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ANALYSIS

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OF

Insane Patients

IN ST. LUKE'S HOSPITAL, IN THE YEAR 1844.

BY

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ANALYSIS OF THE URINE,

&c. &c.

THE following analysis of the urine of insane patients was undertaken, partly because it was a field of investigation hitherto untrodden, and partly from a conviction that the examination into the physical symptoms which accompany madness cannot be too minute. Unfortunately, insanity is regarded in this country with so much awe, and the subject is in itself so unattractive, and so unpopular, that it has not received that attention from medical men (not immediately connected with it) which it deserves; hence have arisen many mistaken theories as to its pathology and treatment, and many popular prejudices, founded upon very limited experience. The theories of the mere metaphysician on the one hand, and of the mere anatomist on the other, are found too limited to solve the problem of the nature of insanity, and are indeed contradicted by daily practice; for, if madness, as some metaphysicians assert, be a disorder of the mind alone, then were it inexpedient to commit its treatment to medical men; and, again, if, in every case, or, even in the majority of cases, there be found an inflammatory condition of the blood-vessels of the brain, as some, whose experience of insanity is limited to post-mortem examinations, maintain, then were needless to enter into minute inquiries as to the causes and symptoms which precede and accompany the disease. But, if every day's experience proves the error of such views, and points out at the same time the manner in which diseases of the mind are to be studied in order to the better understanding of their pathology and treatment.

It is better for us to premise, that there are certain regulations for the admission of patients into St. Luke's. It was the object of those who founded the institution to make it an hospital, not an asylum. There are, nevertheless, a hundred patients, called "boarders," whose disease has assumed a chronic form, and who are admitted by rotation from the list of those who have been discharged as uncured from the hospital after treatment therein for twelve months. As the annual vacancies among the boarders, which occur by death, or by removal of the patient, at the request of friends, are few, the person's name remains upon the list generally between three and four years before he is admitted as a permanent inhabitant of the hospital: these cases have furnished us with the specimens of urine found in our tables, under the head Dementia, or fatuity. There are also rules, which have for many years been adopted by the Committee, which point out those cases which are inadmissible even in the first instance into the hospital, viz:—

I. The possession of sufficient means for decent support in a private asylum.

II. Having been insane for more than twelve calendar months.

III. Having been discharged uncured from any other hospital for the reception of lunatics.

IV. Being troubled with epileptic fits, paralysis, or in a state of idiotcy.

V. Females with child.

VI. Requiring (from disease or debility) the separate attendance of a nurse, or the assistance of a crutch.

VII. Being under the age of 12, or above 70 years.

VIII. Being brought not clean, not properly clothed, and not free from infectious disease.

The rejection of the greatest number of patients, upon the application of the friends for their admission, depends upon the violation of the 2d and 4th rules. The relations are not always the best judges of the exact period when the insanity first manifested itself, and it is often found, upon examination into the history of a case, that many things have been ascribed to caprice and temper which ought to have been attributed to disease: in many cases, also, it is extremely difficult to define the time when the disorder has first broken out, as its advances are sometimes gradual, and almost imperceptible; the affections have perhaps first become estranged, and the character by slow degrees altered, while the functions of the intellect remaining unimpaired, no delusion has been developed; when, however, the intellectual faculties begin to suffer, and the patient becomes troublesome, either from an access of paroxysms of violence, or from refusal of food, the friends begin to take the alarm, and, finding they can no longer manage him at home, they apply to the hospital.

Of course there are many wilful misstatements as to the time when the disease commenced, but these we shall willingly pass over without comment.

