"

Urosemiotik.

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The Pathological Chemistry of the Urine.

The complete Quantitative Analysis of the Urine, a valuable aid to Clinical Diagnosis.

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The importance of the careful examination of the urine with the view of aiding clinical diagnoses has for a long time been before the mind of the medical profession, but it is only within the last few years that the exceeding value of this source of information has become more apparent to the practitioner.

Heller, to whom we are so very greatly indebted for his painstaking work in biological chemistry, says that "every, even the least abnormality in the blood, which may have its origin either in the process of nutrition or in the influence of the nervous system, makes itself known by a chemical change in the urine, and this excretion, which is almost always accessible, is besides best suited to an easy and rapid examination," and he recommends the practical physician to "direct his attention to it, not only in disease of the organs which are most nearly connected with its elimination, but in all the more important morbid conditions of the system." This is certainly true,

and we can go still further in our statements, and say that even in affections of the liver, spleen and digestive system, as well as in those of the circulatory and aerative apparatus, errors in the proper and proportionate change of material are clearly shown in the urine.

From the earliest times in the history of medicine we find attempts made to gain some information, though it was of the slightest, of the diseases of the sick by an observance of the urine. Hippocrates, the great founder of medicine, used to take note of the diverse properties of urine caused by different pathological processes. He even attempted to diagnose and prognose from the results he obtained from his examination of the urine. One special point which he investigated was the influence of nutrition in solid or liquid form on the excreted urine.

Galen, the disciple of Hippocrates, followed in the footsteps of his teacher, but made little progress in the department of urinary examination.

After a long break we find the Arabian Iben Sina, generally called Avicenna, taking note of the influence of fasting, night watching, bodily and mental exertion upon the urine, and also the discolouration of that fluid caused by the various medicinal remedies employed. We are told, however, that it was not until the 13th Century that any minute examination of the urine was made, or any methods for doing so recorded. At that time Johannes called Actuarius, a resident of the Byzantine Court, wrote his great work "Peri uron," giving an account of his researches into the physiological changes in the urine, and pointing out the manner in which the observations should be made. The subject, however, was not followed up. The profession contented itself with merely holding up a vessel containing urine and glancing at it, endeavouring to make the public believe that by this means the practitioner was able to make a diagnosis. This fact was taken notice of, and ridiculed by the

Netherland painters and by the writers of Molière's time. Molière himself puts into Toinette's mouth the reply to Argan the "Malade imaginère," "Cést à M. Fleurant a y mettre le nez, puisqu'il en a le profit."

Naturally all examination of the urine was confined exclusively to the physical properties and naked eye appearances. It needed the development of chemical science to advance, before reliable information from the urine could be obtained.

The first attempt in the more scientific examination was made by Bellini of Florence, who evaporated urine to dryness, and found that by adding water gradually, the conditions of normal urine, as regards colour and taste, were reobtained. He therefore came to the conclusion that these two properties were mainly dependent on the proportion of Dry Residue to water.

From the time of Bellini the progress in urinary examination was rapid. The discovery of urine sugar (glucose) by

Willis, & of Phosphorous by Brant and explained by Graff as having its origin in the phosphates of the urine, were important steps. Then came the discovery of Urea by Rouelle in 1773, which he termed "matière extractive". It was not till 1799 that the substance was named Urea (urée) by Fourcroy and Vauquelin.

Rouelle also noticed that in the urine of herbivora there occurred Carbonate of Lime, and a substance related to Benzoic Acid, viz Hippuric acid. A still further advance was the finding of albumen in the urine by Cotugno in 1770, which Cruck=shanks 28 years afterwards pointed out to be closely connected with dropsy.

Then in the present Century, Bright in 1807 proved the connection between diseases of the Kidney and albumenuria.

Important information from the chemical analysis of gravel and vesical calculi was obtained about this time, the work of Prout being specially worthy of note.

Following him were Rayer, who published

his "Les Maladies des Reins," and Becquerel, who wrote "Semiotique des urines." Then we must notice Simon, Golding Bird, Bence Jones, who demonstrated the presence of sugar in normal urine, a fact which was later confirmed by Pavy; Mohr, who showed how to test quantitatively for Chlorides by means of a solution of Nitrate of Silver with Monochromate of Potash as indicator, and Gmelin, who brought before the profession the test for bile pigments with Nitric acid. We must also refer to Funke, Keller of Vienna, Voigt and Pettenkoffer of Munich, with whose name a fallacious test for bile acids with grape sugar and Sulphuric acid is associated. Both of these men studied the quantitative changes of the nutriment in relation to the products of excretion in animal life. Then we have Wöhler, who in 1828 found out the method of preparing Urea artificially. This was a most important advance on previous researches. It was

the first instance of an organic substance being produced Synthetically, and overthrew the hitherto insurmountable barrier between organic and inorganic Chemistry. Formerly the idea had been held that a Vital power was necessary to the formation of organic products. Wöhler's contemporary, Liebig, soon afterwards showed how the amount of urea in the urine could be tested by means of a solution of nitrate of Mercury.

Following him we have Liebig, who explained the excretion of urine as the result of purely physical causes, partly a transudation and partly a diffusion or osmosis. He said that as the blood pressure in the capillaries of the Malpigian bodies is relatively greater than in the surrounding capsule, on account of the resistance to the exit of the blood through the efferent vessel, a transudation of the watery constituents of the blood with some dissolved salts takes place into the Malpigian capsule. Hence the blood is greatly thickened when

it reaches the second capillary system, sur-
- rounding the convoluted tubules, which
contain the thin aqueous transudation
from the Malpigian bodies. Having
now a basement membrane with a
dense fluid on one side and a thin saline
solution on the other, an interchange
takes place, a true osmosis, the products
of regressive metamorphosis eg. urea
passing into the tubules of the kidney,
concentrating the fluid already there
and forming urine. The albuminous
constituents of the blood remain in the
capillaries unable to pass through the membrane.
Heidenhain, however, has more recently
pointed out that the epithelium of the
kidney has the chief part to play in the
elaboration of the urine. Indigo-carmine
having been injected into the blood, it
was found that the Malpigian capsules
contained unstained fluid, whereas the
cells lining the convoluted tubules and
the looped tubes of Henle were filled
with it. These researches of Heidenhain

published in 1874 conclusively show that the epithelium of the kidney is the true elaborator of the urine.

Mention must also be made of Lehman, of Paris, who has investigated so minutely the subject of sugar in physiological and pathological urine and brought forward qualitative and quantitative tests for sugar, of Thudichum, who called attention to some of the pigments, of Roberts, who tried to explain how acid urine can result from alkaline blood and with whose name the quantitative results from the fermentation test for sugar are connected, and lastly of Dr. Mahomed? who has shown how to ~~test~~ test for blood with Tincture of Guaiac and ozonic ether.

Thus, I have shortly gone over a few of the names that are most prominently connected with biological chemistry. Among them one name has been mentioned. It is that of perhaps the greatest practical worker in this department. I refer to Heller of Vienna, born in 1813, and who

died in 1866. He it was, who simplified processes and agents employed in Chemical investigations. It is impossible to enumerate all his additions to medical and chemical science, but associated with his name we find the nitric acid test for albumen and urates, his urometer, a small areometer with a voluntary scale, the test for sugar in the urine with Caustic Potash, called also Moore's test, (Malagutti first discovered this test for grape sugar, but Heller and Moore applied it to sugar in the urine) the finding of Sarcinae in the urine of patients suffering from Spinal affections. This was before Virchow demonstrated the presence of Sarcinae in the Gastric juice. Heller it was, who first called attention to Urophaein and Uroxanthin the two colouring substances free from Nitrogen, and showed that they occurred only in the urine. The former of these, he said, was not an acid, but an animal pigment with an acid reaction. He also stated that uric acid,

which exists in solution in the urine has no influence on its physical properties, and does not even affect the reaction. He noticed, too, that uric acid was absent in chronic affections of the spinal marrow, in renal disease of long standing, in abscess and atrophy of the kidney, and periodically in gout. He warned the tester for albumen making use of the boiling test, not to add nitric acid should a precipitate occur, but merely a drop of acetic acid, as the latter was sufficiently strong to cause the disappearance of the cloud if due to earthy phosphates, while a small quantity of the former would dissolve a slight precipitate of albumen. He opposed Liebig in stating that the presence of ammonia is abnormal in fresh urine. He also shewed how the presence of pus could be demonstrated.

But a step further has been made since Heller's time. Although Heller was able by the qualitative analysis of the urine approximatively to judge the proportions

of the various ingredients, and thereby to bring into comparison the changes in the urine and the pathological state, it is mainly due to Professor Kletzinsky, who perfected the quantitative volumetric tests, that we now have a complete Urosemiotik -

Kletzinsky was born in 1826 and died in 1882. For several years he assisted Heller, but for thirty years after that he was pathological chemist in Vienna, and occupied the post of Professor of Chemistry at the Vienna Oberreal Schule, and was Forensic Chemist for Lower Austria and Pathological Chemist at the Wieden Krankenhaus. He had the advantage of being both a most experienced Chemist and a Doctor. In his quantitative analyses he took into account the amount of Chlorides, Sulphates, Alkaline and Alkaline Earth Phosphates, Urea, Extractive Material &c. and from these he was able to develope

a semiotic diagnosis, which greatly assisted clinical work. With a view of arriving at a definite and accurate conclusion from the urinary examination, he insisted on the necessity of a twenty four hours' collection being made. His experiments on the action of Iodide of Potassium are well known. They were published by him in his work on Biochemistry. He proved that Iodide of Potassium is not absorbed by the skin, but merely by mucous membrane. He also pointed out that when taking Iodide of Potassium, the Iodine is at first excreted as Iodide of Sodium. Before treating with Iodide of Potassium he tested the amount of Potash in the ash of the urine in 24 hours, and found that only after several weeks was the Potash there increased, shewing that an exchange of metals had taken place, leaving the Potash in the blood and tissues until the body had become satiated with it. Thus he demonstrated that Iodide of Potassium

acts as a Potassium medicinal agent, and that part of its therapeutical effects are to be attributed to the Potassium and not merely to the Iodine.

Kletzinsky's assistant, Mr. A. E. Haswell, who is Pathological Chemist to the St. Joseph's Chilarens Hospital in Vienna, is now following out the plan begun by his teacher, and has carried the subject into greater detail. At his laboratory for many weeks I studied the methods employed for the quantitative determination of the constituent parts of physiological and pathological urines, and the manner in which conclusions were arrived at from these examinations. Mr. Haswell, though he has studied medicine as an accessory to his work, is not a doctor, and claims only to be an analytical and pathological Chemist, but he has made the Uroscopistic department of Chemistry a specialty. Mr. Haswell does not for a moment intend that this Semiotic examination

of the urine is to take the place of clinical work and diagnosis. We only claims for it, that by the qualitative and quantitative examination of the urine the clinical diagnosis can be materially simplified and aided, and I would add in some cases, corrected. From the personal experience I had at the laboratory, I formed an opinion of the great importance of such a "Uroscopic" examination, even for the purpose of correcting false diagnoses.

Many members of the medical profession have said that though they acknowledge the importance of the urinary examination, yet time is so valuable, and the methods at our command for such an examination are so limited, that the complete analysis is practically impossible, or merely a matter for the analytical chemist to take up. This is, however, not so. With a little experience a complete analysis can be made in

about an hour. Let me prove this in a few words -

In order that we may determine the constituent parts "per mille" in the urine, we require to know the density, to make the usual qualitative tests for albumen, sugar, carbonate of Ammonia and Indican, which can be done in a few minutes, and to use six volumetric tests. From the density we can easily find the amount of Dry Residue per mille by employing Haeser's coefficient. Thus we can determine the relative proportion of water to Dry Residue.

The amount of the Organic material is learned from the quantity of Urea and collectively of the Extractive Material. The sum of these two is equal to the organic material. The difference between the sum and the Dry Residue constitutes the amount of Ash or Inorganic material, formed by the union of the Chlorides, chiefly of the Chloride of

Sodium, the Sulphates and the Phosphates of the Alkalies and Alkaline earths (Lime and Magnesia.) These salts are quantitatively determined by means of the different "Titres" of Nitrate of Silver, Chloride of Barium, Bichromate of Potash and Uranium. This part of the Examination requires about 35 minutes. Naturally means must be employed to economise time as much as possible. Hence it is important to arrange at the commencement of the Examination for those tests that require filtering, so that when the operator is ready for them, they are ready for him.

The quantity of sugar can easily and rapidly be determined by means of volumetric process or also and more accurately by means of the polariscope. The quantitative tests for other constituent parts eg. Albumen, Uric Acid, Potash and Iron &c require much more time as their amount can only be

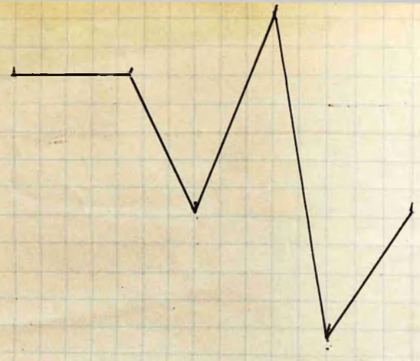
determined by weight, and some of them require to be evaporated, while Uric Acid according to Ludwig's method needs 12-24 hours before a correct result can be arrived at.

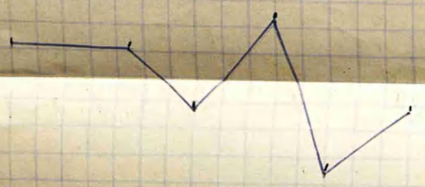
The microscopic examination of the sediment always a most important part of the analysis requires a few minutes, even though several specimens be looked at. In the case of poisoning or where qualitative proof of medicinal agents is needed, a large quantity of urine is necessary and more time demanded for the examination. This department, however, lies rather in the hands of the forensic chemist, than in those of the busy practitioner. From the quantity per mille, when a 24 hours' collection of urine has been made, it can easily be determined how much of each constituent part has been excreted in 24 hours. Thus, with the above exceptions, for ordinary cases

a complete analysis can be performed in a comparatively short space of time, and although the diagnostic value of the analysis of the metamorphosis of the change of material in the body, as shown in the urine must be decided by the corresponding capacity of the Doctor, yet from the standpoint of analytical Chemistry alone, the Statement can never be strongly opposed viz. that, "owing to the insufficiency of our methods and the considerable loss of time, the analysis of the urine is of no use for practical medicine." It is not, however, necessary that always and especially in acute cases a complete analysis be made. In affections of the lungs, for Example, where there are fever and exudation, it may merely be necessary to take note of the density, colour, Sediment and the quantity of the Chlorides per mille, in order that an opinion of the progress of the ~~attack~~ disease may be made.

Or again in affections of the brain, the amount of Phosphates, especially of the Earthy Phosphates, taken in combination with the Density and Colour, may be alone required, or in Kidney affections the amount of Albumen and Urea. As I have

As I have already said, Kletzinsky laid great stress on the importance of having a 24 hours' collection of urine, as during no two consecutive hours is the Dry Residue of the urine the same, though the proportions of the constituents remain more or less unaltered. Besides, in Chronic cases where the per mille analysis shows an almost physiological urine, it is only by the observance of the constituent parts in 24 hours, that differences indicating a decided pathological state may be shown. Although in the majority of acute cases a "Proscenio" is obtainable from any amount of urine, still the intensity of the complaint





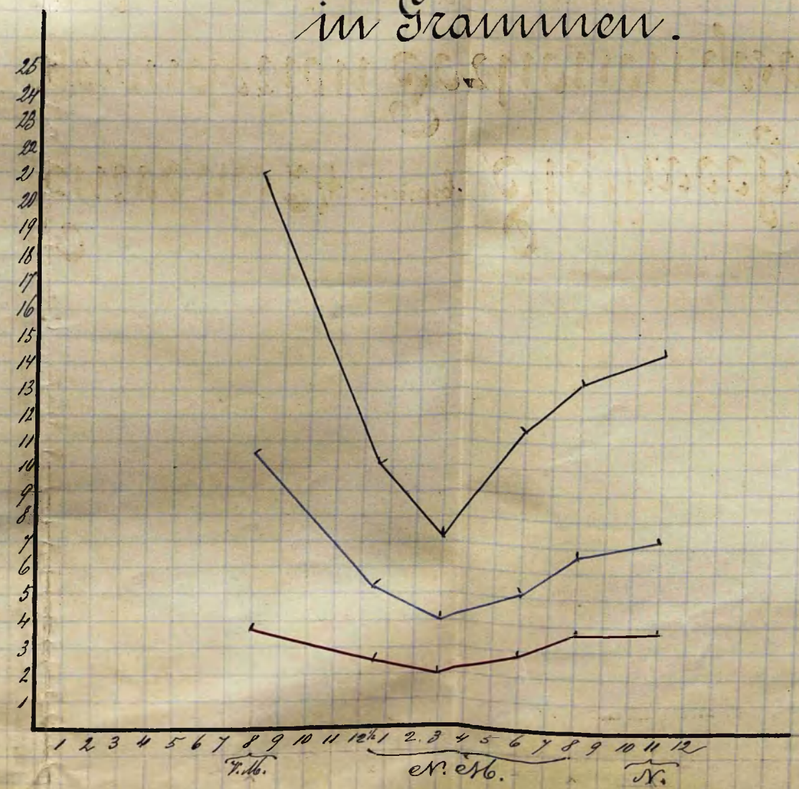
in Semmillen.

no. I.

Curve des 24 stündig. Stoffwechsels des in gesonderten Portionen gesammelten Harnes.

