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REPORT

and

COMMENTARY

on cases

written for the

WIGHTMAN PRIZE

in

CLINICAL MEDICINE

by

[redacted]

Wightman Prize Essay

Edinburgh University

15th June, 1914.

The cases are six in number and are or were under the care of Professor Sir Thomas Fraser and Professor Russell, who have kindly given the writer permission to use his notes for this purpose.

The Commentary includes observations on a few points concerning the metabolism in these patients as expressed in the urine and in the blood: the analyses were carried out in the Edinburgh University Physiological Laboratory.

REPORT OF CASES.

CASE I.

Diabetes Mellitus

Name Duncan Macarthur.

Age 21, unmarried.

Address 24 Plantation Road, Stornoway

Occupation Salesman

Admitted 29th April 1914, Ward XXVIII.

Complaint Fatigue on slight exertion: thirst: large amount of urine.

Duration Three months.

HISTORY.-

Of Present Illness.

February 1914 Early in February the patient began to notice that he was very thirsty & took a great deal to drink: & that he was passing an excessive amount of urine, which was pale. He can think of no cause for these Symptoms.

March 1914 By march he had to rise 5 or 6 times in the night to micturate: & in the daytime the frequency was still greater — 2 or 3 times per hour. And he found himself so thirsty that he had to drink water very freely & frequently — sometimes one pint every quarter or half hour, he states.

He noticed that he was losing weight & strength: & became unfit for work, which he left a fortnight ago. He consulted Dr. Mackenzie then, had a short holiday & was advised to come to the Royal Infirmary Edinburgh. A week before admission he was complaining of being tired even on walking a short distance & had

April 15th

April 22nd

a pain, aggravated by exertion but continuously present, in the region of the right ankle. This has now quite disappeared.

Previous History: Surroundings.

He has been accustomed to plenty good food & is comfortably housed: his work is not heavy nor is he exposed to inclement weather. He has been a teetotaller until a fortnight ago when he began taking some beer to alleviate his thirst. He formerly smoked 3 ounces of tobacco weekly but since his illness started he has reduced the amount to about 1.

He had whooping cough when a child & measles when aet. 14. For 11 years he has suffered from a discharge from the left ear: this has latterly became foul-smelling. There is no history of gonorrhea or syphilis.

Family History.

Mother aet. 45 is alive & well
Father aet. 46 " " "
Four Sisters & four Brothers are all alive & well.
One Brother died of whooping cough in infancy. No family history suggesting tuberculosis or syphilis was elicited.

EXAMINATION

General Facts.

The patient is thin: but apparently comfortable: his cheeks are red but his lips & gums pale.

His weight is 9 stones 10¼ lbs.

He passes about 60 ℥ of pale urine daily: it contains acetone, diacetic acid & sugar (about 30 gr. per ℥).

The skin is moist: his expression is placid & he betrays no special anxiety as to his condition.

Temperature 98° F.

Urinary System.

The kidneys are not palpable: the frequency of micturition has been referred to. The bladder functions are otherwise normal.

The investigation of the urine is expressed in the following table:—

Case I.

Urine Examination

Name D. macarthur Date 5·5·'14

Total 105 ounces = 2980 cc.

	As mg. N. per c.c.	Total in grams of N.	% N.
Total Nitrogen	9·29	27·68	
Urea ..	6·02	17·94	64·5
Ammonia ..	1·43	4·26	15·4
Uric acid ..	·07	·20	·7
Amino acids ..	·42	1·25	4·5
Creatinine ..		·53	3·0
Creatine ..		·42	2·3
Undetermined ..			9·6
			100

Acidity ·29 cc N/10 H_2SO_4 per cc : total = 864 cc N/10 H_2SO_4

Spec.Grav. 1040

Albumin —

Sugar 25·52 gr. per ounce : 58·4 gm per litre :

Diacetic acid +

Acetone +

Indican —

Microscopically —

On using the phenylhydrazine test, glucosazone was obtained. Other points in the composition of the urine are referred to in the Commentary.

The tests for acetone (Legal's, Lieben's iodoform test, Frommer's salicylic aldehyde test) were all markedly positive.

Digestive System.

There are no complaints concerning this system except a tendency to constipation which has come on since he became ill: he may go 2 days without a motion. The liver is 5½ ins. in vertical extent in the mid-clavicular line, reaching from the level of the 5th rib to the costal margin: it is not palpable. No splashing in the stomach region was elicited. His thirst has been referred to.

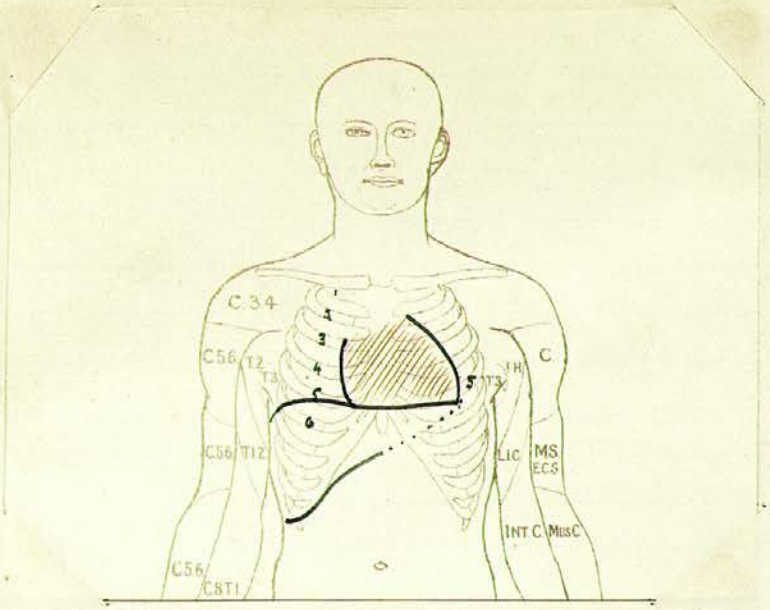
Circulatory System.