The same may be said of the violations against the fourth rule. Many patients are attempted to be passed off upon the hospital who are known to be paralytic, and to have had epilepsy; but, in all probability, the majority of cases of paralysis which are brought for admission are not known to be such either by the friends or by the medical man who sends them. The paralysis of the insane is a disease very different from common paralysis; there is no disintegration of the nervous fibre in these cases, but an exhaustion more or less complete of the nervous energy, producing a state of general debility, and trembling of the limbs: the motor nerves do not refuse to perform their office, but they do it badly: hence the tremor of the upper lip and hands, the stuttering speech, the faltering gait. It is to be wished that some other name than paralysis had been found to express this affection, because it leads to much error and confusion of ideas, and patients of this description are sometimes brought to the hospital from long distances, and at great expense, who are refused admission because it is found by experience that they are incurable. It cannot be too often repeated, that general paralysis, or paralytic insanity, is an affection perfectly distinct from hemiplegia and paraplegia. The disease can be at once recognised by the peculiarity of the speech; the motor nerve of the tongue is generally the first to suffer; the exquisite play of the muscles becomes embarrassed, and produces hesitation and thickness of speech; the pupils of the eye are sluggish, and there is usually asynchronous action present.

The patients admitted into the hospital in 1844 afforded fair samples of the disease in all its varieties; the excitement, restlessness, and sleeplessness in mania; the hopeless despondency, and suicidal tendency in melancholia, were developed in the ordinary manner in the several cases, and differed only from each other in degree, and in the peculiar delusions upon which each had chanced to fix.* It is, however, proper that we should mention that the applications for the admission of women were more numerous than in preceding years; every bed on the female side of the house was occupied, and a resolution was obliged to be passed by the Committee to the effect that the female patients should be admitted by rotation according as vacancies occurred.

In examining the characters of the urine in the different forms of insanity to which we have already alluded, we have selected that which was passed immediately after rising in the morning, as being least liable to be affected by food, and therefore best calculated for affording a fair specimen of any peculiarities it might possess.

Our observations have been made according to a certain tabular arrangement adopted by one of us in previous and similar inquiries; and, what with

* The same observation applies to the cases of monomania, acute dementia, and puerperal madness.

the aid of the requisite tests, and careful use of the microscope, we trust that no peculiarity of any importance has escaped our notice. The analyses have necessarily been chiefly qualitative; nor do we suppose, even had the cases been fewer, and our individual engagements permitted such laborious investigation, that quantitative analyses would have elicited so much additional information as to have made it worth our while. To a certain extent, however, the quantitative investigation has not been omitted, for, whenever excess or deficiency has been detected in any of the urinary constituents, it has been carefully noted.

We have classed our observations under the following heads: viz. colour; acidity and alkalinity; sediments, including the various forms of epithetical matters to be detected by the microscope. Specific gravity; presence of serum; excess of urea; lithic acid and lithate of ammonia; phosphates; oxalates; carbonates; muriates; and muco-pus globules. On each of these subjects we purpose to offer a few remarks.

The variety of colour, and general appearance of the urine in patients labouring under the different species of insanity, was perhaps one of the earliest facts which caught our attention. The high coloured urine occurring in mania and melancholia at the rates respectively of 52 and 56 per cent. was a striking feature, especially when contrasted with the urine of dementia cases, where this depth of colour scarcely occurred in half the number; viz. only 24 per cent. Of the different tints of urine in the three great classes of insanity, viz. mania, melancholia, and dementia, the orange and amber of various shades predominate in mania, being rather more than 35 per cent. of the whole number; whereas, in dementia, the greenish yellow, and straw-colours, attain a proportion of even 52 per cent.; and, if the opal urines, which closely approximate in their tints to the two just mentioned, be added, we shall then have a proportion of nearly 71 per cent. of these colours in dementia.

As regards the colour, and, indeed, in most other respects, a considerable resemblance in the characters of the urine appears to exist between cases of mania and melancholia. The puerperal cases, and those of acute dementia and monomania, were not sufficiently numerous to warrant any distinct conclusion. The former and latter of these species were nearly equally divided; the high coloured urine occurring in the puerperal cases, and in monomania, in proportion of 55 and 60 per cent., whereas in each of the three cases of acute dementia which were noted, it was of this colour. It will also be seen that in other respects the urine in these cases bore a considerable analogy to that in mania and melancholia; the chief difference being that the peculiarities noticed in these two forms of insanity were remarkably exaggerated in acute dementia.

TABLE I.