Curve der festen Stoffe
" Chloride
" des Harnstoffes

in Grammen.



must necessarily be better judged, when we can ascertain the amount of its abnormal ingredients viz. Albumen Sugar &c in 24 hours. Rest, food and drink, too, have a great influence on the change of material in the body. This point I should like to demonstrate by experiments I myself made.

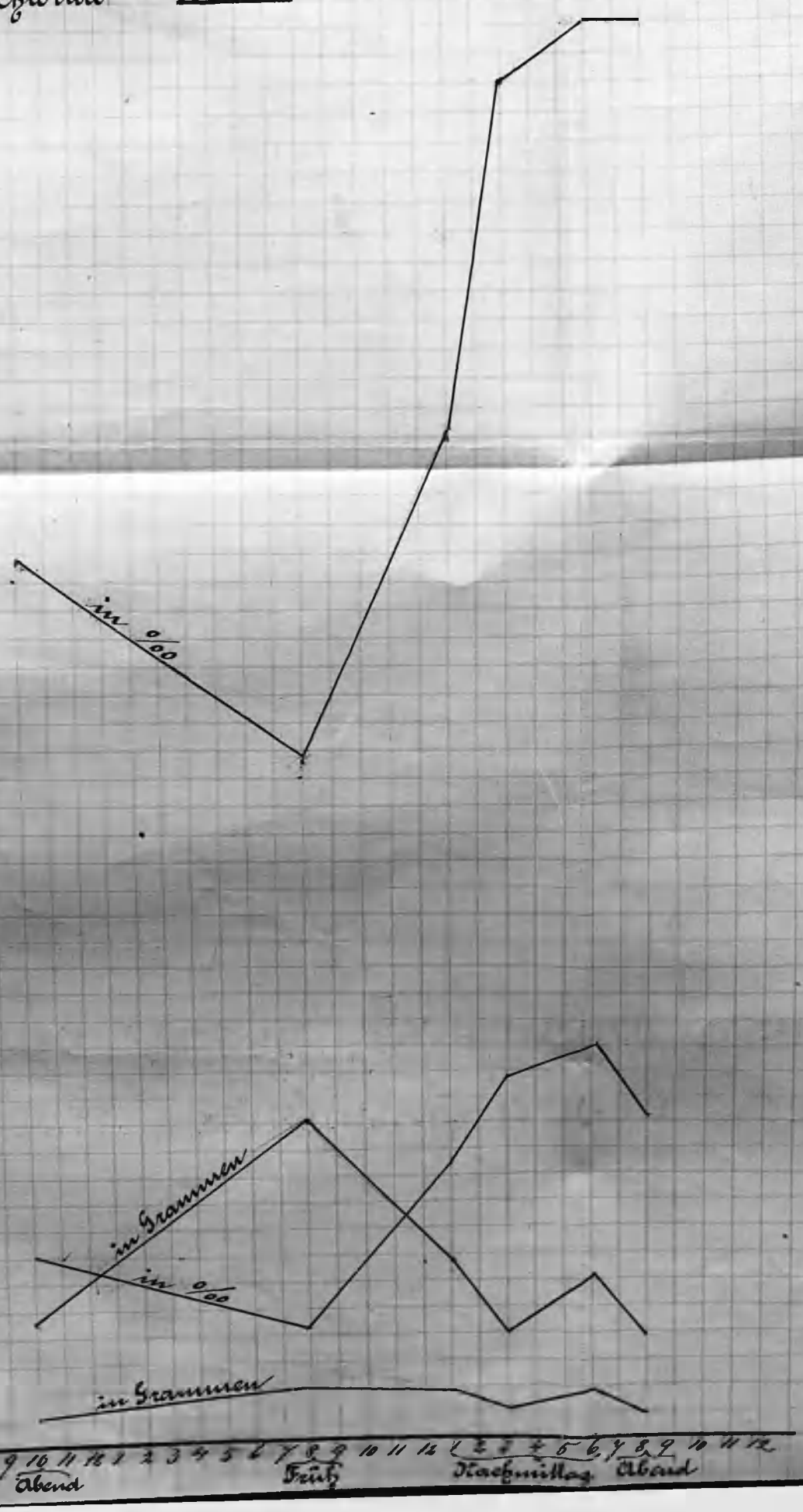
In case No 1. (See chart) we can notice at a glance the ratio per mille and in 24 hours of some of the constituents at various periods of the day. Looking first at the ratio in 24 hours, we find that in the urine passed at 8 am before breakfast, being the secretion of 9 hours, there were 21 grammes of Dry Residue. The urine was again examined at 12½ pm., before dinner and 4½ hours after a light breakfast and was found to contain only 10 grammes Dry Residue. There was a corresponding fall in the amount of Chlorides and Urea. A hearty dinner

was partaken of at 1 p.m. and the urine was again examined at 3 p.m. Strange that though two hours had elapsed since the meal had been taken, the urine showed no signs of enrichment from the metamorphosis of material, the blood being still in an impoverished condition. The urine, however passed at 6 p.m. was found to have become once more enriched. At 8 p.m. a still greater metamorphosis had taken place, and at 11 p.m., three hours after supper, the urine continued to show increase in Dry Residue and Urea. The per mille examination shows a somewhat similar result. The curves of the Dry Residue and Urea correspond markedly but the Chlorides follow a different course. We can notice here the temporary stage of inanition up till 3 p.m., then the rise in the per mille quantity of Dry Residue and Urea till 6 p.m. when a fall take place which does not cease till 8 p.m. at which hour Supper was taken —

No. II.

Curve des 24 stündig. Stoffwechsels des in gesonderten Portionen gesammelten Harnes.

Curve der festen Stoffe ——
" " Chloride ——



The amount of the Dry Residue may have fallen still lower than 60·6 °/oo but by the time the urine was again examined viz at 11 pm. an improvement had taken place. The Chlorides of the food being more diffusible, their increase in the urine occurred more quickly after food was taken than in the case of the urea.

No 2. the urine of another gentleman shows a similar condition. Here the urine was first collected at 9 pm. immediately after Supper. From that hour till just before breakfast next morning the amount of Dry Residue °/oo shows a decrease, while the total amount in grams is on the rise. Again, while the °/oo amount rises during the starvation period from eight till three, the total amount of Dry Residue falls. Though dinner was partaken of at 1 pm. no rise in the total amount is noticed till two hours after the meal.

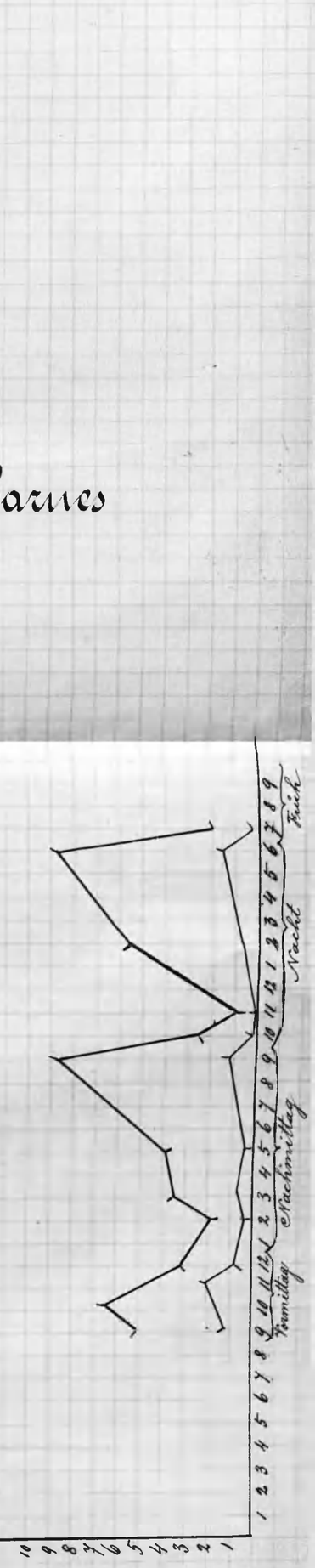
A still more remarkable case is

No. III.

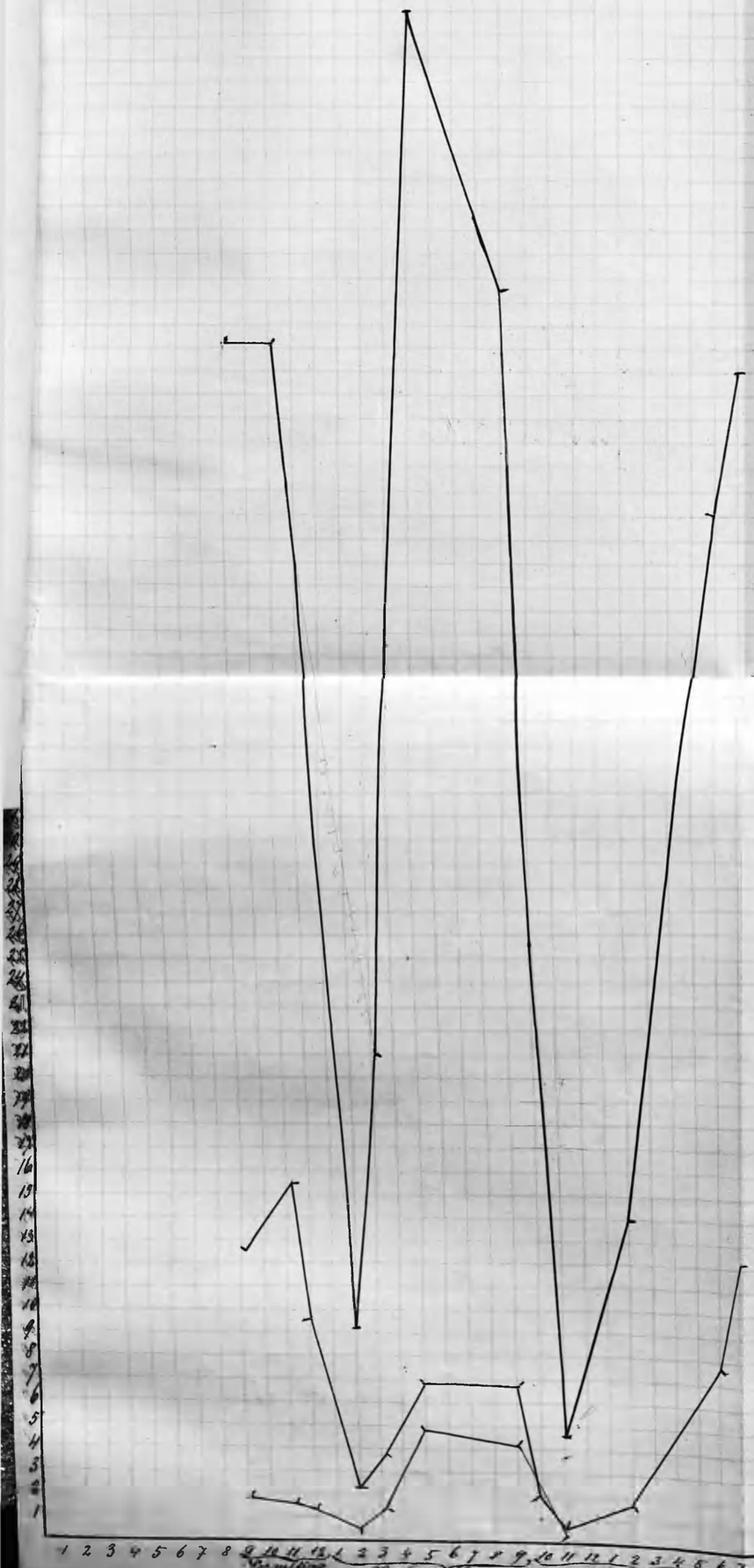
Curve des 24stündig. Stoffwechsels des in gesonderten Portionen gesammelten Harnes

Curve der festen Stoffe ——
" " Chloride ——
" " Säure ——

in Grammen



in Permillen



No. 3. in which it will be seen that from breakfast time till an hour and a half after dinner, there is a great fall in the per mille amount of Dry Residue, corresponding also to the total quantity in grams during that period. From that time till 5 p.m. there is a very sudden rise in the Dry Residue per mille, then a rapid fall to 11 p.m. three hours after supper, followed by a rise till morning. The total amount of Dry Residue in grams excreted shows a constant rise from two hours after dinner to an hour after supper. Then the starvation period comes lasting till 11 p.m. when the change of material of the food taken in at supper at 8 p.m. begins to show its presence in the urine, and the Dry Residue rises again to a maximum at 6 p.m.. The Chlorides and the amount of acidity of the urine follow a pretty constant ratio in the per mille examination.

These three cases illustrate the influence of food on the urine and show the importance of obtaining a twenty four hours' well mixed collection of urine for examination, as the urine at any time does not give an accurate idea of the true condition in twenty four hours.

We notice also by the curves of the grams in the given hours, that the change of material is not a constant vital process, but shows a rise and fall corresponding ~~as is seen by the~~ to the periods, when the principal meals within the twenty four hours are taken.

In a chronic pathological case therefore, it can be understood how the result arrived at will be dependent upon the hour of the day at which the urine under examination was secreted. The need of a twenty four hours' collection in such a case is therefore all the greater.

Man is omnivorous. His food consists of (1) Members of the protein group, composed of bodies which are formed of highly complicated combinations of Carbon, Hydrogen, Oxygen nitrogen and Sulphur, which Liebig calls "Blutbildern" or blood formers, under this group we have Albumen of hens egg, Caesin of milk, Fibrin and Myosin of muscular fibre. These repair the loss in the nitrogenous matter of the organism. (2) Hydrocarbons, which contribute to the formation of fat and by whose slow combustion, the maintenance of the heat of the body is aided. In this class are found Starch and Dextrine of Sugar. (3) Salts or inorganic compounds. These by their presence assist in the chemical and physical processes of the diffusion of gases and of Endosmosis and Exosmosis. To them we are indebted for the building

up of the cell as well as of muscular fibre. Included under this head are cooking salt, the phosphoric acid salts of the alkalies and alkaline earths and iron salts &c.

(4) In addition there are the alkaloids, tea, coffee, ethereal oils, spices, &c. which add so much to our daily comfort.

These do not become integral, normal constituent parts of the blood, but are quickly destroyed or changed. Were this not the case, some of them would act as poisons in the system, the stimulating action being carried too far.

This complex nutriment of man has to pass through many changes in the body before the excess or waste products are thrown out by the kidneys. The subject of the metamorphosis of the change of material is one of the most difficult to become acquainted with, indeed even with all our Scientific Knowledge, we are yet

unable to determine all the different stages through which the nourishment passes. We know, for instance, that the albumen of the food is changed by the action of the gastric juice into the peptones, and so is rendered soluble, and that these again circulating in the blood enrich the tissues, red blood corpuscles and muscle fibre of the body, and that after a further metamorphosis, perhaps by the aid of fermentation, they form nitrogenous compounds like Xanthin, poor in carbonaceous material, are decomposed and with the absorption of Oxygen form in due course such bodies as uric acid and Kreatin &c. and finally are eliminated from the Kidneys as Urea. Thus we know the first and last products and some of the intervening conditions, but our present knowledge does not extend to an acquaintance with all the so called links in this change of

metamorphosis. We are much indebted to the experiments of Pettenkoffer and Voigt, who have proved from their examination of the food taken into the system and of the excreta, exhaled air, urine and faeces that all the nitrogenous food becomes finally transformed and is excreted as Urea, Uric acid and Kreatinine. The last two, however, occur in such very small proportion, that it may be stated that Urea is exclusively the end product of this change of material of the albumen and Proteins. From this we see that the quantity of Urea depends first on the amount of nitrogenous material taken into the body and secondly on the amount of albumen circulating in the blood. Voigt from his experiments with Pettenkoffer on fasting dogs came to the conclusion that the albumen in the body could be divided into circulating albumen, albumen stored

in the system and organic albumen, all three kinds of which are being constantly used up, though in different proportions. The Carbons are only excreted in small quantity by the Kidneys, while the water introduced in the form of drink leaves the body chiefly as urine, the Skin and lungs acting as accessories — The Salts are excreted mostly through the urine, and the Sulphates half by the urine and half by the faeces. In the event, therefore, of the weight of the body remaining unchanged, the daily expenditure from lungs, Kidneys Skin and bowels equals the solid and liquid ingesta, but in consequence of the many abnormal physiological processes to which the body is from time to time subjected, the urine varies much both in the quantity and quality of the chemical constituents. From a study of these variations, therefore, an idea can to a great extent be formed of the

abnormalities of these processes, and a diagnosis can be made should the results of these examinations prove that a pathological condition exists in the body.

Before taking up the subject of pathological urines it may be well first of all to refer shortly to the urine in its normal condition.

