Lupuli	0·930 to 0·940	4·0	54·0 to 57·0	
,, Myrrhæ	0·850 to 0·855	5·6	84·0 to 86·0	
,, Nucis Vomicæ	0·910 to 0·914	*0·25 strychnine	58·0 to 64·0	

Tinct. Opii	0·955 to 0·960	*0·75 morphine	40·0 to 44·0
,, Opii Ammon.	0·895 to 0·900	*0·113 morphine	60·0 to 63·0
,, Podophylli	0·850 to 0·855	3·65 resin	84·5 to 89·0
,, Pruni Virg.	0·930 to 0·938	3·0	52·0 to 57·0
,, Pyrethri	0·895 to 0·900	2·25 (0·22—0·36)	66·0 to 69·0
,, Quassiæ	0·944 to 0·948	0·05 quassin	42·0 to 44·0
,, Quillaiæ	0·918 to 0.924	1·25	56·0 to 58·0
,, Quininæ	0·885 to 0·895		72·5 to 76·0
,, ,, Ammon.	0·925 to 0·928		53·0 to 54·0
,, Rhei Comp.	0·970 to 0·975	4·50 (Exclusive of Glycerine)	51·0 to 53·0
,, Scillæ	0·955 to 0·962	10·0	52·0 to 54·0
,, Senegæ	0·935 to 0·938	6·5	55·0 to 57·0
,, Sennæ Comp.	0·985 to 0·994	10·00	38·5 to 40·5
,, Serpentariæ	0·896 to 0·900	2·00	66·0 to 68·0
,, Stramonii	0·950 to 0·964	0·04 total alkaloid	42·0 to 44·0
,, Strophanthi	0·892 to 0·895	0·2 strophanthin	67·0 to 69·0
,, Sumbul	0·895 to 0·900	2·5	66·0 to 69·0
,, Tolutana..	0·860 to 0·865	about 3 balsamic acids ⅓ of which are free	80·0 to 82·0
,, Valerianæ Ammon.	0·935 to 0·942	3·0	50·0 to 54·0
,, Zingiberis	0·835 to 0·840	0·4	88·5 to 89·5
Vin. Colchici	1·010 to 1·015	7.0	
,, Ferri		0.40 total Fe.	

* Officially Standardized.

"LOFOTOL."

ALTHOUGH the past year has been most unfavourable for the development of any preparation of the Cod Liver Oil, yet the results obtained are such as to lead us to believe that in "Lofotol" we have a most valuble means of administering what is to many a most nauseous drug.

The advantages of "Lofotol" are many. The palatability of the oil is vastly increased. "Lofotol" is easily digestible, and being protected by an atmosphere of carbonic acid gas, the tendency to rancidity is reduced to a minimum. In addition, the name "Lofotol" carries with it a guarantee that it is composed of the finest Norwegian Oil.

"Lofotol" is simply the finest "A1" Cod Liver Oil, impregnated with carbonic acid gas.

GUARANTEE OF B.P. QUALITY.

WE are sometimes asked how it is that we do not use some form of guarantee with the drugs and preparations which we supply, and we call attention to the fact that in all cases the labels which we use for our goods are themselves guarantees of quality. When we label a drug or preparation B.P., it is to be clearly understood that we take full responsibility for its quality, and that we are prepared to stand by the fact that it is as labelled.

AËRATED WATER FACTORY.

THE manufacture of aërated waters is a branch of industry that pre-eminently calls for analytical control. It is, of course, of the highest importance that the water, salts, etc., should be of the greatest possible purity. Not content with using DISTILLED WATER throughout, we frequently make rigid analyses to ensure its absolute purity. The question of metallic contamination is one, too, which calls for considerable care and watchfulness to avoid. This testing has necessitated the examination of several hundred samples during the past year.

THE QUALIFIED RETAIL CHEMIST AS AN ANALYST.

WE again wish to draw the special attention of our customers and others to the arrangments we have made whereby they may undertake analytical work required by the public. We are fully convinced that a lucrative business might be done in this class of work if proper facilities for obtaining analyses on reasonable terms were placed within reach of the public. The daily increasing demand for assurance as to the purity of foods and drinks should, in our opinion, be put to profitable use by qualified chemists, and where, as is often the case, it is impossible for them to undertake work of this themselves, it is obvious to us that the opportunity of having it done speedily, and of at the same time sharing in the proceeds, will be generally acceptable.

Detailed circulars will be sent free on application.

SURGICAL DRESSINGS DEPARTMENT.

THE analytical work in connection with this department consists in the supervision of the chemical processes used in the bleach works, and in the preparation of antiseptics, as well as in the testing of the latter after manufacture, in order to ascertain whether they contain the stated proportions of antiseptic agent. Being, as we believe, the only Manufacturing Chemists in the world who weave, bleach, and manufacture Surgical Dressings plain and antiseptic from the raw materials, we are particularly well placed for turning out these goods in a satisfactory manner, and the supervision which our Analytical Department is able to use in these works is of considerable value. In addition to the routine work alluded to above, researches are constantly being made with a view of improving and developing the processes used, and for further information we refer our customers to the separate price list which we publish of Surgical Dressings and similar goods.