	Light Colour.				Dark Colour.				
	Colourless.	Greenish Yellow.	Straw.	Opal.	Amber.	Orange.	Red.	Brown.	Total.
Mania . . .	2	11	10	9	12	12	9	2	67
Melancholia .	1	6	8	7	12	11	6	0	51
Dementia . .	4	32	28	22	9	14	5	0	114
Puerperal . .		2	2		2	3			9
Acute Dementia					1	1	1		3
Monomania .				2	2	1			5

Mania . . .	32 light	1 in 2·09	47·76 per cent.	35 dark	1 in 1·93	52·24 per cent.
Melancholia .	22 light	1 in 2.31	43·13 per cent.	29 dark	1 in 1·76	56·86 per cent.
Dementia . .	86 light	1 in 1·32	75·61 per cent.	28 dark	1 in 4·07	24·73 per cent.
Puerperal cases	4 light	1 in 2·25	44·44 per cent.	5 dark	1 in 1·80	55·55 per cent.
Acute Dementia				3 dark	1 in 1	100 per cent.
Monomania .	2 light	1 in 2·5	40·00 per cent.	3 dark	1 in 1·66	60 per cent.

In examining the acid and alkaline states of the urine, it was found to be acid in about 80 per cent. of the mania and melancholia cases; and nearly approaching to the same proportion (viz. 77 per cent.) in the puerperal cases, and nearly in the same relation which these three forms of insanity bore to each other in point of colour; whereas in dementia it was acid in only 63 per cent. In the urine of this last mentioned form, a few hours were frequently sufficient, not merely to render it opalescent, but neutral, or even alkaline. In many of these latter cases it would distinctly redden litmus paper from the presence of carbonic acid,—on the removal of which by boiling, the urine became alkaline and turbid, from the precipitation of earthy phosphates, chiefly phosphate of lime, which were no longer held in solution by the carbonic acid. Indeed, it might be questioned how far the six cases of dementia in which the urine was marked "neutral," might not have been placed more correctly under the head of "alkaline," the urea being even in process of decomposition and conversion into carbonate of ammonia when passed from the bladder.

Of the three smaller sets of cases, acute dementia maintains the same position, as regards mania and melancholia, in point of the acidity of the urine, as it did with respect to the depth of colour; whereas the chronic characters of the monomania cases, making them approximate to those of dementia, may account for the urine being alkaline in a large proportion, viz. 60 per cent.

Table II.

	Acid.	Neutral.	Alkaline.
Mania . . .	80·35		19·64
Puerperal . .	77·77		22·20
Melancholia .	80·00		20·00
Dementia . .	63·54	6·25	30·20
Acute Dementia	100·00		
Monomania .	44·00		60·00

On reviewing the notes which we have made on the subject of sediments, it must be borne in mind that under the head of "white and brown," sediments of very opposite characters have been classed; this was unavoidable, nor is it of very great importance, for the table of lithates will give the proportion of these salts; and it will also be seen that the sediments of the urine in mania and melancholia are chiefly of this acid character. The preponderance of sediments in these two forms of insanity over those in dementia is remarkable, being respectively in the proportion of 87·50 and 100 per cent., while in dementia it was only 54·16 per cent., or little more than half. In melancholia the proportions are considerably the highest, particularly as regards the red sediments, thus maintaining the same station which it has been already seen to occupy as regards the depth of colour.

Table III.—Sediments.

	Natural Mucous.		White and Brown.		Red.	
	Number observed.	Proportion per cent.	Number observed.	Proportion per cent.	Number observed.	Proportion per cent.
56 cases of Mania: total 49, or 87·50 per cent.	24	42·85	20	35·71	5	8·92
9 Puerperal cases: total 9, or 100 per cent. . .	7	77·77	2	22·22		
40 cases of Melancholia: total 40, or 100 per cent. . .	18	45·00	16	40·00	6	15·00
96 cases of Dementia: total 52, or 54·16 per cent. . .	30	31·25	21	21·87	1	1·04
5 cases of Monomania: total 2, or 40 per cent. . . .			2	40·00		

The observations on epithelial matter in the urine of these patients affords a good deal of interesting matter; melancholia again shows the preponderance to a certain extent; excess of epithelial matter having been met with at the rate of 57·50 per cent., whereas in mania it was 55·35, and in dementia, only 46·87 per cent.