Its colour of amber yellow, its peculiar odour, its acid reaction and specific gravity of 1017 – 1021 are known to all. If a Litre of urine be evaporated to dryness, we have left the Dry Residue weighing from 40 – 50 grams. Should this residue be exposed to such a heat as will destroy all the organic material, the inorganic ash, which forms about a third of the Dry Residue, remains. The other two thirds are made up in great

part of urea, and to a less extent of the so called extractive materials, principally the pigments, mucin and a few other substances in very small proportion. Of the ash the chief constituent is Chloride of Sodium with a small quantity of Chlorate of Potash. The rest of the ash is for the most part composed of the Sulphates of Soda and of the Phosphates present in the form of the alkalies, principally of Soda and of the Alkaline earths in usually equal proportions of Lime and Magnesia. The Extractive materials of complex nature embrace bodies about which laying aside mucin, up to this time little is known. They pass under the name of pigments. If basic acetate of lead be added to a urine, the brown pigments now known to be direct derivatives of the Haematosine of the red blood corpuscles are precipitated along with

the Sulphates, Phosphates, Carbonates and Urate of Lead. If the filtrate be then treated with fuming Hydro Chloric acid, the decomposition of a Substance now known under the name of Indican or Heller's Uro = = xanthine takes place, shown by the appearance in the normal urine of a reddish violet tinge, caused by the appearance of two pigments, Urrhodine (Urobiline) and Indigo (Heller's Uroglaucin.) The Indigo has recently been found to be the same substance as that which occurs in the Indigo plant. These two pigments come under the name of Indican, and are of importance in Urosemiotek. Mention may also be made of Oxalic and Oxaluric acids, which are considered as further stages of oxidation of Uric acid and mucin. Uric acid, formerly thought to be a preliminary stage of Urea, but which is proved now

to be the product of regressive meta=
- morphosis, occurs normally in small
quantity in the urine. When seen by
the naked eye in the form of crystals,
the conclusion must not be at once
jumped at that it exists in such
a case in excess, but notice must
be taken of the quantity of the
Phosphates in the urine, as to them
belongs the power in great measure of
retaining the uric acid in solution.
When once they are reduced, as a
natural consequence the uric acid
crystals deposit themselves. Uric Acid
however occurs in excess in the urine
of patients suffering from the Urate
diathesis.

By way of summing up the above
it may be well to give the following
table shewing the average, per mille
and in twenty-four hours of the
different constituents of the urine

	per mille Specific gravity 1019.	Quantity of urine in 24 hours 1·5 Litre. Grms in 24 hours. Specific gravity 1019.
Water	955·8	1433·7 grms
Dry Residue	44·2	66·3
Organic material	31·0	46·5
Ash	13·2	19·8
Extractive material	5·5	8·2
Urea	24·3	36·4
Chlorides	6·6	9·9
Sulphates	3·3	4·9
Phosphates	3·3	4·9
Uric acid	0·5	0·7
Alkali Phosphates	2·4	3·6
Alk. Earth Phos.	0·88	1·3
Nitrogen.	11·2	16·8

Among other things I would like to prove in this Thesis that urines in which there is complete absence of any abnormalities in the sediment or of foreign ingredients Eg. Albumen, sugar &c. may still be pathological as shown by the altered proportion of the normal ingredients of the urine.

We come now to the Pathological urines. These I shall take up Seriatim and make a few notes on the cases as we find them.

In order to simplify matters it will be necessary to place these urines in groups For the purpose I have followed the plan devised by Mr Haswell. The accompanying table of the various diseases he has lately published, and I think I cannot do better than refer to the urines in the order in which they are placed by him.

I have endeavoured as much as possible

to give an analysis of a urine belonging to each group and subdivision, but in some instances it has been impossible to do this. I obtained most of the urines from the Wieden Krankenhaus, but naturally all diseases are not always to be found in a hospital. So I had to be contented with what was available. Several analyses, too, are by no means typical, but still they afford some information with regard to the case. I could give in some instances several analyses of urines shewing the same pathological conditions but with one or two exceptions refrain from doing so. I regret I was unable to obtain twenty four hours' collection of the urines to the extent that I would have liked, but in the circumstances it was impossible to be otherwise.

Hydruria.

- Urina Potus.
- Hydraemia.
  - Oligaemia.
  - Oligocythaemia.
  - Chlorosis.
- Anaemia.
- Neurosis.
  - spinal and with peripheral root.
  - Hysteria.
- Status in reconvalescence.
- Stage of inanition.
- Other Cachexias.
- Dropsies from different causes.

Anhydruria.

- Polyphagia, too rich diet relatively.
- Uratic and Oxalic Diathesis
  - acute rheumatism
  - chronic rheumatism
  - Gout.
- Status Febrilis
  - Exudation
  - Resorption.
- Central Hyperaemia
  - neurosis
  - with cerebral roots
- Febricula.
- Anomalies of change of material
  - with retardation
  - with acceleration
- Diabetes
  - Insipidus.
  - Mellitus.

Choluria. { Hepatic disease with or without jaundice.

Osteopathia. { Osteomalacia. Rickets.

Albuminurias.
- Renal (nephrogenetic) — Different forms of nephritis
- Accidental { Pyelitis. Suppurative cystitis.
- Mixed { nephro pyelitis. Suppurative nephritis.
- Nephrauxogenetic { Arterial, Venous } Engorgement. Haematuria.

Ammonurias. { Alkaline decomposition of urine internal or external to the bladder in Suppurative cystitis

Poisons. { Metallic. Vegetable.

I. Hydruria.

As the name implies, under this heading we have those urines, which contain a large proportion of water and possess a correspondingly low density, of from 1004 – 1017. Their colour is as a consequence abnormally light.

Before any accurate conclusion can be arrived at, whether or not such a urine is dependent on a pathological condition, a twenty four hours' collection must be examined. We are thus able to calculate the Dry Residue in 24 hours. If we find that the amount of the Dry Residue lies between 50 and 70 grms. in the twenty four hours, though the urine itself be in excess, we are in a position to say that we have to deal with a physiological urine, and that the excess of water is not due to any abnormal condition, but merely to the fact that a large quantity of fluid has been drunk. Such urines come under the class of Urina Potus. I have not personally examined a good case of this kind, but the analysis of

a urine has been shown me, where the Specific Gravity was 1006, and where in twenty four hours the amount of water in the urine amounted to 3747·2 grms., whilst the Dry Residue per mille only showed 13·9 and the Urea 6·0. Now had merely the per mille examination been made, the fact that only 13·9 per mille Dry Residue and 6·0 per mille Urea existed, the case might have been considered a grave one, but from a twenty four hours' collection it is seen that 32·8 grms. Dry Residue and 22·8 Grms Urea were excreted, the examiner knows he has only to deal with a normal condition. In the above case the patient was under treatment with mineral waters for gout, and so had to drink an excess of fluid. When we come to speak of Diabetes, we shall find a large quantity of urine with or without sugar, but in either case an excess of the Dry Residue in twenty four hours. In Hysteria on the other hand, though the quantity of water be

increased in twenty four hours, the amount of Dry Residue is decreased.

Another subdivision of the Hydraemias is that of the Hydraemias. This class is placed in contrast to the true Anaemias. In Hydraemia the blood is watery, but is increased in quantity, so that taken in toto in the body, there is a normal amount of albumen contained in it, though if a given volume of blood be taken, it is found to contain too small a quantity of albuminous material. Therefore the relative proportion of albumen in the blood is reduced. Hence Haswell calls it "relative anaemia", as such blood through its dilution, its want of albumen and corpuscles in a given volume, naturally carries on impeded functions, and is in most respects similar to what occurs in actual anaemia.

In the true Anaemia on the other hand the amount of water in the blood is normal, but the dry Residue is reduced. A clear understanding

of this point is necessary for the treatment. In the case of Hydraemia, the indication is to concentrate the blood by withdrawing the water element. This can be done by reducing the amount of fluid drunk, increasing the action of the skin, the use of steam baths, exercise &c. In the case of Anaemia, however, the treatment consists in attempting to overcome the cause, and then in enriching the blood with good food and in giving tonics. As an ~~instance~~ example of Hydraemia, I may quote the case of a gentleman, a friend of my own, who while overworking himself had found his urine much increased viz to 3·7 litres in 24 hours. It almost reached a pathological condition. No organic disease was present, but the symptoms were those of Anaemia, mainly peripheral neurosis, shown by headache, vague flying pains and general debility. The treatment in this case was more exercise and less water drunk. The consequence

was that in four months the urine had been reduced to 1·4 Litre in 24 hours, and the Dry Residue had increased, showing that the change of material had been improved.

The causes of Chlorosis or Anaemia are various. We can distinguish between.

I Congenital i.e. Malformations.

II Acquired

1. True Anaemia from Haemorrhages
2. Antagonistic, from draining on the System e.g. from Albuminuria, suppurative processes, Leucorrhoea, lactitis, neoplasms

III Transitive Chlorosis.

1. Stage of reconvalescence
2. Starvation e.g. from neoplasms in oesophagus, sympathetic vomiting &c.

IV. Hepatogenic Chlorosis with excessive production of fat or wasting.

V Malaria.

VI Leucorrhoea.

VII Vitium cordis and engorgement

VIII. Dyspepsia.

IX. Circumstances connected with puberty
X. Deficiency of Iron.
"Eisen Mangel Chlorosis".

The following, Analysis No 1. shows a condition of oligocythaemia in a child, who had been wrongly fed, too much animal food having been given for many months previously.

Analysis No 1.

Quantity of urine passed in 24 hours 0·6 Litre
Sediment. (microscopic exam.). Slight, a little mucus
Epithelial debris, rich quantity of uric acid crystals
scattered and also in groups.
Colour Light amber.
Smell slightly urinous.
Reaction strongly acid.
Specific gravity 1021.

	In permille	Grms. in 24 hours.
Water	951	570·6
Dry Residue	49	29·4
Organic material	28·1	16·8
Ash	20·9	12·6
Extractive material	6·0	3·6
Urea	20·8	12·5
Chlorides	14·3	8·6
Sulphates	3·2	1·9
Phosphates	3·4	2·0
Uric acid	relatively increased, absolutely normal	
Pigments	normal	
Albumen	none	
Sugar	none	
Ammon-Carb	Indistinct traces	
Alkali Phosphate	2·6	1·5
Alk. Earth Phos.	0·8	0·5
Nitrogen	9·1	5·8

Analysis No. 1. Here in looking at the per-mille examination one is struck with the seeming normality of the proportion of the constituent parts. When, however, we look at the 24 hours' collection we find the Dry Residue much decreased, the ash relatively increased, due chiefly to the quantity of Chlorides, and the Urea in abnormally small quantity. We therefore judge that from the decrease of Urea there is less Albumen in the blood, and that therefore it is a case of Anaemia. But as the Iron and Potash salts were also deminished, it is probably a case of Oligocythaemia. The treatment here indicated is simple food, plenty of berry fruit, easily dissolved and assimilated preparations of Iron combined with Potash.

I was unable to obtain the Urine from a good case of Chlorosis, but I may here refer to the characteristics of such a Urine. In the initiatory stage the Urea and brown pigment are found to be highly increased, and the Uric Acid to be

correspondingly augmented, while all the other constituents of the urine appear normal. The increase of brown pigment is due to the loss of haematine of the blood, and the excess of Urea is formed out of the Albumen of the destroyed red blood corpuscles, & out of the circulating albumen.

A chlorosis of this kind constitutes the Iron deficient chlorosis or Oligocythaemia. Such a condition of the urine must not be confounded with that of a fever urine, where, so to speak, there is a temporary Chlorosis. The fever in this case acts as the poison to destroy the red blood corpuscles, a condition which shows itself by increased brown pigment and Urea. But these symptoms pass off as soon as the acute stage is over. Though the urines from a case of Chlorosis and of acute fever resemble one another in these respects, they differ widely in others, chiefly in the amount of Chlorides excreted. In the latter stage of a true Chlorosis when great loss of

red blood corpuscles and Urea has occurred, we find an anaemic or rather a hydroanaemic condition, where the blood not only contains little albumen and red blood corpuscles, but where in order to make up the deficient bulk, an excess of water is present in the urine. Such a condition is shown by Analysis No 2 which is that of the urine of a young woman aet 20, whose chief complaint was repeated and violent attacks of headache. Otherwise she felt well She had, however, become thinner during the last twelve months. In addition to the decrease of Dry Residue and increase of water we find the Urea and Phosphates decreased.

Analysis No. 2.

Amount of urine passed in 24 hours 0·74 Litre
Colour pale
Smell urinous
Reaction acid
Sp. gravity 1017.

	In per mille	Grms in 24 hs.	
Water	960	710·4	oliguria
Dry Residue	40	29·6	very little
Organic material	27·2	20·1	relat —
Ash	12·8	9·5	" +
Extractive material	6·7	4·9	" +
Urea	19·0	14·0	absol. relat —
Chlorides	7·5	5·5	relat +
Sulphates	2·4	1·7	" —
Phosphates	2·9	2·1	" slightly —
Uric Acid	Diminished slightly.		
Pigments	Chromophanic acid present, Indican increased		
Albumen	none		
Sugar	none		
Ammon. Carb.	none		
Alkali Phosphates	2·3	1·7	slightly —
Alk. Earth Phos.	0·6	0·4	" —
Nitrogen	8·8	6·5	rel —

Analysis No 3.

Amount of urine in 24 hours 1·36 Litre
Sediment (microscopic exam) Epithelial debris.
Colour Lemon
Smell strongly urinous
Reaction neutral
Sp. gravity 1015

	Per mille	Grm. in 24 hours
Water	965·0	1312·4
Dry Residue	35·0	47·6
Organic material	23·3	31·7
Ash.	11·7	16·0
Extractive material	6·5	8·8
Urea	16·3	22·1
Chlorides	7·5	10·2
Sulphates	2·6	3·5
Phosphates	1·6	2·1
Uric acid	slightly decreased.	
Pigments	nearly normal	
Albumen	none	
Sugar	none	
Ammon carb.	in excess	
Alkali Phos.	0·87	1·1
Alk Earth Phos.	0·8	1·0
Abnormalities	a precipitate on boiling, soluble on drop of acetic acid, due probably to the ammon carb.	
Nitrogen	7·6	10·3.

Analysis No 3½

Amount of urine in 24 hours 1·06 Litre
Sediment (microscopic exam) Epithelial Debris.
Colour Lemon
Smell Strongly urinous
Reaction Slightly acid

Sp. gravity 1018	In per mille	Grm. in 24 hs.
Water	958·0	1015·5
Dry Residue	42·0	44·5
Organic Material	24·7	26·1
Ash	17·3	18·3
Extractive Material	9·1	9·7
Urea	15·0	15·9
Chlorides	12·3	13·0
Sulphates	2·8	2·9
Phosphates	2·2	2·3
Uric Acid	normal, relat. decreased	
Pigments	normal	
Albumen	Doubtful trace	
Sugar	none	
Ammon. Carb.	none	
Alkali Phos.	1·13	1·19
Alk Earth Phos.	1·04	1·06
Nitrogen	7·0	7·4.

Analysis No. 3. is that of a urine of a man act 34. who for eight days had been suffering from an Adenitis inguinalis with an Erysipelitus erythema. The urine, however, shows little that is abnormal. The Urea is deminished, and the Phosphates, especially those of the alkalies, are much reduced. The case is one of anaemia or impoverished blood, though by no means a marked one. There are no symptoms of Erysipelas, exudation or fever. We shall refer to Erysipelas at a later date.

Analysis No 3½. is an example of an Anaemia brought on by starvation due to a carcinoma of the oesophagus in a man of 59 years of age, who for three months had been unable to partake of proper nourishment.

We come now to the urines of the neuroses, under which we have those of the Central Spinal and peripheral Systems and Hysteria. These three have a common footing, in so far as the Dry Residue in 24 hours in each is, if any thing, subnormal and the quantity of urine often in excess.

Under the head of Spinal neurosis, we find these urines, Hyaurias, with low Specific gravity, pale, limpid, of a weakly acid to an alkaline reaction, the Dry Residue, Urea and Ash decreased per mille and in 24 hours, the Chlorides relatively normal or deminished, the Indican increased and the Phosphates normal or decreased, but with the Earthy Phosphates frequently relatively less in amount than the Alkaline phosphates and the Carbonate of Ammonia only in traces. Analysis No 4. shows most of the above points.

Analysis No 4

Amount of urine in 24 hours 1·3 Litre
Sediment (micro exam) very little, mucus and epithelial debris, groups of urate of Soda.
Colour Light wine yellow, turbid.
Smell urinous
Reaction nearly neutral

Specific Gravity 1011	per mill	Grm in 24 hs.	
Water	974·4	1266·8	Hydruria
Dry Residue	25·6	33·2	much —
Organic Material	15·9	20·6	relat —
Ash	9·7	12·6	relat +
Extractive Material	2·9	3·7	normal
Urea	12·2	15·8	absol relat —
Chlorides	7·8	10·1	rel. +
Sulphates	0·6	0·78	" —
Phosphates	1·3	1·69	" —
Uric Acid	Decreased		
Pigments	Urocrin slightly increased		
Albumen	none		
Sugar	none		
Ammon. Carb.	Traces		
Alkali Phos.	0·3	0·39	" much —
Alk Earth Phos	1·0	1·3	" " +
Abnormalities	appt. on boiling (earthy phos.) sol. in a drop of acetic acid		
nitrogen.	5·6	7·28	" —

The analysis shows it to be a case of a neurosis of the central nervous system though and somewhat spinal in origin. What is not characteristic of a spinal neurosis is the increase of the Chlorides, and the fact that the Phosphates of the Alkaline Earths are relatively more abundant than those of the alkalies. Hoole

Analysis No 4. The clinical diagnosis was indefinite, a tumour of the brain being the only accountable cause for the symptoms. ~~The analysis, however, shows it to be a case of spinal neurasis. The only part of the analysis, which is not characteristic of a spinal affection is the increase of Chlorides~~ of the Chlorides. This slight increase may be attributed to a simultaneous peripheral neurosis. The neutral reaction is here due to the Phosphates of the Alkalies, and not to the Carbonate of Ammonia, which in this case is only present in traces. This is also shown by the precipitate on boiling soluble on the addition of a drop of acetic acid.

Analysis No. 5.

Amount of urine in 24 hours 0·744 Litre.
Sediment (micro. exam) moderate amount with rich epithelium + Carbonate of Lime Crystals.
Colour urine yellow, muddy
Smell weakly urinous
Reaction very slightly acid
Sp. gravity 1025.