One of the most remarkable features in the whole course of our investigations was observed in the examination of the epithelial matter. Although excess of epithelial matter was frequently met with, it was soon remarked that it did not present the ordinary characteristics of this appearance; indeed, the well-marked nucleated and tessellated epithelial matter was of rare occurrence in comparison with a peculiarly ragged and broken condition in which it more frequently appeared. Thus, in mania, this form of epithelial matter occurred in the proportion of 19·64, and in melancholia of 20·00 per cent, whereas in dementia it was as high as 26·04 per cent. By reference to the table it will also be seen that although this ragged broken epithelial matter occurred nearly twice as often in dementia as the more common nucleated form, it occurred in mania nearly three times as frequently.

That this peculiar state of the epithelial matter is not dependent on an alkaline condition of the urine, is shown by the proportions in which it occurred; for although the preponderance was in dementia considerable, still it was extensively observed in the two other forms of insanity where acidity of the urine predominates. Whatever may be its source, we cannot but look upon it as one of the most peculiar features in the urine of lunatics.

TABLE IV.—Epithelial Matter.

	Nucleated and Tessellated.		Ragged and Broken.		Lace.	Unmarked.
	Number observed.	Proportion per cent.	Number observed.	Proportion per cent		
56 cases of Mania: total 31, or 55·35 per cent. . . .	4	7·14	11	19·64	3 cases, or 5·55 per cent.	13 cases, or 23·21 per cent.
40 cases of Melancholia: total 23, or 57·50 per cent. . .	5	12·50	8	20·00	1 case, or 2·50 per cent.	9 cases, or 22·50 per cent.
96 cases of Dementia: total 45, or 46·87 per cent. . .	12	13·54	25	26·04		8 cases, or 8·33 per cent.
9 Puerperal cases: total 7, or 47·77 per cent.	1	11·11	1	11·11		5 cases, or 55·55 per cent.
5 cases of Monomania: total 1, or 20 per cent. . . .						1 case, or 100 per cent.
3 cases of Acute Dementia: total 1, or 33·33 per cent.						1 case, or 100 per cent.

As regards the specific gravity of the urine in lunatics, it will be seen that melancholia occupies the same prominent position here as it has done in the previous subjects of examination. Thus the cases of this disease, where the specific gravity was above 10·30, were as many as 23·68 per cent.; whereas in mania they were only 8·92 per cent, or nearly a third. Mania appeared to occupy a medium position between melancholia and dementia, with respect to the specific gravity of the urine; thus the cases in which it ranged from

10·20 to 10·30 were at the rate of 57·14 per cent.; whereas those of melancholia were only 52·62 per cent. This difference increases as the specific gravity diminishes: thus in mania the cases in which it ranged from 10·10 to 10·20 were at the rate of 28·57, whereas in melancholia they were only 23·68 per cent. Of those where it was below 10·10 it occurred at the rate of 5·35 per cent. in mania, and not at all in melancholia.

TABLE V.—Specific Gravity.

	Total observed.	10·00 to 10·10		10·11 to 10·20		10·21 to 10·30		10·31 to 10·40	
		Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Mania . .	56	3	5·35	16	28·57	32	57·14	5	8·92
Melancholia	38			9	23·68	20	52·62	9	23·68
Dementia .	96	12	12·50	46	47·93	38	39·58		

On the other hand, the prevalence of a light specific gravity was very marked in cases of dementia: the greatest proportion was between 10·10 and 10·20, viz. 47·93 per cent.; the next was between 10·20 and 10·30, viz. 39·58 per cent., following an order the reverse of the two other affections. Not a single case of dementia occurred where the specific gravity of the urine was *above* 10·30; whereas of those where it was below 10·10 the proportion was as high as 12·50, more than double those of the same specific gravity in mania.

Serum in the urine has been of unusually rare occurrence in these cases. Out of the 192 individuals labouring under the different forms of insanity, in whom the urine was examined, it was found to be serous (or perhaps more strictly speaking, albuminous) in only seven cases,—a fact which we certainly could not have anticipated, even if we could have been previously aware in how few cases we should find the urine perfectly normal and healthy; least of all did we expect to find that the proportion was considerably the smallest in dementia, in which the greatest deviations from healthy urine were observed.

Melancholia again stands first in our list, the urine having shown the existence of albumen in three cases, or at the rate of 7·50 per cent. A similar number of cases occurred in mania, making the proportion therefore 5·35 per cent.; whereas in dement'a the presence of it was distinctly made out in only one case (1·04 per cent.); in two others, if present, it was to so small an extent as to make it very doubtful.

In two out of three cases of albuminous urine which were observed among the maniacal patients the colour was orange. We subjoin the analyses entered into our note-book as affording a better view of their characters.

	Urine passed in the morning	Thick red	Acid	Dirty-brown sediment	10·23	Serous	Phosphates by ammonia copious	Copious bubbles of air on boiling	Strong smell of Sulphuretted Hydrogen	Phosphates Natural	Numerous small Oxalates
R. W.	Morning	Orange	Acid	No sediment	10·13	Slightly serous	Phosphates copious, but light; Lime sparing				Muco-pus Globules.
C. L. W.	Morning	Reddish orange, slightly opal	Strongly acid	Thick white sediment; Epithelial matter	10·32	Serous	Considerable excess of Urea.	Singular nucleated lithic crystals			
M. A. B.											

In the first of these cases, where the odour of sulphuretted hydrogen was remarkably strong, nitro-muriatic acid was given, by Dr. Prout's suggestion, with apparent benefit.

The difference of the specific gravity in the three cases of serous urine above quoted is curious enough. The only feature in common seems to be the colour of the urine, approaching to a red, and thus indicating the probability that the presence of serum was owing to a slight admixture of blood.

TABLE VI.—Serous.

	Number of cases.	Proportion per cent.
Mania . . 56	3	5·35
Melancholia 40	3	7·50
Dementia . 96 doubtful in 2 cases.	1	1·04

In investigating the subject of *Urea*, and ascertaining the proportion in which it occurred in excess in the different forms of insanity, by far the largest is in acute dementia; viz. in three out of four cases, or 75·00 per cent. But, the very small number of cases which occurred of this disease, scarcely permits it to be of sufficient extent for evidence in a statistical point of view; and, from the circumstance of the specific gravity being in every case above 10·25, the excess of urea can only be looked upon as merely resulting from the condensed state of the urine, or, in other words, from an unusually small proportion of aqueous matter. With this exception, melancholia again maintains the same prominent position which it has hitherto taken; excess of urea having occurred in this form of insanity at the rate of of 47·50 per cent., of which it is worthy of notice that in 36·84 per cent., the specific gravity was not above 10·25

Mania follows in the scale, showing excess of urea in 33·92 per cent., of which in only 21·05 per cent. of these cases, the specific gravity was above 10·25. In the nine cases of puerperal mania, the proportion was very similar; viz., 33·33; but, as in acute dementia, the specific gravity was above 10·25 in every instance.

Puerperal mania which has been of sufficient duration to allow of the patient being brought to St. Luke's Hospital, is usually connected with, or, at least, accompanied by, considerable gastro-enteric derangement. The evacuations are very unhealthy; and, when roused by active mercurial purges, the bowels throw off immense quantities of fæculent excretion, which are not so much the results of mal-digested food, as actually a discharge of impurities from the circulation by the secreting surface of the intestine: in these cases, the urine is always greatly loaded; and specific gravity very high, and excess of urea a pretty frequent result. We regret that in the numerous cases of anemic puerperal mania which have occurred to one of us, no examination of the urine has been made.