	In per mille	Grms in 24 hs	
Water	941·8	697	
Dry Residue	58·2	43	
Organic Material	38·2	28·2	
Ash	20·0	14·8	much —
Extractive Material	10·4	7·7	
Urea	26·3	19·5	absol —
Chlorides	13·8	10·2	much +
Sulphates	2·9	2·1	
Phosphates	3·3	2·4	
Uric acid	normal		
Pigments	increased, Indican much increased		
Albumen	none		
Sugar	none		
Ammon Carb.	rich trace		
Alkali Phos.	2·5	1·8	
Earthy Phos.	0·8	0·6	
Nitrogen.	12·3	9·1	

Analysis No 5 is that of the urine of a girl 12 years of age with a slight lateral Curvature of the Spine, a very nervous child whose development had been retarded. The case is one of a marked Central neurosis as Shown by the reduced Phosphates especially the Earthy Phosphates, slightly increased Chlorides, largely increased Indican and Carbonate of Ammonia. It is one where spinal irritation is present, and is opposed to a purely Cerebral affection, because the Earthy phosphates are not increased.

The urines show in addition a state of the system in which the Change of Material is impeded, The trophic nervous centres or regulators of this metamorphosis being at fault, the full change of material does not take place. When we speak of impeded Change of material, we mean, that the end products of the Albumen

are not attained in full.

Differing from these Central Spinal cases are those with peripheral origin. The primary lesion in such cases may not be nervous but merely impoverished blood, caused by anaemia. This prevents the nerve tissue from receiving a full supply of nourishment, and consequently symptoms of a neurosis appear. This in turn may react on the blood and still more impoverish it, and so finally a central neurosis develops.

Analysis No 6

Amount of urine in 24 hours not known.
Colour dark amber.
Smell urinous
Reaction acid
Sp. Gravity 1022 In per mille

Water	948·8	
Dry Residue	57·2	
Organic material	36·5	
Ash	14·7	
Extractive material	8·2	rel. +
Urea	26·8	" —
Chlorides	8·9	" +
Sulphates	2·4	" —
Phosphates	3·4	" slightly —
Pigments	Indican increased, chiefly indigo	
Albumen	none	
Sugar	none	
Ammon. Carb.	slightly increased	
Alkali Phos.	2·5	relat. —
Earthy Phos.	0·9	slightly —
Nitrogen.	12·5	rel —

Analysis No. 7.

Quantity of urine in 24 hours unknown.
Sediment (microexam.) mucus, pus,
triple phosphate crystals.

Colour	pale		
Smell	urinous		
Reaction	neutral		
Sp. Gravity	1016	In per mille	
Water		962·8	
Dry Residue		37·2	
Organic Material		23·0	
Ash		14·2	
Extractive Material		5·4	
Urea		17·1	rel. —
Chlorides		10·4	much +
Sulphates		1·9	rel. —
Phosphates		1·9	" much —
Pigments		Marcain slightly increased, Urrhodine	
Albumen		none	
Sugar		none	
Ammon. Carb.		in excess	
Alkali Phos.		1·1	rel. —
Alk. Earth Phos		0·8	normal.
Nitrogen		7·9	rel —

Analysis No 6. is that of the urine of a man, who had suffered much pain for some time, and who now had become delirious from some cause or another. and Analysis No 7 is that of a case said to be of rheumatism. The Analyses of these urines show differences from those of the Central Kind, in so far as the Chlorides are increased and the Phosphates reduced. No. 7. Shows no signs of rheumatism. The Indican and chlorides being increased, the Phosphates deminished and the Uroerythrine being absent, & the ~~diagnosis~~ Urophaein not much increased, the diagnosis rather lies on the side of a peripheral neurosis and not rheumatism

Analysis no. 8.

Quantity of urine in 24 hours not known.

Colour	amber	
Smell	urinous	
Reaction	acid	
Specific Gravity	1016	
		In per mille
Water		962·8
Dry Residue		37·2
Organic material		20·4
Ash		16·8
Extractive material		3·1
Urea		16·7
Chlorides		13·7 very much increased
Sulphates		1·4
Phosphates		1·7
Uric Acid		normal
Pigments		Indican (Indigo) increased
Albumen		none
Sugar		none
Ammon. Carb.		in excess
Alkali Phos.		1·0
Alk. Earth Phos.		0·67
Nitrogen		1·8.

Analysis No. 8. is that of a case suffering from Eczema impetiginodes, where there are signs of a peripheral neurosis, perhaps caused by the skin complaint. Low density and high Chlorides, however, are two of the chief features of an urine from a skin case, for as the function of the skin becomes impeded, there is an increase of water in the urine and in consequence a larger quantity of Chlorides. This may also account for the excess of Chlorides in cases of peripheral neurosis, where the skin is not working properly.

The urines from cases of Psoriasis are characterised by their large quantity in 24 hours, low specific gravity, the light colour, and the general characteristics of an impeded change of Material, trophic innervation, though with peripheral root.

These urines of patients recovering from severe illnesses show signs of Hydruria and Anaemia. All Symptoms of fever may be gone, the Chlorides will be high, yet the fever poison has given rise to a temporary Chlorosis and a resulting Anaemia occurs. In such cases we find the Dry Residue, Urea, and Phosphates decreased, while the Chlorides, Pigments and Carbonate of Ammonia increased. The Colour of the Urine, too, is lighter, the Specific gravity normal or subnormal, and the reaction neutral or weakly acid. Such a condition we see expressed in analysis No 9. which is that of a urine of a woman aet. 26. who for three months had been suffering from pneumothorax.

Analysis No 9.

Amount of urine in 24 hours, unknown.
Sediment (Micro. Exam.) mucus, triple phosphate crystals, Epithelial debris, Bacteria.

Colour	light red brown.		
Smell	Strongly urinous		
Reaction	neutral		
Sp. Gravity	1017		
		Per mille	
Water		960·4	
Dry Residue		39·6	
Organic Material		26·2	
Ash		13·4	rel. +
Extractive Material		6·8	" +
Urea		18·4	" —
Chlorides		9·1	" +
Sulphates		2·2	" —
Phosphates		2·1	" —
Uric Acid		normal.	
Pigments		Urorythrine present	
Albumen		none	
Sugar		none	
Ammon Carb.		In Excess	
Alkali Phos.		1·45	" —
Earthy Phos.		·64	" —

Abnormal ingredients precipitate on boiling, which dissolves on addition of a drop of acetic acid

Nitrogen. 8·6.

Analysis No. 9. In addition to the signs of "Status in reconvalescence", we see these of a retardation in the change of material. The pigments being high and yet no fever present would indicate this. Such a condition may be caused by the want of a proper aeration of the blood, a result of the pneumo-thorax.

Allied to this class but belonging to a more marked condition is that of the stage of Inanition, where the urine shows that there is a poverty in Albuminous material in the blood. We have seen when considering the influence of food on the change of material, how we normally experience a stage of inanition more than once in the 24 hours. It commences four or five hours after a meal and lasts till perhaps an hour or an hour and a half after the next meal.

A more prolonged condition exists

when there has been high fever, wasting disease, loss of blood or insufficient formation of blood, inability to eat or contra indication to the partaking of much albuminous food. Not only is the usual amount of circulating albumen in the blood considerably expended, but the person draws to a much greater extent than when in health on the stored up Albumen in the tissues.

In Analysis No 10. we have the urine of a gentleman, ~~who~~ naturally robust, but who had for five months suffered from a severe attack of Erysipelas of the face. The urine in the analysis is that of the 4th day after albuminous diet was allowed, when convalescence was nearly completed.

Analysis No 10.

Amount of urine in 24 hours. 1·6 Litre
Sediment none.
Colour normal
Smell urinous
Reaction acid
Sp. Gravity 1011

	In per mille	Grms in 24 hs.	
Water	974·3	1558·8	
Dry Residue	25·6	41·0	
Organic Material	15·16	24·3	
Ash	10·4	16·7	absol. +
Extractive material	4·79	7·6	relat. +
Urea	10·4	16·6	much —
Chlorides	7·8	12·4	" +
Sulphates	0·99	1·5	rel. —
Phosphates	1·65	1·6	" —
Uric acid	normal		
Pigments	normal		
Albumen	none		
Sugar	none		
Ammon. Carb.	normal		
Alkali Phos.	0·64	1·0	much —
Alk. Earth Phos.	1·01	1·6	rel. —
Nitrogen	4·8	7·7	much —

Analysis No. 10. The normal colour of the urine, the low Specific gravity, decreased dry residue and increased Chlorides, show that all fever has gone. The urine is still of the class Hydruria, The Sulphates and Phosphates are low, the former because the bowels had been previously well purged, and the latter because of the earlier waste of material. The Quantity of Urea excreted in 24 hours is still low, even though an albuminous diet has been allowed. But the wasted tissues have still to be strengthened, and the stored up albumen to be replaced before the full quantity of Urea is seen as a waste product in the urine. There is not yet an equilibrium in the amount of Nitrogen, as the Analysis clearly shows.

The stage of transition may refer not only to watery blood in general, but to a want of some special ingredient in the blood, e.g. Potash. During the "Status febrilis" there is a great loss of

the Potash Salts from the destruction of the red blood corpuscles. Hence the need in the treatment of giving vegitables containing much Potash, berry fruits &c. As I have said inability to eat is a frequent cause of the stage of inaction, Such a condition occurs in patients suffering from acute or chronic dyspepsia. In cases of engorgement of the circulation, ~~high~~ Hydraemia, may exist though the urine may not show symptoms of a Hydraemia, indeed even the contrary may be found viz. high Specific gravity, normal or abnormal Dry Residue in 24 hours (Anhydraemia). The impaired circulation of the blood prevents a ready flow of urine through the Kidneys, and consequently dropsy may occur. If the fluid nutriment, however, be diminished, the heart will have less work to do, or if the heart be stimulated by Digitalis &c the urine will become more abundant,

and shew itself in a more diluted condition and a true Hydruria may be the result or a Urina potus.

Hence it is sometimes of importance to take notice of the amount of fluid taken in and the quantity of urine excreted in 24 hours. The action of the skin and lungs must of course be taken into account. They give off 1/6th to 1/3rd of the total amount of fluid drunk, while to the Kidneys there falls the duty of excreting 2/3rds to 5/6ths

Analyses nos 11 and 12 are examples of this condition.

Analysis No. 11.

Amount of urine in 24 hours not known
Sediment, (micro. exam) urates. mucus
~~rbc~~ vaginal epithelium

Colour	brick red, muddy, filtered dark amber		
Smell	urinous		
Reaction	acid		
Specific Gravity	1026.	In per mille	
Water		939	
Dry Residue		60·58	
Organic Material		47·28	rel +
Ash		13·3	rel —
Extractive material		5·0	" —
Urea		40·7	" +
Chlorides		5·1	" —
Sulphates		3·6	" —
Phosphates		4·6	" —
Uric Acid		Increased	
Pigments	Uroerythrine present, Indican slightly incr^{d}		
Albumen		a trace	
Sugar		none	
Ammon. Carb.		Slight increase	
Alkali Pho.		2·97	" —
Alk Earth Pho		1·7	nearly normal
Nitrogen		19·0	" +

Analysis no. 12.

Quantity of urine in 24 hours 0·4 Litre
Sediment (microscopic) rich, mucus, Epithelial cells & urates

Colour	red brown, very muddy		
Smell	urinous		
Reaction	acid		
Sp. gravity	1023	In per mille	Grms in 24 hrs.
Water		946·4	378·6
Dry Residue		53·6	21·4
Organic material		38·5	15·4
Ash		15·1	6·0
Extractive material		10·7	4·3
Urea		26·3	10·5
Chlorides		8·7	3·5
Sulphates		2·6	1·0
Phosphates		3·8	1·5
Uric Acid		Increased	
Pigments	Urrhodine increased, traces of Uroerythrine		
Albumen		none	
Sugar		none	
Ammon. Carb.		In traces	
Alkali Phosphates		2·8	1·1
Earthy Pho.		1·0	0·4
Nitrogen		12·3	4·9

Analysis no. 11. is that of the urine of a woman 38 years old, who had been suffering for three weeks from Emphysema Pulmonalis and Vitium Cordis. The high Specific Gravity and subnormal Chlorides would at first sight suggest a Status febrilis, but the increased Uric acid as Urates, and at the same time nearly normal Urophaein exclude the possibility of an acute condition, but indicate an insufficiency of Aeration of the blood. The Exudation, shown by the diminished Chlorides, is present in the heart.

Analysis no. 12. is that of an adult suffering from incompetency of the Mitral Valve. Here again at first sight an acute fever case is thought of, but the high Chlorides negative such a diagnosis.

Taking into consideration that the 24 hours' excretion is so small, there is shown that in consequence of the

engorgement, the natural flow of water from the Kidneys is impeded and therefore is retained in the blood. The result of this is a watery condition of the blood, a perfect Hydraemia, and this Hydraemia or relative Anaemia with its naturally reduced physiological functions shows itself by the impeded change of material in 24 hours.

The "other Cachexias" referred to in Haswell's table are those of malignant diseases and neoplasms generally, Syphilis &c.

The conclusions arrived at from these case of Hydruria drawn from the reduced Dry Residue in 24 hours, only hold good in absence of any complaint of the urinary System, principally of Chronic disease of the Kidney. Evidently in such cases Hydruria may exist though the Hydraemia of the blood may not have yet developed, because the diseased tissues of the Kidney do not allow a ready flow of urea -

Anhydruria

We come now to the second large group in the analyses, viz that containing urines, where the excretion of Dry Residue in 24 hours is often above normal, and where in the "permille column" the amount of water is relatively to the Dry Residue less than in the case of Hydruria.

We must not, however, rush to the conclusion that, because we have a normal or even subnormal amount of Dry Residue in 24 hours, ~~that therefore~~ therefore we have not to deal with a case of Anhydruria. We must take other conditions of the urine into account. For instance in a fever urine the Dry Residue may be found to be normal, but when it is remembered that during the stage of fever very little food is being taken, it will be found that the Dry Residue is increased relatively ~~to the~~ in proportion to the amount of nourishment.

I shall refer first to the class of urines which Haswell terms Polyphagi, or the

urines of over-luxurious eaters. This appellation must be used with caution: When we speak of too rich nutriment, we mean that for that particular individual the living is too high. What may be suitable for one person may be over rich for another. We therefore employ the term relatively to the person. The result of this rich diet is that the normal change of material is not complete. The end products, which should pass into the urine, are not yet fully reached, and the blood is therefore over rich in substances, which have an intermediate place in the metamorphosis.

When we talk of a retarded metamorphosis we do not mean that there is a lessened change of material in the blood, because we find the Dry Residue in the urine in 24 hours normal or even rich, but we find that there is a disproportion in the end products of the change of material in the urine, and consequently we find an increase of Uric acid and Oxalate of lime (or only Oxalate of Lime,) and Pigments, while the Urea abundant

in the urine is still deminished in relation to the total amount of excretion of Dry Residue.

To illustrate this, we may take the case of a furnace, where in consequence of over filling with fuel a sufficient supply of air cannot be admitted. Incomplete combustion occurs, and the normal end products of combustion viz CO_2 and H_2O are not attained to, but the former is partly substituted by its lower stage of combustion viz. Carbonic oxide gas.

In simple forms of this condition, which are not strictly pathological, the ash may show no abnormality as regards its constituents viz Chlorides, Sulphates and Phosphates, but in more pronounced cases the Phosphates become reduced and the Chlorides relatively increased, showing signs of the commencement of a Neurosis or at least a disturbance in the innervation. See Analysis ✱ 13. The great danger in such cases is that Concretions of uric acid or oxalate of Lime may form in the Kidney itself or in the bladder.

No 13

Quantity in 24 hours 1·6 Litre.
Sediment (Micro. Exam.) slight, mucus.
Epithelial debris, rich Uric Acid cryptals, large
Single ones & in groups, Oxalate of Lime cryptals
Colour. amber, almost colourless
Smell weakly urinous
Reaction Slightly acid
Specific gravity. 1021.

	In permille,	Grm. in 24 hours.	
Water	957	1521·6	
Dry Residue	49	78·4	
Organic Material	34·8	55·6	
Ash	14·2	22·8	
Extractive Material	6·9	11·1	rel +
Urea	26·4	42·2	normal
Chlorides	9·1	14·5	rel +
Sulphates	2·4	3·8	" −
Phosphates	2·7	4·5	" −
Uric Acid	Somewhat increased		
Pigments	normal		
Albumen	none		
Sugar	none		
Ammon Carb	In distinct traces		
Alkali Phosphates	2·1	3·3	" −
Alk. Earth Phosphates	0·6	1·2	
Nitrogen	12·3	19·7	

Quantity of urine in 24 hours. 1·5 Litre
Sediment (Micro-exam) mucus, Epithelium; here & there Epithelial cells of the Calyces. Uric acid crystals in masses.
Colour dark amber
Smell urinous
Reaction Acid
Specific Gravity 1021.

	per mille	gms in 24 hours.
Water	951	1445·6
Dry Residue	49	74·4
Organic Material	34·6	52·4
Ash	14·4	22·0
Extractive material	7	* 10·7
Urea	24·8	37·7
Chlorides	8·4	12·8
Sulphates	2·6	4·0
Phosphates	3·3	5·1
Uric Acid	Increased.	
Pigments	Indican slightly increased	
Albumen	none	
Sugar	none	
Ammon carb.	none	

* uric acid not included here as it was chiefly in the sediment in the form of crystals.