Dementia presents the fewest cases of urea; viz., only 16·66 per cent.; a proportion which might almost have been expected from the characters which the urine has been shown to possess in this form of mental derangement. It may be observed that in 43·75 per cent. of these cases, the specific gravity of the urine was not above 10·25.

TABLE VII.—Urea.

	Excess.	Relations to Sp. Gr.
Mania . . 56	19 cases, or 33·92 per cent.	21·05 per cent. above 10·25
Melancholia 40	19 cases, or 47·50 per cent.	36·84 per cent. not higher than 10·25
Dementia . 96	16 cases, or 16·66 per cent.	43·75 per cent. not higher than 10·25
Puerperal Mania . 9	3 cases, or 33·33 per cent.	None below 10·25
Acute Dementia . 4	3 cases, or 75·00 per cent.	None below 10·25.

On examining the results of our investigations as regards the frequency of lithic acid and lithate of ammonia in the urine of insane patients, it will be seen that nearly the same order of priority is observed.

In melancholia, lithic acid and lithate of ammonia respectively occur in the proportion of 47·50, and 32·50 pe

cent., whereas in mania they only appear at the rate of 39·46 and 19·64 per cent. In dementia, the occurrence of lithic acid and lithate of ammonia must be considered as an unusual circumstance, inasmuch as they were only met with at the rate of 13·54 and 1·04 per cent. The extreme rarity of lithate of ammonia, viz., only one in ninety-six cases, is worthy of notice. In the puerperal cases, the proportions were higher, being 22·22, and 11·11 per cent.

In the three cases of acute dementia, each of these deposits occurred once; whereas they were not observed in any of the five cases of monomania.

TABLE VIII. TABLE X.

	Lithic Acid.		Lithate of Ammonia.		Oxalate of Lime.	
	Relative proportion.	Per Cent.	Relative proportion.	Per Cent.	Relative proportion.	Per Cent.
Mania . . . 56	22 Cases		11 Cases		10 Cases	
	1 in 2·54	39·46	1 in 5·09	19·64	1 in 5·60	17·85
Melancholia . 40	19 Cases		13 Cases		10 Cases	
	1 in 2·10	47·50	1 in 3·07	32·50	1 in 4·00	25·00
Dementia . . 96	19 Cases		1 Case		2 Cases	
	1 in 7·28	13·54	1 in 96	1·04	1 in 48·00	2·08
Puerperal cases 2	2 Cases		1 Case		——	——
	1 in 4·50	22·22	1 in 9	11·11		
Acute Dementia 3	1 Case		1 Case		1 Case	
	1 in 3	33·33	1 in 3	33.33	1 in 3	33·33
Monomania . 5	——	——	——	——	1 Case	
					1 in 5	20·00

In our table of the phosphates, we have first of all noticed the quantity and character of the sediment produced by precipitating them with ammonia, — dividing these under the four heads of "natural," "abundant," "sparing," and "flocculent:" by this last we allude to the peculiarly light semi-transparent precipitate which takes place in some cases; it is a feature so well marked, that we have thought right to specify it, although unable to explain the causes on which it depends. Under the head of triple phosphates, are brought all those cases in which crystals of this salt could be detected by the microscope:—to this last head would we especially direct attention. The largest proportion of cases in which they occurred was in dementia, being 1 in 4, or 25 per cent. In mania, the proportion was also large, viz., 23·21 per cent., whereas in melancholia it was only 15.

The same preponderance was observed in mania with regard to the precipitate of the mixed phosphates by ammonia. In 33·92 per cent., it came under the head of "abundant," whereas in melancholia this was not higher than 23·21, and in dementia only 17·7 per cent.; the peculiar flocculent appearance of this precipitate occurred most frequently in mania; viz., in 7·14 per cent., whereas in melancholia and dementia it was respectively at the rate of 5, and 4·16 per cent.

The relations of phosphate of lime to these three principal species of insanity are different to those of the mixed or of the triple phosphates. It occurred abundantly in melancholia, at the rate of 52·5 per cent.; in mania, in 41·07, and in dementia, in only 15·62 per cent. It was entirely absent in 11·45 per cent. of the cases of dementia, in 5 per cent. of melancholia, and in only 1·77 per cent. of mania.

To offer any observations on the peculiar nervous irritability which attends phosphatic deposits, or to investigate how far this condition may be connected with certain forms of insanity, is a subject which, from its extent, and interesting character, would lead us far beyond the limits of this memoir; there can be no doubt but that it is one which is deserving of close attention, and well calculated to repay the inquirer for his trouble.

It is only fair to state the manner in which we have determined the phosphate of lime; it has been done by dissolving the precipitate of mixed phosphates in strong acetic acid, and throwing down the lime by oxalate of am-

monia. We are aware that this process has been deemed uncertain by a high authority, and that nothing short of actual incineration will show the real proportion of the phosphates; but the tediousness of this process rendered it impossible, among such a number of cases, and we have therefore been compelled to run the risk of, we hope, only a slight degree of inaccuracy upon this head.

TABLE IX.—Phosphates.

Phosphate of Lime.

		Natural.	Abundant.	Sparing.	Flocculent.	Triple Crystals.	Natural.	Abundant.	Sparing.	None.
Mania . . 56	Number of Cases .	13	19	7	4	13	20	23	12	1
	Relative Proportion	1 in 4·30	1 in 2·94	1 in 8	1 in 14	1 in 4·30	1 in 2·80	1 in 2·43	1 in 4·66	1 in 56
	Per Cent. . . .	23·21	33·92	12·50	7·14	23·21	35·71	41·07	21·42	1·77
Melancholia 40	Number of Cases .	6	22	4	2	6	10	21	7	2
	Rel. Proportion .	1 in 6·66	1 in 1·81	1 in 10	1 in 20	1 in 6·66	1 in 4	1 in 1·90	1 in 5·71	1 in 20
	Per Cent. . . .	15	23·21	10	5	15	25	52·5	17·5	5
Dementia . 96	Number of Cases .	21	17	30	4	24	27	15	43	11
	Rel. Proportion .	1 in 4·57	1 in 5·64	1 in 3·20	1 in 24	1 in 4	1 in 3·55	1 in 6·4	1 in 2·29	1 in 8·72
	Per Cent. . . .	21·8	17·70	31·25	4·16	25	28·18	15·62	44·79	11·45
Puerperal Cases . . 9	Number of Cases .	1	3	4		1	2	4	3	
	Rel. Proportion .	1 in 9	1 in 3	1 in 2·25		1 in 9	1 in 4·5	1 in 2·25	1 in 3	
	Per Cent. . . .	11·11	33·33	44·44		11·11	22·22	44·44	33·33	
Acute Dementia . 3	Number of Cases .		3					2	1	
	Rel. Proportion .							1 in 1·5	1 in 3	
	Per Cent. . . .							66·66	33·33	
Monomania . 5	Number of Cases .	1	1			3		3	2	
	Rel. Proportion .	1 in 5	1 in 5			1 in 1·66		1 in 1·66	1 in 2·5	
	Per Cent. . . .	20	20			60		60	40	

Oxalate of lime was observed most frequently in melancholia; viz., as often as 1 in 4 cases, or at the rate of 25 per cent. In mania it was 17·85, and in dementia only 2·08 per cent.

Under the head of *carbonates*, are

promiscuously brought all cases where effervescence was produced by the addition of an acid. This was seen most frequently in dementia—viz., in 34·37 per cent. In melancholia, the proportion was 30, and in mania 16·07 per cent.

Hydrochlorate of ammonia formed also a distinct subject of investigation, as we considered that wherever this salt existed in the urine, it indicated the formation of hydrochloric acid by the kidney, which can only take place as a result of inflammatory action in this organ.

Our numbers under this head are probably not quite correct, as we did not test the presence of this salt in every case, but in those alone where we had reason to suspect its presence. The proportion seems to have been nearly equal in all the three chief forms of insanity; viz., in dementia, 14·58; in mania, 14·28; in melancholia, 12·50 per cent.