Analysis No 14 is that of the urine of a gentleman, who for years has had uric acid crystals in the sediment of his urine, and who was afraid he might acquire a renal calculus. The uric acid is certainly markedly increased here, and there is present the tendency to the formation of crystals, and the microscopic examination suggests a preexisting irritation of the urinary tract. There are at present, however, no traces of a calculus for there is absence of haematuria and of signs of catarrh of the pelvis or calyces.

When the patient was asked what his food consisted of, the reply showed that it was rich in character, poultry being to a great extent partaken of. Hence in this case the treatment consisted in not giving permission to take so much food especially young animal food, in prohibiting poultry and alcohol, which takes Oxygen from the blood, in ordering more water and plenty of fruit. As

regarded Medicinal agents, alkalies in the form of Carbonate of Soda may be given or the neutral phosphate of Soda com= =bined with the carbonate in the proportion of 1-3. for the purpose of increasing the Phosphates, which hold the uric acid in solution, for the uric acid may not be in excess in the blood, but merely be unable to retain its soluble con= =dition on account of its solvent, the Phosphates being deficient. Carbonate of Lithium may also be given.

Analysis 15 is that of the urine of a lady aet 50. who had been for some time troubled with frequency of micturition, rheumatic pain in the face and in lumbar region and swellings of the joints of the fingers. The urine shows strong indications of the predisposition to the formation of a renal calculus, though at present the extent of the evil is limited to a mere irritation of the urinary tract by the uric acid. There is no blood in the urine
Analysis 16 shows the presence of a renal calculus.

Quantity of urine in 24 hours 1·3 Litre
Sediment (micro. exam) rich cloudy. Cayenne pepper sediment of uric acid. Mucus in quantity Epithelial cells of ureter Calyces. Large quantity of uric acid crystals, singly and in groups. Vaginal Epithelium.
Colour Dark wine yellow, slightly muddy
Reaction acid
Sp. gravity 1018 & per mille grm in 24 hours.

Water	958	1244·2	rather little
Dry Residue	42	55·8	
Organic Material	29·3	38·9	rel. nearly
Ash	12·7	16·9	normal
Extractive Material	5·1	6·7	n
Urea	22·7	30·2	n
Chlorides	8·5	11·3	rel +
Sulphates	1·7	2·3	" Slightly −
Phosphates	2·5	3·3	" " −
Uric acid	Slightly increased		
Pigments	urobiline	Slightly increased	
Albumen / Sugar	None.		
Ammon Carb	Traces		
Alkali Phosphates	1·7	2·3	" " −
Alkaline Earth Phosph.	0·8	1·0	nearly n.
Nitrogen.	10·6	14·1	

No 16.

Amount of urine in 24 hours not known.
Sediment, moderate, rich quantity of red blood corpuscles, amorph. urates, moderate amount of uric acid cryptals, mucus & a little Epithelium.
Colour. urine yellow, somewhat muddy
Reaction acid

Sp. gravity 1016	In per mille	
Water	962·7	
Dry Residue	37·3	
Organic Material	28·1	
Ash	9·2	
Extractive material	5·6	rel +
Urea	21·8	" +
Chlorides	4·5	" —
Sulphates	2·4	" —
Phosphates	2·3	" —
Uric acid	normal, (slightly rich)	
Pigments	normal, Urobilin relat. slightly increased	
Albumen	Distinct trace	
Sugar	none.	
Ammon carb	Distinct trace.	
Alkali Phosphates	1·6	
Alk Earth phosph.	0·7	
Nitrogen	10·2.	

Though Uric acid be found in the Sediment of a urine &c. in gravel, no certain sign by that circumstance is given that there is actually an excess of uric acid in the urine.
Among several reasons why Uric acid is deposited is that it is deprived in many cases of its solvents, the Phosphates or Water or both, as, for instance, in fevers where the Phosphates are retained in the blood and tissues, and where there is a deminished amount of water. In nervous cases on the other hand where the Phosphates are decreased on account of impaired change of material in nervous tissue, the Uric acid is frequently found in the Sediment, and we find this to occur in all these cases where a retarded metamorphosis, due &c. to an excess of food being taken, prolonged high living &c has brought about a derangement in the change of material.
The true Uric or oxaluric diatheses is where the uric acid is really increased, as occurs in Rheumatic fever, or in cases where there is an insufficiency of aeration

in the blood or a disturbance in the circulatory apparatus.

In chronic gout the uric acid in the urine is deminished, for it is retained in the blood, and so it has been thought that the blood, being over rich in uric acid, deposits it in the joints as urate of Lime and Magnesia. Haswell, however, has thrown out the question, whether these deposits or Tophi are not due more to some abnormal and local conditions of the tissues and blood, that cause the uric acid to be precipitated, even in absence of an excess of uric acid in the blood.

I had no opportunity of examining any good cases of acute or chronic rheumatism. However, analysed one urine of a man 20 years of age, who was said to be suffering from "Gonitis Rheumatica", the subacute attack having lasted for twenty days.

The following is the analysis (No 1)

No 17.

Quantity of urine in 24 hours not known.
Microscopic exam. Mucus & Epithelial debris
Colour red brown
Smell slightly urinous
Reaction acid
Specific Gravity 1026 in per mille
Water 939·5
Dry Residue 60·5
Organic Material 45·7 rel +
Ash 14·8 rel −
Extractive Material 12 rel +
Urea 33·7
Chlorides 6·6 " −
Sulphates 4·2
Phosphates 4·0
Uric Acid normal
Pigments Urocrythrine & Indican slightly increased
Albumen none
Sugar none
Ammon. Carb. in excess
Alkali Phosphates 2·97 rel −
Alkaline Earth Phosphates 1·04
a precipitate on boiling, disappearing on adding a drop of acetic acid
Nitrogen 15·7

The analysis of the urine here hardly agrees with the diagnosis. The trace of Urocrythrine is the only symptom belonging to a rheumatic urine. Had the urine been from a case of acute rheumatism, the colour of the urine would have been that of red brick, and the Urocrythrine and Phosphates would have been increased. Had the rheumatism been chronic, the urine would have still been darker than it was found to be, and would have contained more Urocrythrine and Uric acid. The precipitate of Earthy Phosphates on boiling rather points to slight inflamation of the periosteum, but this sign is only of value when the urine is examined as soon as passed, and when it is then found to contain no carbonate of ammonia, and still to give the precipitate.

Uric acid in acute cases may be retained in solution in the urine, but it is nevertheless really increased. Its retention in solution may be due to Alkalies, if the Alkaline treatment has

been carried out, and so crystals do not form. Where the phosphates and urocrythrine are specially high, there is indicated a heart complication either peri or endo-carditis, and a trace of albumen is often present, showing an engorgement of the circulation.

In contrast, are the urines from patients with rheumatic pains, though a state of Chronic rheumatism has not been reached. The urine will be lighter in colour, and will give on cooling a large flaky precipitate of rose coloured urates, the density will be high, chlorides all but normal, Phosphates normal, Indican not increased and Carbonate of Ammonium only in traces, resembling, with the exception of the increase of Urocrythrine, a common febricula.

Analysis No 18.

Quantity of urine in 24 hours, not known.

Sediment,	amorphous urates.	
Colour	muddy red	
Smell	urinous	
Reaction	acid	
Specific gravity	1030	In permille
Water		930·1
Dry Residue		69·9
Organic Material		49·4
Ash		20·5
Extractive material		14·6
Urea.		33·3
Chlorides		12·4
Sulphates		1·98
Phosphates		6·1
Uric acid		normal.
Pigments		Indican much increased
Albumen		none.
Sugar		none.
Ammon. Carb.		In excess
Alkali Phosphates		5·0
Alkaline Earth Pho.		1·1
Abnormal ingredients		Chrysophanic acid
Nitrogen		15·5

Analysis No. 18 is of a mixed character. There are indications of a slates febriles Sine exudation. The presence of Urocrythrine + increased Phosphates would tend to show the presence of rheuma or flying rheumatic pains accompanied by a little rise of temperature. The increase of Indican is not characteristic of this condition, but as the presence of Chrysophanic acid was discovered in the urine, (probably from Senna rhubarb or aloes) + taking into account the very small quantity of Sulphates excreted by the Kidney, the increased Indican is no doubt due to its reabsorption into the blood from a collection of faeces in the bowel, which has now been removed.

One of the most important subdivisions of the group of Anhydruurias is that of the fever urines or those of the "States Febriles". They divide themselves chiefly into two classes, those where exudation is still taking place, and those where the crisis is over and re-absorption has begun, though fever may still be present.

The symptoms of a condition of fever demonstrated in the urine are the following. The colour is always high and in many urines is that of brick red. This is due to the excess of Urocrythrine in the urine. The so called muddiness which is visible after the urine has stood for some time is caused by the amount of urates, which cannot be held in solution when the urine is cold. The Density is high from the amount of Urea and extractive material present in the urine. The organic material is relatively increased and the Ash decreased owing to the lessened amount of chlorides and

Phosphates excreted. The Chlorides show a great fall and in pneumonia may even be absent altogether in the urine. The Sulphates remain the same. The Phosphates are generally decreased, except as we have seen in the case of acute rheumatism, where they are increased, especially those of the Earthy Phosphates. The Urea is as a rule increased, showing that in the blood there is an accelerated change of material taking place. The Uric acid is slightly increased, and in rheumatic pains it is largely increased. The Extractive materials are increased, and they give the brown colour to the urine derived from the destruction of red blood corpuscles. As a rule except in all abdominal cases, Indican is found decreased, as in general the Indican is in inverse ratio to the Urophaein. Albumen may exist as an accessory, indicating an engorgement of the circulation. Sugar is seldom present. The alkali and alkaline Earth Phosphates

are decreased and the nitrogen is increased. The States febriles as shown by the urine may be in consequence of a cerebral, thoracic or abdominal affection or from a wider spread cause. The cerebral cases we shall speak of later on, but a word may be said here with regard to the difference between the urines of the thoracic and abdominal affections. In the thoracic as a rule the exudation is more rapid and more intense, & resorption is more quickly effected. Consequently at the outbreak of a fever, where the thoracic organs are affected, the urine is found to be scanty and high coloured, containing a rich deposit of urates with high density, and the Chlorides very low reaching even zero. The Indican is very slightly, if at all, increased. In abdominal cases taking the same intensity of colour of the urine, the Chlorides will be found low below normal, but higher than in thoracic affections. That is to say, if we have a urine shown us having

a beer brown colour with Chlorides at 4 °/oo we can at once state that it is a urine from an abdominal and not a thoracic case, for were it from a patient suffering from, say, a Pneumonia the Chlorides in a urine of that colour would have been much more diminished perhaps standing at 1 °/oo or even less.

Again in a urine from a Status febriles abdominales, the Indican chiefly in the form of Indigo would be much increased, and also the carbonate of Ammonia.

It cannot be supposed that an examination of the urine will allow of a diagnoses between the different kinds of Exanthemata. That lies entirely to the Clinical observer, though in passing I may say that a urine from a case of enteric fever has characteristics peculiar to itself, but the value of the Urosemiotic is that it can show by an examination of the rise and fall of the Chlorides

and the Extractive Material viz. the amount of the Urophaein present in the urine, the intensity of the exud= =ation and is therefore a great help to the Physician in forming a prognosis. And so it is that this urinary Examination is so useful in acute as well as in Chronic cases.

In referring to the Chlorides and their daily rise or fall in acute cases of fever, a word of caution must be given lest the analyst fall into error. Note must not simply be taken of the amount of Chlorides per mille, but must be reckoned relatively to the Specific gravity and Dry Residue.

For instance if we found a urine which on one day shewed by the usual test that the Chlorides stood at 3/00 and that on the next they had decreased to 2/00 we might be tempted to conclude that the exudation was greater on the latter day, and that the case was in a

graver condition, but if on taking the Specific gravity we found it in the former case to stand at 1026 and in the latter at 1017 our fear would be greatly lessened. Because when calculating the Chlorides in the urine diluted to a density of 1017, they amount in ‰ to 1·9 and are therefore the same or slightly increased and not reduced as we might at first sight imagine. The following is the equation. If with a Dry Residue of 60·6 (calculated by Haeser's coefficient from Specific gravity 1026) the Chlorides amount ‰ to 3, how great will the amount of Chlorides be ‰ when the Dry Residue is 40 (calculated from Specific gravity 1017)

60·6 : 3‰ :: 40 : x = 1·9‰

I had many opportunities of analysing urines from cases of Pneumonia either completely or in part

Analysis no 19 is that of a child's urine from a case of Pneumonia

Analysis No 19. 99

Amount of urine in 24 hours. 0·240 Litre
Sediment (microscopic exam.) Urates, Epithelial tubes, mucus, stray uric acid crystals.
Colour Heller's "Urina Tumentosa", filtered, dark amber
Smell urinous
Reaction acid
Specific gravity 1017

	In 100,	Grm. in 24 hrs.	
Water	960·4	230·5	
Dry Residue	39·6	9·5	
Organic Material	34·3	8·2	rel +
Ash	5·3	1·3	" —
Extractive material	4·1	·98	normal
Urea	28·7	6·8	rel +
Chlorides	1·4	0·3	rel + absol much diminished
Sulphates	1·8	0·4	rel —
Phosphates	2·1	0·5	" —
Uric acid	normal		
Pigments	Indican slightly increased		
Albumen	Trace		
Sugar	none		
Ammon Carb	Traces		
Alkali Phosphates	1·3	0·3	decreased
Alkaline Earth Phosphates	0·8	0·2	
Nitrogen	13·4	3·2	

The status febrilis in Analysis no. 19 is specially shown by the decrease in the Chlorides which in the 24 hours should have been 1·4 grm. as judged from the Density while they are found to be only 0·3. The trace of albumen indicates that the inflamatory process is still on the increase.

In a case like this the question may arise, Is this a case of Pneumonia or of Pleurisy? If the analyst knew on what day of the inflamatory attack the urine which he had to examine had been passed, he could distinguish between these two thoracic affections. The fall of the Chlorides in Pleurisy is never so great or so sudden.

Analysis No. 20.

Quantity of urine passed in 24 hours, not known
Sediment (microscopic exam.) Amorphous urates and uric acid crystals
Colour, muddy brick red; filtered, amber
Smell urinous
Reaction acid
Specific gravity 1025 per mille.

Water	941·7	
Dry Residue.	58·2	
Chlorides.	3·8	greatly decreased.
Pigments.	Indican normal	
Albumen.	none	
Sugar.	none	
Ammon. Carb.	normal.	

Analysis No 21.

Amount of urine in 24 hours not known
Colour Beer brown
Reaction Acid
Specific gravity 1019

	In per mille	
Water	955·8	
Dry Residue	44·2	
Organic material	35·3	rel +
Ash	8·9	" much −
Extractive material	3·7	" −
Urea	30·5	" +
Chlorides	1·8	rel + absol much −
Sulphates	2·6	rel −
Phosphates	4·5	" +
Pigments	Indican very slightly increased	
Albumen	none	
Sugar	none	
Ammon carb.	In excess	
Alkali Phosphates	3·2	rel. +
Earthy Phosphates	1·3	" +
Abnormal materials.	Slight urate ring with HNO_3	
Nitrogen	14·2.	

Analysis no. 20 is also that of the urine from a case of Pneumonia in an adult. The chlorides here are greatly reduced viz. to 3·8 ‰ while relatively to the Density and Dry Residue they should have stood at 8·7.

Analysis no 21. is that of the urine from the same patient, 13 days later, where there is a slight want of harmony among the symptoms. The chlorides are still very low being only at 1·8 ‰ ~~when they should have been only~~. whereas at this density, (1019) provided they had not changed in quantity from that of the previous day, they would have been 2·8 ‰., wherefore it shows that the Exudation is on the rise

58·2 : 3·8 ‰ :: 44·2 : x = 2·8 ‰.

Dry Residue Sp. gravity 1025 — Chlorides in analysis no 20 — Dry Residue Sp. gravity 1019

This decrease of Chlorides along with the increase of Pigments and Urea, taken into proportion to the Specific gravity, Shew that there is a fresh Exudation going on. On the other

hand, the colour being lighter and the specific gravity normal, the urates being in solution, as shewn by the urate ring with addition of nitric acid and the Carbonate of Ammonia in excess, as well as the increased Phosphates in=dicate that simultaneously reabsorption is taking place. But such a condition is quite possible. Exudation may be occurring in one lobe of a lung, while in another absorption is going on, or while the condition in one lung is improving, it may be becoming more serious in another. On later enquiry from the chief Doctor at the Hospital, I was told that such a condition did actually exist, viz that while the patient was recovering from the affection in the one lung, he was now suffering from the complication of the other.

Analysis No. 22 is another example from a case of Pneumonia.

Analysis No 22.

Amount of urine in 24 hours not Known -
Colour Beer brown
Smell urinous
Reaction Acid
Specific gravity 1018 In per mille
Water 958·0
Dry Residue 42·0
Chlorides 1·4 much -
Pigments Indican increased
Albumen a trace
Sugar none
Ammon carb. normal
Abnormal ingredients a watering on addition of Nitric acid

Analysis No 23

Amount of urine in 24 hours, not known

Sediment, microscopic exam. Urates,
Epithelial tube casts & red blood corpuscles.

Colour	Brick red	
Smell	normal	
Reaction	Slightly acid	
Specific gravity	1023.	In per mille
Water		946·4
Dry Residue		53·6
Urea		35·0
Chlorides		1·5 much —
Pigments	Urocrythrine increased, Indican normal	
Albumen		1·0
Sugar		none
Ammon Carb		normal
Nitrogen		16·3.