Lastly, the presence of muco-pus globules was observed most frequently in mania; viz., at the rate of 17·85 per cent. In melancholia it was 10, and in dementia only 7·27 per cent.

TABLE XI. TABLE XII. TABLE XIII.

	Carbonates.		Muriate of Ammonia.		Muco-pus Globules.	
	Relative proportion.	Per Cent.	Relative proportion.	Per Cent.	Relative proportion.	Per Cent.
Mania . . . 56	9 Cases		8 Cases		10 Cases	
	1 in 6·22	16·07	1 in 7	14·28	1 in 5·60	17·85
Melancholia . 40	12 Cases		5 Cases		4 Cases	
	1 in 3·33	30·00	1 in 8	12·50	1 in 10	10·00
Dementia . . 96	33 Cases		14 Cases		7 Cases	
	1 in 2·90	34·37	1 in 6·85	14·58	1 in 13·18	7·27
Puerperal cases 9	——	——	1 Case		3 Cases	
			1 in 9	11·11	1 in 3	33·33
Acute Dementia 3	——	——	1 Case		——	——
			1 in 3	33·33		
Monomania . . 5	3 Cases		——	——	——	——
	1 in 1·66	60·00				

In concluding these remarks, we may offer the following brief summary of our investigations, viz.

That in mania and melancholia the prevailing colour of the urine is high; in dementia it is light.

It is acid in at least 80 per cent. of the mania and melancholia cases; in dementia, the proportion is much smaller—viz., 63·54 per cent.

Sediments of one sort or another occur in almost every case of mania and melancholia, especially the latter; in dementia, in only every other case.

The specific gravity in the two former species ranges most usually between 10·21 and 10·30; that of melancholia frequently exceeds even 10·30, whereas that of dementia is usually found between 10·11 and 10·20.

Serous urine was a rare occurrence; viz., 7·50 in melancholia; in mania, 5·35, and in dementia, only 1·04 per cent.

Excess of urea was seen most frequently in melancholia, least so in dementia.

Lithic acid and lithate of ammonia were likewise observed most frequently in melancholia, and least so in dementia.

Lithic acid being, in all three forms of insanity, of much more usual occurrence than lithate of ammonia.

Crystals of triple phosphate were met with in dementia at the rate of 25 per cent.; in mania 23·21; and in melancholia, 6·66 per cent. Crystals of oxalate of lime were seen in every fourth case of melancholia, or, at the rate of 25 per cent. In mania, the proportion was 17·85, and in dementia, only 2·08 per cent.

Carbonates were seen most frequently in dementia and melancholia.

Muriates occurred at about the average of 13 per cent. in all three forms of insanity.

Muco-pus globules were most frequent in mania; viz., 17·85 per cent.; whereas in melancholia they were at the rate of 10, and in dementia of 7·72 per cent.

TABLE XIV.—Summary.

	Colour of Urine.	Acid Urine.	Sediments.	Specific Gravity.	Serous.	Urea, Excess of.	Lithic Acid.	Lithate of Ammonia.	Triple Phosphate Crystals.	Oxalate of Lime.	Carbonates.	Muriate of Ammonia.	Muco-Pus.
Mania . .	High	80·35 per cent.	87·50 per cent.	Between 10·21 and 10·30	5·35 per cent.	33·92 per cent.	39·46 per cent.	19·64 per cent.	23·21 per cent.	17·85 per cent.	16·07 per cent.	14·28 per cent.	17·85 per cent.
Melancholia .	High	80·00 per cent.	100 per cent.	Between 10·21 and 10·30	7·50 per cent.	47·50 per cent.	47·50 per cent.	32·50 per cent.	6·66 per cent.	25· per cent.	30· per cent.	12·50 per cent.	10· per cent.
Dementia .	Light.	63·54 per cent.	54·16 per cent.	Between 10·11 and 10·20	1·04 per cent.	16·66 per cent.	13·54 per cent.	1·04 per cent.	25· per cent.	2·08 per cent.	34·37 per cent.	14·58 per cent.	7·27 per cent.

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