Analysis No. 24

Amount of urine passed in 24 hours 0·740 Litre
Sediment (microscopic Exam.) none, only a little mucus seen.
Colour Light beer brown
Reaction Acid
Specific Gravity 1025

	In permille	From in 24 ho.	
Water	941·7	697	
Dry Residue	58·2	43	
Organic Material	46·6	30·8	rel +
Ash	16·6	12·2	" —
Extractive Material	7·9	5·1	" +
Urea	31·7	23·4	normal
Chlorides	10·3	7·6	rel +
Phosphates	3·9	2·8	" —
Sulphates	2·4	1·7	" —
Pigments	Indican much increased		
Albumen	Doubtful trace		
Alkali Phosphates	2·8	2·0	" —
Earthy Phosphates	1·1	0·8	normal
Sugar	none		
Ammon Carb.	In excess		
Nitrogen	14·8	10·9	

Analysis No. 23 is that of a urine of a young woman, 20 years of age, suffering from an acute Pneumonia of the fourth day. And Analysis No. 24 is that of the same case on the thirteenth day after the attack had commenced. These data were given by the Hospital Physician. I am inclined to think, however, that the "fourth day" should have been termed the sixth or seventh and the "thirteenth" the fifteenth or sixteenth. The lights beer brown colour, high chlorides (1·6 above the indicated chlorides), Phosphates on the increase, normal pigments and excess of carbonate of ammonia point to a condition where all fever is over and even resorption is complete and the stage of closing reconvalescence is attained —

Analysis No 25 shows the condition in a protracted Pneumonia, where the chlorides will not rise and where from the presence of albumen an engorgement of the circulation is shown to be present

The excess of carbonate of Ammonia would in this case almost suggest the existence of Empyaema.

Analysis No 25.

Amount of urine passed in 24 hours not known.

Colour	amber	
Smell	urinous	
Reaction	Slightly acid	
Specific gravity	1015	In per mille
Water		965
Dry Residue		34·9
Urea		21·6
Chlorides		1·1 much –
Pigments		Indican (Indigo) much increased
Albumen		Distinct trace
Sugar		none
Ammon Carb.		In excess
Nitrogen		10·0.

Analysis No. 26

Amount of urine passed in 24 hours, not known
Sediment (microscopic exam.) rich, mucus.
and Epithelial cells abundant urates.
Colour Red brown, very muddy.
Smell Weakly aromatic
Reaction Acid

Specific Gravity 1031.	In per mille	
Water	927·8	
Dry Residue	72·2	
Organic Material	55·6	
Ash	16·6	
Extractive Material	10·2	
Urea	43·9	absol rel. +
Chlorides	5·8	" " —
Sulphates	3·0	rel —
Phosphates	7·8	" +
Uric acid	Increased	
Pigments	Urobilin Uroerythrine Uroerythrin richly increased, not so	
Albumen	none	
Sugar	none	
Ammon. Carb.	Distinct trace	
Alkali Phosphates	6·7	rel. much +
Alk. Earth Phosphates	1·1	
Nitrogen	20·5.	

Analysis No 26 shows signs of a status febrilis with exudation, and the mind of the analyst is directed to the possibility of the case being one of Pneumonia. The urine examined had been passed on the third day of the attack. It was found afterwards that the patient was suffering from Acute Tuberculosis.

Passing from the Pneumonias it may be well to give the analysis of the urine from a woman act 30 suffering now on the 8th day from Idiopathic Erysipelas of the face. (see next page)

Analysis No. 27.

Analysis No 27.

Amount of urine passed in 24 hours, not known.
Sediment (microscopic exam.) only a little vaginal epith.
Colour red brown, turbid
Smell urinous
Reaction Acid
Specific gravity 1020

	In per mille	
Water	953·4	
Dry Residue	46·6	
Organic material	36·7	rel +
Ash	9·9	" —
Extractive material	6·7	" +
Urea	27·5	" normal
Chlorides	2·8	" much — normal
Sulphates	3·2	rel +
Phosphates	3·9	
Uric acid	normal	
Pigments	normal	
Sugar	none	
Albumen	1·0	
Ammon. Carb.	Increase	
Alkali Phosphates	3·5	rel. +
Alk. Earth Phosphates	·4	" —
Nitrogen	12·8	

Analysis No 27

The status febrilis is here shown by the comparatively high density, (for the patient has naturally been receiving very little food) the increase of pigments and urophaein, and greatly diminished chlorides. The trace of albumen shows a slight congorgement. It is impossible here to diagnose the exact disease which occasions such a urine, but we can at once set aside those of thoracic, cerebral or abdominal origin, and it is not the urine of a febricula or of an acute rheumatism. We are thus limited to a few cases of status febrilis, and as the Uroscopist claims only to be a help to an accurate clinical diagnosis, it lies in such a case to the visiting physician to judge of the complaint.

Analysis No. 28

Amount of urine passed in 24 hours 0·3 litre

Sediment (microscopic exam.) Epithelium, mucus & uric acid crystals and urates

Colour Deep amber, turbid,

Reaction Slightly acid

Specific gravity 1026

	In permille.	Grm. in 24 hrs.	
Water	939·4	281	
Dry Residue	60·5	18·1	
Organic material	50·6	15·1	
Ash	9·9	3·0	
Extractive material	10·2	3·0	
Urea	38·4	11·5	
Chlorides	2·4	·7	much —
Sulphates	4·5	1·3	
Phosphates	3·0	·9	
Pigments	greatly in excess (Indigo)		
Albumen	none		
Sugar	none		
Ammon. Carb.	In excess		
Alkali. Phosphates	2·7	·8	
Alk. Earth Phosphates	·3	·09	
Abnormal Material	urate ring with HNO_3		
Nitrogen	17·9	5·3.	

Analysis No. 28 is that of a urine from a child under 12 years of age. He had had an attack of Scarlatina which was now almost at an end and the Doctor fearing that acute nephritis had commenced sent the urine to be examined. There are present most of the conditions of the status febrilis The above analysis was made on March 8th when no albumen was present and no tube casts were found in the Sediment. The urine was again examined on March 26th with the same result; but on April 5th, 2 ‰ albumen was found, and in the rich Sediment that existed, red blood corpuscles, a large quantity of Epithelial tubes, uric acid cryptals, mucus and amorphous urates were discovered.

Analysis No. 29.

Amount of urine passed in 24 hours, not known.			
Sediment	Mucus.		
Colour	brick red		
Smell	Strongly urinous		
Reaction	neutral		
Specific gravity	1018	In permille	
Water		958	
Dry Residue		42	
Organic material		35·8	rel +
Ash		6·2	" —
Extractive material		2·5	" —
Urea		32·3	" +
Chlorides		1·8	" much —
Sulphates		3·2	normal
Phosphates		1·2	rel. —
Pigments	Urophaein + Indican (chiefly Indigo) largely increased		
Albumen		none	
Sugar		none	
Ammon. Carb.		slightly increased	
Alkali Phosphates		0·5	rel —
Alk. Earth Phosphates		0·7	normal.
Nitrogen		15·1	

Analysis No. 29.

I could only get one specimen of a urine from a good abdominal case. It is to be found in Analysis No 29.

The usual signs of a status febrilis are present. At first sight the diagnosis, Pneumonia, would be indicated, but though the Chlorides are deminished (1·8 % when in proportion to the amount of Dry Residue they should be 6·3) and may still be getting less, suggesting a thoracic inflammatory condition, yet the large increase of Indican, chiefly in the form of Indigo, and the presence of Carbonate of Ammonia in this stage exclude the possibility of a chest affection. The diagnosis, therefore, must be between a Peritonitis, and Enteritis (Duodenitis) or Enteric fever, but in the last two cases the Chlorides would never be so much deminished, and in Duodenitis there would also be a distinct play of colours of bile pigments. It is probably therefore a case, and a bad one too, of

Peritonitis. This agrees with the Clinical diagnosis, which was Peritonitis after an abortion.

Having now spoken about the fever urines in their stage of exudation, a word may be added to what has already been said with regard to the period of absorption. Some of the previous analyses show in part the character of this stage in the course of the fever.

The chief symptoms after a crisis, and when a state of convalescence has begun, are the lighter colour of the urine, and the lower density and greater flow. The reaction, if the urine be tested very shortly after the crisis has occurred, will be found to be neutral or even alkaline. The Urea in per mille and in 24 hours is somewhat decreased, showing the presence of a temporary Anaemia, one of the results of the fever poison. The Chlorides are on the rise, and there is

an excess of Carbonate of Ammonia.
When the urine cools there is no sediment
of urates, but when Nitric acid is
added to the urine as when testing
for Albumen, a distinct "urate ring"
is seen at a level above that where the
urine and nitric acid meet, sharply
defined on its under surface but gradually
extending into the urine above, showing
no distinct line of demarcation.
A good example of this (a condition of absorption) was seen
in the urine of Analysis No 9.
This condition must be distinguished from
that of Convalescence where absorption is
complete, where the reaction is now acid,
the Chlorides normal or hyper normal only
a trace of Carbonate of Ammonia present,
Urea subnormal, Urophaein approaching
the normal and the urine generally
showing a stage of transition.

alkaline Earths are increased ——

We have already considered the urines from cases of central neurosis, where the spinal cord was chiefly affected, we now come to look at those urines where the neurosis originates entirely or principally in the brain. There are certain most distinctive characteristics belonging to this class. The Specific gravity is always high, though the colour is normal, thus differing from urines from thoracic and abdominal cases. The reaction is acid; the Indican is increased and the Carbonate of Ammonia is in excess, showing a contrast to the urines of febricula. The Chlorides are normal, while the Phosphates, chiefly of the ~~alkalies~~ ~~earths~~ ~~are~~ ~~decreased~~. Those urines on cooling give a muddy precipitate just as in cases of febricula.

Analysis No 30

Amount of urine passed in 24 hours not known
Sediment (Microscopic exam.) a few pus corpuscles

Colour	amber		
Smell	urinous		
Reaction	slightly acid		
Specific gravity	1028	In per mille	
Water		934·8	
Dry Residue		65·2	
Organic material		48·2	rel. +
Ash		17·0	rel. —
Extractive material		4·7	" —
Urea		41·9	" +
Chlorides		8·8	" —
Sulphates		2·9	" —
Phosphates		5·3	" +
Pigments	Indican (chiefly indigo) increased. No urocrythrin		
Albumen		none	
Sugar		Trace	
Carbonate of Ammonia		Trace	
Alkali Phosphate		4·5	" +
Alk Earth Phosphate		0·8	" —
Nitrogen		19·5	" +

Analysis No. 31

Amount of urine passed in 24 hours, not known

Sediment (microscopic exam.) Oxalate of Lime crystals, mucus, Stray uric acid crystals.

Colour	amber		
Smell	urinous		
Reaction	acid		
Specific gravity	1031.	In per mille	
Water		927·8	
Dry Residue		72·2	
Organic material		47·3	rel —
Ash		24·9	" +
Extractive Material		8·3	" —
Urea		37·2	" —
Chlorides		18·3	" much +
Sulphates		2·6	" " —
Phosphates		4·0	" —
Pigments	Uroerythrine present, Indican largely increased		
Uric acid		Increased	
Albumen		none	
Sugar		none	
Ammon. Carb.		Slightly in excess	
Alkali Phosphates		2·3	rel —
Alk. Earth Phosphates		1·6	" normal
Nitrogen		17 3	" +

Analysis no. 32

Amount of urine in 24 hours, 0·4 Litre
Sediment (microscopic exam.) abundant, of mucus + epithelium with rich quantity of urates and often oxalate of lime crystals.
Colour coffee brown, very muddy, when filtered dark amber.
Reaction acid
Specific gravity 1029.

	In 1000.	Grm. in 24 hrs.	
Water	932·3	373	
Dry Residue	67·7	27	
Organic material	54·6	21·8	
Ash	13·1	5·2	
Extractive material	11·8	4·7	rel +
Urea	41·5	16·6	" +
Chlorides	4·7	1·8	" —
Sulphates	2·8	1·1	
Phosphates	5·6	2·3	" +
Uric acid	Increased		
Pigments	Traces of Uroerythrine, Indican (Indigo) increased		
Albumen	none		
Sugar	none		
Ammon. carb.	Rich traces		
Alkali. Phos.	3·8	1·5	normal
Alk. Earth Phos.	1·8	0·8	rel +
Nitrogen	19·4	7·7	" +

Analysis No 30 is that of a urine from a man aet. 47 who two days previously had had a stroke of apoplexy from rupture of a cerebral vessel. The trace of sugar here is striking possibly showing connection between a central neurosis and a temporary Glycosuria – The increased Phosphates, ~~chiefly of the alkalies~~ is here marked and shows how there is a cerebral disturbance and nervous tissue waste.

Analysis No. 31. is from a case where the clinical history was Psychosis. The analysis somewhat resembles that of the previous case. Here however the Phosphates are decreased.

Analysis No 32 belongs to a case of Tetanus which Mr Haswell has published in his "Uroscopistik"

In cases of mere Hyperaemia occurring from action of the Sun or in convulsions of children we have similar conditions in the urine, with the exception that the Phosphates remain normal.

The urines from cases of Febricula or Influenza are in some points of interest. The resemble those in cases of hyperaemia of the brain, having a slighly hyper normal colour, giving a rich precipitate of urates on cooling, possessing a high amount of Dry Residue in 24 hours, but otherwise showing normal chemical properties, except when complicated with rheumatism, when we find traces of Urocrythrine -

We come now to the important class of Diabetes in its two divisions of Insipidus and Mellitus.

Both have several characteristics in common. There is the abundant flow of Urine in 24 hours, and high Dry Residue, large amount of Chlorides and decreased quantity of Phosphates. In both there are signs of a central neurosis. The Specific gravity is usually low in Diabetes Insipidus and high in Diabetes Mellitus. But this is not constant. In analysis no 35 a case of Diabetes Insipidus the Specific gravity stands at 1034 and I have seen a case of Diabetes Mellitus or at least Glycosuria where the amount of Sugar was very abundant and yet the Specific gravity was only 1008 The different analyses will shew the other distinguishing points -

Analysis No 33

Amount of urine passed in 24 hours 3·110 Litre
Sediment (microscopic exam.) Mucus & Epithelium
Colour pale urine colour
Smell Strongly urinous
Reaction Acid

		In 1000.	Grm. in 24 hs.	
Specific gravity	1.011			
Water		974·4	3020·7	polyuria
Dry Residue		25·6	79·3	
Organic material		14·8	45·8	rel & absol. —
Ash		10·8	33·5	" " +
Extractive material		5·6	17·3	rel +
Urea		8·7	26·9	" & absol —
Chlorides		8·6	26·6	" " much +
Sulphates		0·8	2·4	" " —
Phosphates		1·4	4·4	" " —
Pigments	Indican slightly increased			
Albumen	none			
Sugar	none			
Ammon. Carb.	slightly increased			
Alkali Phosph.		0·6	1·86	rel —
Alk. Earth Phos.		0·8	2·48	" +
Nitrogen		4·1	12·7	" —

Analysis No. 34.

Amount of urine passed in 24 hours 5·0 Litre
Sediment (microscopic exam.) very little, composed of mucus, epithelial debris and Bacteria.
Colour wine yellow, muddy
Reaction acid

		In per mille	Grm in 24 hs.	
Specific gravity	1010			
Water		976·7	4883·5	polyuria
Dry Residue		23·3	116·5	
Organic Material		16·6	83·2	rel +
Ash		6·6	33·3	" —
Extractive Material		3·8	19·0	
Urea		11·1	55·5	
Chlorides		3·3	16·5	" —
Sulphates		2·1	10·5	rel +
Phosphates		1·2	6·3	absol. —
Uric acid	normal			
Pigments	Urorhodin relat. somewhat increased			
Albumen	none			
Sugar	none			
Ammon.-Carb.	In distinct traces			
Alkali Phos.		1·1	5·6	
Alk Earth Phos.		0·1	0·6	absol —
Nitrogen		5·2	26·0	

Analysis No. 35.

Amount of urine passed in 24 hours 2·03 Litre
Sediment (microscopic exam.) very little, only mucus and epithelial debris
Colour Lemon yellow, turbid
Smell Slightly urinous
Reaction acid
Specific Gravity 1024

	In permille	Grm. in 24 hs.
Water	944·1	
Dry Residue	55·9	
Organic material	36·6	
Ash	19·3	
Extractive material	6·0	
Urea	29·1	
Chlorides	13·2	
Sulphates	3·3	
Phosphates	2·8	
Uric acid	normal	
Pigments	normal	
Albumen	none	
Sugar	none	
Ammon. carb.	In excess	
Alkali Phosphate	2·0	
Alk. Earth Phos.	0·8	
Nitrogen	13·5	

Analysis No 33 is that of the urine of a hospital patient. Looking at the permille analysis alone, one would not be able to form a correct diagnosis. When, however, the 24 hours' collection is taken into consideration we find the Dry Residue, Extractive material and Chlorides greatly and the Indican somewhat increased, and the Phosphates especially those of the alkalies deminished. All of which symptoms point to a central neurotic origin.

Analysis No. 34. resembles the preceding one, except that the urine is in greater quantity and the Dry Residue more increased.

Analysis No 35. is that of a urine of a gentleman who for many months had been a sufferer from neuralgic pains all over the body and from rheumatism in the knee joints. Here the Dry Residue in 24 hours is again high, Chlorides are high and Phosphates especially those of the alkalies decreased.

Analysis No 36. is that of a child's urine. The quantity of urine for one under 12 years is large and with the high Dry Residue in

Analysis no. 36.

Amount of urine passed in 24 hours, 1·22 Litre.
Sediment (microscopic exam) mucus, Epithelium
Abundant triple phosphates in three different forms.
Colour Lemon yellow, turbid
Smell Strongly urinous
Reaction very alkaline

Specific gravity 1017	In per mille	Grm. in 24 ho.	
Water	960·4	1171·2	polyuria
Dry Residue	39·6	48·3	
Organic material	27·7	33·8	rel. normal.
Ash	11·9	14·5	rel. normal.
Extractive material	5·8	7·0	rel +
Urea	20·9	25·4	" —
Chlorides	7·9	9·6	" +
Sulphates	2·2	2·7	" —
Phosphates	1·8	2·1	" —
Uric acid	normal		
Pigments	normal		
Albumen	none		
Sugar	none		
Ammon. carb.	much in excess		
Alkali Phos.	1·4	1·7	" —
Alk. Earth Phos.	0·4	0·5	" —
Nitrogen	9·7	11·8	

24 hours, increase of Chlorides, deminished Phosphates we have no difficulty in recognising a case of Diabetes Insipidus, where also there are symptoms of a central neurosis.

I have no analysis from a case of true Diabetes Mellitus, but I examined a few urines showing unmistakable signs of a Glycosuria.

Analysis 37·38·39. are all of urines from the same gentleman aged 45.
Mr. Haswell told me that the patient had been ill for about two years, when it chanced that Sugar was found in the urine. He was then put on diabetic diet, and when Mr Haswell first examined the urine, on 17th Aug/85 not a trace of Sugar was found. Since then the urine has been analysed frequently, and while the patient was strictly under diabetic diet, only a trace of sugar was discovered in the urine. On Feb 5·/86 no sugar was found in the urine, but traces were present of a hydrocarbon, Glycuronic

acid. This acid gives the sugar test with Fehling's solution if the urine be boiled long enough. And while referring to this point, I may state that when testing with Fehling's solution, if sugar be present, the usual reduction of the Copper should occur immediately before the boiling point is reached. After the urine has been allowed to boil, other substances may be precipitated. On March 9. /86 I personally analysed the urine and found it to be as shown in Analysis no 37. The sugar then amounted to nearly 1 per mille or 1·6 Grammes in 24 hours. The man had been previously on rigid diabetic diet. The quantity of sugar was so minute, that a little license was given the patient, and for ten days he was allowed two small rolls in the morning and one piece of sugar once a day in his coffee. On March 19th – ten days later, I again examined the urine with the result shown in Analysis no 38

During those few days and with that small amount of liberty in the way of general diet, the sugar had rapidly risen to 31·5 %. The patient was again placed strictly on diabetic diet, and in seven days afterwards I once more analysed the urine, and found it to contain no sugar at all. But the Glycuronic acid again showed itself. See Analysis No 39.

Analysis No. 37.

Amount of urine passed in 24 hours 1·6 Litre
Sediment (microscopic exam.) Uric acid crystals
Colour amber
Smell slightly urinous
Reaction Acid
Specific gravity Water = 1023

	A per mille	Grm. in 24 hrs.
	946·4	1514·3
Dry Residue	53·6	85·7
Organic material	38·3	61·2
Ash	15·3	24·5
Extractive material	10·1	16·1
Urea	25·7	41·1
Chlorides	9·6	15·3
Sulphates	2·7	4·3
Phosphates	3·0	4·8
Uric acid	normal	
Pigments	Slightly increased	
Albumen	none	
Sugar	nearly 1%	1·6
Ammon. carb.	none	
Alkali Phosphates	2·5	4·0
Alk Earth Phosphates	0·5	0·8
Nitrogen	12·0	19·2

Analysis No 38

Amount of urine in 24 hours		1 litre.
Sediment	none.	
Colour	amber	
Smell	slightly urinous	
Reaction	acid	
Sp. gravity	1030	In permille
Water		930
Dry Residue		70
Organic material		56·6
Ash.		13·4
Extractive material		4·7
Urea		19·7
Chlorides		9·4
Sulphates		2·0
Phosphates		2·0
Uric acid		normal
Pigments		normal
Albumen		none
Sugar		31·5
Ammon. Carb.		normal
Alkali Phosphates		1·6
Alk Earth Phosph.		0·4
Nitrogen		9·2.

Analysis no. 39.

Amount of urine passed in 24 hours, not known.
Sediment (microscopic exam.) mucus and epithelial debris
Colour wine yellow – clear
Smell very urinous
Reaction acid
Specific gravity 1017 In per mille

Water	960
Dry Residue	40
Organic material	31·2
Ash	8·8
Extractive material	7·1
Urea	22·8
Chlorides	4·7
Sulphates	2·1
Phosphates	2·0
Uric acid	normal
Pigments	normal
Albumen	none
Sugar	none
Ammon. Carb.	none
Alkali Phosphates	1·5
Alk Earth Phosphates	0·5
Abnormal ingredients	Glycuronic acid
Nitrogen	10·6.

Analysis No 40

Amount of urine passed in 24 hours 1·2 Litre
Sediment (Microscopic Exam.) mucus & uric acid crystals abundant. Vaginal epithelium -
Colour Lemon - slightly turbid
Reaction acid
Specific gravity 1034

	In per mille	Grms in 24 hs.
Water	920·8	1105
Dry Residue	79·2	95
Organic material	67·0	80·4
Ash	12·2	14·6
Extractive material	10·1	12·1
Urea	19·5	23·4
Chlorides	7·2	8·6
Sulphates	2·6	3·1
Phosphates	2·4	2·9
Uric acid	In excess	
Pigments	normal	
Albumen	none	
Sugar	35·9	43·1
Ammon Carb.	slightly in excess	
Alkali pposph.	1·7	2·0
Alk. Earth Phos.	0·7	0·8
Nitrogen.	9·1	10·9.

Analysis No. 40 is that of a urine of a lady aet. 50. who for a long time had been in the habit of taking much sugar in or along with her food. What attracted her attention first was the amount of urine voided in 24 hours.
At present there is no polyuria, but the Dry Residue is fairly in excess.
I found on analysing the urine however as much as 35·9 % of Sugar and 43·1 Grammes in 24 hours.
It is a case of what Bernard calls a "Glycosuria Alimentaire". There are signs present of a retarded metamorphosis and of a uratic diathesis. The Nitrogen is not increased, and there are no Symptoms of a Central neurosis.

In a true Diabetes Mellitus Sugar is always found in the urine, no matter what the diet may be, and with the Sugar there is an increase of Urea indicating a rapid change of material Similar to that in cases of Diabetes Insipidus with a true neurotic root. The Glycosurias are probably the initiatory stage in many cases of a true Diabetes Mellitus.

Reference must now be made to <u>Choluria</u> or that class of cases where the liver or gall bladder or both become affected.

In cases of Morbus Hepatarius Gravis the Urea is found to be greatly de=creased, and is generally replaced by Leucine and Tyrosine, intermediate products formed in the liver. Coupled with this the chlorides are usually decreased, and other signs of a status febrilis are present. An intense brown pigment (Urophaein) shows itself, Indican is largely increased in the form of Indigo, and Albumen is found in the urine, probably from engorgement of the portal system. These signs give evidence of a parenchymatous affection of the liver and that of a serious character.

When there is simple increase of the gall colouring pigments, Bilirerdine and Bilirubine, we have only to deal with a slight catarrhal affection of the Ductus Choledocus.

Analysis No. 40

Amount of urine in 24 hours, not known.

Colour	yellow brown		
Smell	foetid		
Reaction	faintly acid		
Specific Gravity	1019	In permille	
Water		955·8	
Dry Residue		44·2	
Organic Material		33·3	rel +
Ash		10·9	" −
Extractive material		13·0	" much +
Urea		19·7	" = −
Chlorides		3·7	" much −
Sulphates		0·8	" " −
Phosphates		6·4	" " +
Pigments	Urophaein, Indican + Bilirerdine greatly increased		
Albumen		none	
Sugar		none	
Ammon. Carb.		In excess.	
Alkali Phosphates		5·1	" " +
Alk. Earth Phos.		1·3	" +
Nitrogen		9·2.	" −

Analysis No. 40. is an interesting one. It is that of the urine from a young woman a hospital patient, 20 years of age. The Urea in this instance is not markedly decreased, and leucine and Tyrosine were not found. The Extractive materials are, however, in excess, the pigments Biliverdine and Bilirubine are in quantity, and the Chlorides are low. The fact that these salts are deminished shows that Exudation is taking place somewhere, accompanied by fever. In fever cases, as we have seen, the Phosphates are usually deminished, except in the case of Rheumatic fever. Here they are largely increased. This circumstance coupled with the great increase of Indican strongly suggests an accompanying affection of the central nervous System, perhaps an acute hyperaemia of the brain. The decrease of the Chlorides is too great taken in connection with the comparatively high urea for a case of atrophy or cirrhosis of the liver,

but rather point to a hepatic abscess or a pneumonic complication. The comparatively high amount of urea excludes the possibility of a large part of the parenchyma of the liver being destroyed or implicated. This diagnosis was fully borne out when the post mortem examination was made, for the patient died in two days afterwards. The parenchyma of the liver was only to a slight extent affected. During the last 24 hours of life the patient was in a state of coma, and the fatal cause of death was Pneumonia.

Analysis No 41

Amount of urine passed in 24 hours, not known
Sediment (microscopic exam.) Abundant urates
& under microscope quantity of amorphous urate

Colour	orange red		
Smell	urinous		
Reaction	acid		
Specific Gravity	1025	In per mille	
Water		941·8	
Dry Residue		58·2	
Organic material		39·4	
Ash		18·8	
Extractive material		7·5	
Urea		30·9	rel. slightly −
Chlorides		12·5	" " +
Sulphates		2·4	" —
Phosphates		3·9	" slightly −
Pigments	Urobilin present, Indican (Indigo) largely increased		
Albumen	a trace		
Sugar		none	
Ammon. Carb.		Slightly increased	
Alkali Phos.		3·0	
Alk. Earth Phos.		0·9	
Nitrogen		14·2	

Analysis No. 41 is that of a case, where the clinical diagnosis was Cirrhosis of the liver and is an example of how an erroneous diagnosis may be corrected. The urine here has a high density, yet the Chlorides are increased. A condition of fever is therefore set aside. The high density is from the decrease of water in the urine, probably owing to the Ascites which was here present. The trace of Albumen without any sign of an affection of the Kidney, indicates a disturbance in the Circulation, excluding, however, engorgement of the portal system, for had it been complicated, the urophaein would have been increased, and Bile pig= =ments would have been increased. From the analysis it is perfectly clear that liver was not affected.

One of the most important groups of the Albuminuriasis that of the Albuminurias They are of frequent occurrence and a clear knowledge of them is necessary.

Naswell has subdivided this large group into

I. Renal Albuminurias. (Nephrogenous of Thomas) which deals with all albuminurias that are directly caused by disease of the Kidney, and include all those affections, which come under the title of Bright's disease.

II. Accidental Albuminurias where a substance or fluid rich in Albumen is mixed with the urine

III. Mixed Albuminurias where in the sediment of the urine for example there are found morphotic elements both of the kidney itself and of its pelvis.

IV. The nephrangiogenous, a term employed by Thomas in ~~contrast~~ contrast to the Nephrogenous, and which refers to Albumen having nothing to do with the Kidney, as a primary cause or directly.

These subdivisions will now be taken up more in detail

Under the first subdivision we have

1. Intratubular or Parenchymatous Nephritis including

(1) Desquamative Nephritis.

This is merely a catarrh of the tubuli, caused by a temporary hyperaemia. With the exception of a small amount of albumen, the volumetric analysis of the urine does not show much difference from that of a physiological urine, but in the sediment by means of the microscope we find a great number of Epithelial tubes and a few red blood corpuscles.

(2) Acute Nephritis, which occurs as a result of Scarlet fever and Diphtheritis, or from the effects of cold. In the early Stage we have a fewer urine with evidence of Exudation, shown by reduced Chlorides. In addition there is a considerable amount of albumen, which may even reach 50 %., and a characteristic Sediment containing

granular and epithelial tubes and red blood corpuscles. The excretion of the Chlorides and albumen stands usually in an inverse proportion to one another. The presence of blood in the urine is shown by the reddish brown pigment from methaemoglobin, a derivative from haematine.

Analysis No 42 shows the above characteristics very well.

Analysis No. 42

Amount of urine passed in 24 hours 0·3 Litre
Sediment, (Microscopic exam.) Spare; mucus and Epithelial debris, occasional Epithelial and hyaline tubes, abundant red blood corpuscles
Colour Dark beer brown, muddy
Smell weakly urinous
Reaction acid
Specific Gravity 1014. In per mille. Grm. in 24 hrs.

Water	967·4	290·3
Dry Residue	32·6	9·7
Organic material	20·8	6·2
Ash	11·8	3·5
Extractive material	6·5	1·9
Urea	11·3	3·4
Chlorides	6·6	1·9
Sulphates	1·8	0·5
Phosphates	3·4	1·1
Uric acid	decreased	
Pigments	Urophaein increased	Haemoglobin
Albumen	2·5	0·75
Sugar	none	
Ammon. Carb.	In traces	
Alkali Phos.	2·5	0·75
Alk. Earth Phos.	0·9	0·27
Nitrogen	5·3	1·6

Analysis No. 43.

Amount of urine in 24 hours. 2·35 Litre
Sediment (microscopic exam.) Epithelial & granular tubes in fair quantity. Pus abundant Redblood corpuscles & mucus.
Colour redbrown, turbid
Reaction slightly acid

Specific gravity 1011	In per mille	Gram in 24 hrs.
Water	974·4	2289·9
Dry Residue	25·6	60·1
Organic material	19·5	45·8
Ash	6·1	14·3
Extractive material	5·1	11·9
Urea	9·4	22·0
Chlorides	3·2	7·5
Sulphates	1·3	3·0
Phosphates	1·6	3·7
Uric Acid	Slightly decreased.	
Pigments	Methaemoglobin & Indican	
Albumen	4·1	9·6
Sugar	none	
Ammon Carb.	None	
Alkali Phosphates	1·3	3·05
Alk. Earth Phos.	0·3	0·7
Abnormal ingredients	Salicylic acid ex medication	
Nitrogen	4·4.	10·3.

Analysis No. 43 is also of a urine from acute nephritis. Five days before this particular Analysis was made viz. on the tenth day of the attack, the Albumen was very abundant, 5 °/₀₀. and the Chlorides were somewhat decreased. On the thirteenth day the Chlorides were on the rise and the albumen had de=creased to 2'4 °/₀₀.

On the fifteenth day I again examined the urine, and found the Chlorides still decreased and the albumen at 4'1 °/₀₀ The quantity of urine was more than double the amount on the thirteenth day. On that day there was merely one litre. Now it reached to 2'35 litre. This last was a favourable Symptom, as it shewed that the system was being relieved of engorgement

Analysis No 44

Amount of urine passed in 24 hours, not known.
Sediment (microscopic exam) Granular and epithelial tubes, red blood corpuscles uric acid crystals and mucus.

Colour	red brown	
Smell	urinous	
Reaction	slightly acid	
Specific gravity	1019	
Water		In per mille 953·8
Dry Residue		44·2
Urea		24·9
Chlorides		3·9
Pigments	urobilin & indican slightly increased	
Albumen		9·7
Sugar.		none.

Analysis No 45

Amount of urine in 12 hours 1 Litre
Sediment (microscopic exam) Epithelial Tubes & tubecasts
Colour blood red, muddy
Smell slightly urinous
Reaction acid
Specific gravity 1011

	In per mille and Grm. in 12 hours.
Water	974·4
Dry Residue	25·6
Organic material	18·3
Ash	7·3
Extractive material	3·6
Urea	11·7
Chlorides	4·0
Sulphates	2·0
Phosphates	1·3
Uric Acid	Diminished
Pigments	Methaemoglobin & Indican
Albumen	2·4
Sugar	none
Ammon. Carb.	slight trace
Alkali Phos.	1·0
Alk. Earth Phos.	0·3
Nitrogen	5·4

Analysis No. 44. 45 are those from two specimens of urine from a patient suffering from Acute nephritis. The urine in Analysis No 44 was passed two days before that shown in analysis No. 45. The second analysis, No. 45, is already in the stage of reabsorption shown by lower density, relatively increased Chlorides and reduced Albumen.

(3) Separate from acute parenchymatous nephritis we have the Chronic form with, in most cases, unknown origin. There is frequently a cardiac complication. In such cases the urine possesses a lighter colour, than in the acute stage, is of lower density, has less sediment, which under the microscope shows as a rule hyaline or fatty tube casts. The Albumen is in large quantity, and may be due partly to the Kidney disease and partly to engorgement from the impaired function of the heart.

Analysis No 46.

Amount of urine passed in 24 hours, not known.
Sediment (microscopic exam.) A few hyaline tube casts and pus cells.
Colour dark orange
Smell strongly urinous
Reaction acid
Specific Gravity 1021.

	In permille	
Water	951·1	
Dry Residue	48·9	
Organic Material	34·4	normal
Ash	14·6	normal
Extractive Material.	4·3	
Urea	27·1	normal
Chlorides	9·0	rel. +
Sulphates	2·6	" —
Phosphates	3·0	" —
Pigments	Urophaein present + Indican increased	
Albumen	1·5 approx. Cy.	
Sugar	none	
Ammon. Carb.	slightly increased	
Alkali Phosph.	2·3	" —
Alk. Earth Phos.	0·6.	" —
Abnormal ingredients	urates ring on addition of HNO_3	
Nitrogen	12·6.	

Analysis No. 46. is an example of a case of Chronic nephritis, where the clinical diagnosis also added "stenosis of the tricuspid valve" There are evidences of astalus febrilis from the high colour of the urine (Urophaein) reduction of Phosphates and presence of Urates in solution. The Chlorides being high however exclude the presence of hydration. The amount of Albumen (1·5‰ approx.) taken along with the result of the microscopic examination indicates a Chronic Parenchymatous Nephritis.

Under the head of Chronic disease we also have the interstitial form of Nephritis or we may have at the same time a condition of parenchymatous and interstitial nephritis. The albumen here is somewhat less than in the former cases; the microscope reveals the presence of only a few granular and hyaline casts. The urea is reduced and a frequent result of such a condition is that of atrophy of the Kidney.

Analysis No. 47.

Amount of urine in 24 hours, not known,
Sediment (microscopic exam) Granular and
Epithelial tubes and hyaline casts,
Mucus, Epithelial debris & bacteria

Colour	beer brown		
Smell	urinous		
Reaction	acid		
Specific Gravity	1022		
	In permille		
Water	948·8		
Dry Residue	51·2		
Organic material	40·2	rel	+
Ash	11·0	"	—
Extractive material	7·6	"	+
Urea	27·6	"	— slightly
Chlorides	6·7	"	— "
Sulphates	1·2	"	—
Phosphates	3·1	"	—
Pigments	Indican (Indigo) in excess		
Albumen	3·5		
Sugar	none		
Ammon. Carb.	Slight excess		
Alkali Phos.	2·1	"	—
Alk Earth Phos.	1·0	normal	
Nitrogen.	12·8		

Analysis No. 47. is a case of Chronic Interstitial nephritis with cardiac complication (Clinical Diagnosis)
The diagnosis here must be mainly founded on the microscopic examination.
The high Specific gravity would tend to direct the attention to the possibility of an engorgement, as a secondary process resulting from the disease of the Kidney.
Analysis No 48. were it not that in this analysis no tubes could be found, the diagnosis of atrophy of the Kidney might be made, as judged from the quantity of urine and the small amount of Albumen. The urine is here very salt, as is seen by the large increase of Chlorides (hydrochloruria neurotica). Further signs of a neurosis are shown by the diminished Phosphates (especially of the alkalies) the increased Indican and dry Residue.

Another Chronic affection of the Kidney is Amyloid disease, where there is voided abundant urine and a large amount of albumen, with a sediment composed in part of hyaline casts.

Analysis No. 48.

Amount of urine in 24 hours, 3·8 Litre
Sediment (microscopic exam) pus cells + mucus
Colour pale
Smell urinous
Reaction faintly acid
Specific Gravity 1008

	In permille	Grm. in 24 hours	
Water	981·4	3768·6	polyuria
Dry Residue	18·6	71·4	absol. +
Organic Material	11·3	43·3	rel —
Ash	7·3	28·1	" +
Extractive material	2·9	11·1	" +
Urea	7·5	28·8	" rabsol —
Chlorides	5·6	21·5	absol greatly +
Sulphates	0·6	2·3	rel —
Phosphates	1·1	4·2	" —
Pigments	Indican slightly increased		
Albumen	0·77	2·9	
Sugar	none		
Ammon. Carb.	slightly increased		
Alkali Phos.	0·54	2·0	" —
Alk. Earth Phos.	0·58	2·2	" —
Nitrogen	5·4	13·0	" —

II under the second division of the Albuminuria group, viz the accidental albuminurias we have

1. Pyelitis 2 Suppurative Nephritis.

As said before the albumen present in the urine here is due not to disease of the Kidneys per se, but to the addition to the urine of an albuminous material, blood or pus or both from another part of the urinary tract viz the pelvis, ureter, bladder or urethra. It is mainly from the microscopic examination that we are able to discover the site of suppuration or hoemorrhage. In cases of Pyelitis we find in the acute form, normal to dark brown urine, fairly high density, acid reaction, with slightly decreased Chlorides and increased Indican; while under the microscope, we find well defined pus corpuscles having distinct nuclei on the addition of acetic acid, and at the same time larger quantities of the unipolar, Spindle shaped, epithelial cells of the pelvis and those of the

Calyces, arranged like tiles on a roof, with an occasional epithelial cell from the ureter.

In the chronic form of pyelitis, the urine is lighter in colour, the pus has a greenish yellow hue, on account of its commencing to decompose and to become viscid. The Specific gravity is subnormal, the pus corpuscles are less sharply defined, the nuclei less distinct with acetic acid and the pelvic epithelium is in less quantity or is even absent. It is supposed that the pus cells are formed thro degeneration of the epithelial cells by metamorphosis -

Analysis No 49. 50. 57 are cases of Chronic Pyelitis -

Analysis No 49. The trace of albumen is here due to the pyuria. There were no morphotic elements of the Kidney found under the microscope.

Analysis No. 49.

Amount of urine in 24 hours not known.
Sediment (microscopic exam). Large & flaky.
nearly all pus cells. Occasional epithelial
cells of pelvis & calyces.

Colour	wine colour, turbid	
Reaction	acid	
Specific gravity	1016	In per mille
Water		962·7
Dry Residue		37·3
Organic material		26·2
Ash		11·1
Extractive material		6·7
Urea		18·7
Chlorides		8·0
Sulphates		1·7
Phosphates		1·4
Uric acid	normal, rel. slightly reduced	
Pigments	Indican slightly increased	
Albumen		clear trace
Sugar		none
Ammon. Carb.		small trace
Alkali Phos.		1·1
Alk. Earth Phos.		0·3
Nitrogen		8·7

Analysis No 50.

Amount of urine passed in 24 hours 1·5 Litre
Sediment (microscopic exam.). Rich, flaky & purulent. Pus corpuscles in great abundance. Epithelial cells few. Here & there over the bladder.
Colour Light amber. Turbid
Reaction neutral
Specific gravity 1008

	In per mille	Grm. in 24 hrs.	
Water	981·4	1472·1	Shows a
Dry Residue	18·6	27·9	very little
Organic material	11·1	16·6	
Ash	7·5	11·3	
Extractive material	3·5	5·2	
Urea	7·0	10·5	very little
Chlorides	5·0	7·5	rel. rich
Sulphates	1·4	2·1	
Phosphates	1·1	1·6	
Uric acid	Diminished		
Pigments	Indican slightly increased		
Albumen	Decided trace		
Sugar	none.		
Ammon. Carb.	Distinct trace		
Alkali Phos.	0·4	0·6	
Alk. Earth Phos.	0·7	1·0	
Nitrogen	3·2.	4·8	

Analysis No. 50. Though the Epithelium characteristic of Pyelitis could not be found, yet the very small quantity of Carbonate of Ammonia and absence of Epithelium of the bladder, (both excluding Cystitis) and of all morphotic elements of the Kidney, which would show a condition of suppurative nephritis, confines the diagnosis to that of a Pyelitis. The neutral reaction of the urine is caused in part by the Alkalies given in the course of the treatment.

Analysis No. 57

Amount of urine passed in 24 hours 1·24 Litre
Sediment (microscopic exam) Moderate amount flaky
Amount pus corpuscles, single, in groups
and in threads. Scattered swelled up epithelial
cells of calyces. Bacteria.
Colour orange yellow, very turbid
Smell strongly urinous
Reaction acid
Specific gravity 1020

	In per mille	From in 24 hs.	
Water	953·4	1182·3	
Dry Residue	46·6	57·7	
Organic material	31·3	38·8	rel slightly —
Ash	15·3	18·9	" " +
Extractive material	5·7	7·0	" " +
Urea	24·3	30·1	" " —
Chlorides	10·2	12·6	" " +
Sulphates	2·2	2·7	" " —
Phosphates	2·9	3·6	" " —
Pigments	Urrhodine slightly increased		
Albumen	Distinct trace		
Ammon carb	Slight trace		
Alkali Phosphates	2·5	3·10	normal
Alk Earth Phos	0·4	0·5	rel —
Nitrogen	11·3	14·0	" —

Analysis No. 51. is that of a case of Pyuria. The small amount of Carbonate of Ammonia, the acid reaction and the absence of bladder epithelium exclude the possibility of a Cystitis. The diagnosis therefore lies between a urethritis and a pyelitis. The presence of a few Epithelial cells of the Calyces makes it to be more probably a case of pyelitis. The Analysis shews no signs of an acute condition.

In Cystitis, as opposed to Pyelitis we have with the abundant amount of pus, giving rise to the presence of Albumen, an alkaline reaction of the urine, so soon as it has been voided, though Ultzmann and others have lately stated that an acid reaction may be given in a case of Simple Cystitis. There is an excess of Carbonate of Ammonia from the decomposition of the mucus of the Urea into Carbonate of Ammonia. We find also under the microscope bladder Epithelial cells, and there is an absence of the morphotic elements of the Kidneys—

III. Under the third division of the Albumenuria we have the mixed cases, where at the same time there is an affection both of the tubules or tissue proper of the Kidney and of the pelvis, or again where there is suppuration of the Kidney following a nephritis.

IV Finally we have the Nephrangiogenes of Thomas, where the presence of Albumen is not due to any actual disease of the Kidney or bladder, but to some external cause Eg. engorgement (Arterial or Venous) or Haematuria from some irritant eg. cantharides or carbolic acid. &c.
As examples of venous engorgement, I may refer to those cases of advanced pregnancy, where albumen is present in the urine. I had occasion to examine seven times of women with whom labour had commenced. In five of these, distinct traces of albumen were visible. One case was particularly remarkable. A primipara aet 21.

was seized on the morning of 8th March with attacks of eclampsia, which occurred at 5. 7. and 9 am. On the 9th she had two attacks, viz. at 7 and 9 am. The urine I examined was passed between these last two seizures.
The analysis is seen in No 52. One mistake that was fallen into at the bedside was caused by the rapid admixture of nitric acid, which gave rise to a thick precipitate, at first sight believed to be Albumen.
But when the urine was filtered and diluted, two distinct rings were noticed on the careful addition of nitric acid, the lower ring, that of albumen, showing approximately 0·2 per mille, the upper and less dense one was merely composed of urates, which had masked the precipitate of albumen. The presence of epithelial tubes seen under the microscope indicate perhaps the existance of a slight ~~engorgement~~ nephritis
On the 10th at 9 am. the child was

born spontaneously and after that no more convulsive attacks occurred.
Before delivery, however, she had had altogether nine separate and severe fits.
On the 12th I examined the urine of the previous evening, twenty four hours after delivery and found only the faintest trace of albumen.

Amount of urine in 24 hours unknown.
Sediment (micro. exam) urates, mucus
Stray epithelial tubes.

Colour	brick red, filtered dark amber	
Reaction	acid	
Smell	urinous	
Specific gravity	1028	
Water	934·8	per mille
Dry Residue	65·2	
Organic Material	54·2	
Ash	11·0	
Extractive Material	17·5	
Urea	34·7	
Chlorides	4·4	rel. quantity —
Sulphates	2·3	" —
Phosphates	4·3	" —
Pigments	Highly pigmented. Indican rich urine also a trace of urobilin.	
Albumen	Scarcely 0·2.	
Sugar	none	
Ammon Carb.	normal	
Alkali Phos.	3·2	" —
Alk Earth Phos.	1·1	" —
Abnormal ingredients	Urate ring with HNO_3	
Nitrogen	16·4	normal

In these analyses I have tried to show how greatly the careful examination of the urine to a full extent qualitatively and quantitatively can assist the clinical observer to form a correct diagnosis and prognosis. Each disease or pathological condition of the body possesses its own characteristic urine, and a knowledge of the varieties in the proportion of the constituents of the urine in most cases can give a distinct clue to the state of the patient.
No attempt has been made to urge that this urinoscopic should supersede accurate and painstaking clinical work. What has been aimed at has been, among other things, to point out that in neglecting the examination of the urine in all its details the practising physician is setting aside one of the most valuable aids to his endeavours to distinguish between diseases and to alleviate their symptoms.

And now by way of Summary let me group in a few words some of the more important points that have been referred to in this "Urosemiotik".

We have seen as regards Colour, how in fever urines, in acute cases generally, and in the early stage of Chlorosis, it is high, due to the excess of brown pigment from the loss of Haematine; while in the Hyaemias, eg. Neuroses, central and peripheral, in Hysteria, in the latter stage of Chlorosis and in some of the Chronic diseases of the Kidney, it is pale.

Smell is of value in detecting Ammoniacal urine, and giving a reason why Carbonate of Ammonia is found in the Urine. The characteristic odour of the urine in Diabetes Mellitus is well known.

It is important to note the Specific Gravity, its height in Diabetes Mellitus, in Cerebral cases and in acute febrile conditions, from the amount of Urea and Extractive material, which the urine

contains; its lowness in Diabetes Insipidus, in Spinal neuroses, in Hysteria, in cases where the function of the skin is impaired and in some chronic conditions of the Kidney.

The Reaction is worthy of notice, as showing a point of difference between Spinal and cerebral neuroses. In the former it is weakly acid or neutral, while in the latter it is decidedly acid.

It was pointed out also that immediately after a Crisis has occurred in a febrile condition, the reaction of the urine is neutral or even alkaline, and thus occurs with the presence of the Urate ring on the addition of nitric acid. The alkalinity in Cystitis is marked due to the amount of Carbonate of Ammonia. The ~~acidity~~ acidity of the urine is increased in fever cases, especially in Rheumatic fever, and also where there is present the Uratic diathesis.

The proportion of water to Dry Residue is increased in cases of Urina Potus, in

the Hydruria and Hydraemias and in some of the chronic diseases of the kidney.

We found the amount of Dry Residue in 24 hours largely increased in Diabetes Mellitus and Insipidus, in fever urines and decreased in Hysteria and in cases of Convalescence &c.

The varying amount of the Urea in this is of importance to notice. In considering the fever urines, and the early of Chlorosis and in Diabetes we saw that it was in excess, while in Anaemia, in the stages of resorption and Convalescence in Bright's disease and especially in severe cases of Morbus Hepatis gravis it is much diminished, due either to impoverished blood or to its retention in the blood ——.

The estimation of the amount of the Chlorides in all acute cases was dwelt upon, care being urged while doing so to take into consideration the Colour of the urine and its density.

We saw how in all conditions where

exudation was taking place the Chlorides were found to be deminished, and how this was particularly marked in acute thoracic affections. It was pointed out that the rapidity and extent of the fall in the amount of Chlorides enabled the analyst to distinguish between abdominal affection, Pleurisy, and Pneumonia. One case was specially noticed, where, though there were indications of reabsorption going on in one lung, it was known from the deminished Chlorides that exudation was still occurring in the other lung, or in another part of the same lung. In spinal neuroses and in Morbus Hepatarius gravis it was shown that the Chlorides were frequently deminished, and their increase was noticed in cases of recovery, in Diabetis Mellitus and Insipidus, in cases where the skin was affected, and in the urines of those people, whose diet was relatively

too rich.

He found that when the bowels had been thoroughly purged, the Sulphates were decreased

As regards the Phosphates, a consideration of them was found to be of great service. They were seen to be increased in acute rheumatism in the form of Earthy Phosphates, and when this occurred immediately after the urine was passed and in the absence of Carbonate of Ammonia it was suggested that the pericisteum had become affected. The Phosphates are markedly increased also in brain cases, where in addition there was found to be a disproportion between the Phosphates of the Alkalis and of the Alkaline Earths, the ~~former~~ latter subdivision being the one chiefly augmented. The contrary was found to occur in Spinal neuroses, where the Earthy Phosphates were precipitated on the addition of

heat, and were redissolved by a drop of acetic acid, and were noticed to be relatively ~~more~~ less abundant than the Alkali Phosphates. In Diabetes, in Convalescence, in the states febriles, in the uratic diathesis, and where an impaired change of material in nervous tissue was occurring, the Phosphates were discovered to be decreased.

It was also pointed out that their decrease had an important influence on the retention in solution of the cryptals of uric acid. The finding therefore of uric acid cryptals in the sediment of a urine was no guarantee that the uric acid was in excess, but when really present in too great proportion the mind of the physician would be directed to careful attention to the patient's diet.

The presence or absence of Carbonate of Ammonia was shown to be well worthy of notice. Naturally it is much increased in ammoniacal

urine in Cystitis &c. It was seen to be in excess just after a crisis, in Spinal and Cerebral neuroses, in Empyaema and in abdominal affections.

The Pigments such as Uroerythrine Urophaein and Indican were found to demand regard. A distinguishing point about Abdominal and Thoracic affections was illustrated in the fact, that in the former the Indican appears in the form of Indigo, but in the latter in that of Urrhodine. We saw that Indican was increased in all central nervous lesions, in cases of over loaded bowel, where absorption from the faeces took place, and in affections of the liver.

The influence of diet on Glycosuria was proved in more than one Analysis, & in Analysis No 30, there seemed to be a connection between a central (Cerebral) Neurosis and a temporary Glycosuria.

with reference to the Albuminurias as the notice of them in the thesis is so short, it is unnecessary to group them still further. The difference between acute and Chronic cases is shown by the colour and density, the amount of Chlorides, Phosphates and albumen. The use of the microscope is the chief means by which a correct diagnosis can be made. The absence or presence and character of the morphotic elements of the Kidneys is naturally of the highest importance to notice.

Let me again mention that before a true Knowledge of the condition of the patient can be arrived at from the Urosemiotik, it is necessary that no one feature should alone be noted, but that from the complete analysis of the urine a general and comprehensive view of the state of matters be arrived at.