He has no subjective phenomena. The pulse rate is 68 per minute: the rise & fall of the wave are of normal rapidity & extent & the apex of the wave is well-sustained. The blood pressure is 100 mm of mercury (systolic)

On inspection there is no cyanosis or dropsy to be seen: the lips are pale. There is slight pulsation seen in the neck: it is arterial. The apex beat is seen in the 5th left intercostal space 4½ inches from the middle line.

On palpation the cardiac impact is not abnormal as to force or otherwise.

On auscultation the heart sounds bear normal relations one to another, & are free of morbid accompaniments in all areas.



On percussion the right border of the heart is found to extent ½ an inch out from the edge of the sternum at the level of the 4th costal cartilage: to the left at the same level the heart dulness extends for 3½ inches: the apex is distant 4½ inches from the middle line.

Haemopoietic System.

The spleen does not come in front of the mid-axillary line. The superficial lymphatic glands are not enlarged nor

is the thyroid gland.

The blood counts are these :—

(15·4·'14)

Haemaglobin 58%

Red Corpuscles .... 3,020,000 /c.mm.

Colour Index ..... ·96

White Corpuscles ... 5125 /c mm.

Polymorphs ..... 55·5 %

Lymphocytes ..... 38·0 %

Large mononuclears ... 5·5 %

Eosinophils ..... 1·0 %

Platelets ..... 186,000 /c.mm.

There is thus a well-marked condition of anaemia : all the elements are low in amount. There is diminution of leucocytes.

The blood sugar was ·477 gm. per 100 cc (%).

Respiratory System.

There is no apparent embarrassment of breathing & no complaint of dyspnoea or other symptom. On inspection & palpation the chest wall is seen to be poorly clad

with subcutaneous fat: the movement is equal on the right & left sides & no morbid change is seen or felt. On percussion the note is of normal resonance. Vocal fremitus is of normal intensity on both sides. On auscultation, the breathing is found to be vesicular & without accompaniments: vocal resonance is normal. The rate of respiration is 18 per minute. There are no signs of tubercular disease.

Nervous System.

There are no mental or subjective phenomena: the pain formerly felt in the region of the right ankle has now disappeared & there is no local tenderness. No abnormalities in the motor or sensory functions was made out. The knee jerk is active: the response to stroking the sole is a flexor one.

The patient has a long-standing discharge from the left ear: the odour is foetid there is occasionally a little blood with the discharge: a watch normally (by this ear) heard at 18 inches is only heard when about 6 inches away.

Integumentary System.

The skin is dry. There is no complaint of itching. Subcutaneous fat is scanty.

PROGRESS and TREATMENT

29. 4. '14 Full diet. : weight 9 st 10¼ lb.

5. 5. '14 Milk diet.

6. 5. '14 Fish, Eggs.

8. 5. '14 : weight 8 st 13 3/4 lb.

9. 5. '14 Porridge, Butter, ~~toast~~.
Eggs, carrot etc.

20. 5. '14 Patient complains of pain at back of his eyes : but there is no impairment of vision.

21. 5. '14 Porridge, butter, Eggs,
oatcake, onion etc.

22. 5. '14 : weight 8 st 10 lb.

25. 5. '14 Meat diet.
Thyroid 3ij

26. 5. '14 Thyroid 3ij

30. 5. '14 "

1. 6. '14 "

The patient's condition is not improving : the progress will also be considered in the Commentary.

CASE II.

Diabetes Mellitus

Name Mrs Sarah Reilly.

Age 43

Address 15 Stoneroad, Dalmeny.

Occupation Housewife.

Admitted 15th December 1913, Ward XXV

Complaint Thirst, weakness & frequency of micturition.

Duration 13 months.

HISTORY.-

Of Present Illness

October 1912 The present illness dates from the birth of a dead child in October 1912: there was delay in obtaining the doctor & the labour was tedious. During the pregnancy she had observed a tendency to drink a great deal. This thirst became more marked in the puerperium

which was complicated by attacks of nausea, giddiness faintness of vomiting which left her very exhausted: her feet became swollen in the pregnancy & have remained so, since.

October 1913 By 12 months, she had become considerably worse. For example she would drink 3d worth of skimmed milk & 3 bottles of ginger beer between 7 a.m. & 9 a.m. The thirst continued throughout the day & night & was not specially marked at any particular time. She lost appetite for solid food & became very constipated.

November 1913 She consulted Dr. Dickson of Queensferry, who gave her "pills & medicine": this relieved the sickness & dizziness but not the excessive thirst. She observed that she was sweating

profusely at night & that the swelling of the feet had increased. Within the last month she has also been complaining of headaches.

December 1913 She was admitted to ward XXI on the 15th December 1913.

Previous History: Surroundings.

She is in comfortable surroundings & gets plenty good food & fresh air. She has been subject to headaches for "many years" but has until 13 months ago enjoyed otherwise good health. She remembers having had measles in childhood.

Family History.

Father died aet. 59 from Bronchitis
Mother died aet. 56 from "Gastric Inflammation".

Two sisters
One brother } alive & well.

The husband is alive & well: there is tuberculosis in his side, however.

There has been a family of ten, of whom 5 are alive :—

3 girls — aet. 14 alive & well
aet. 11 " "
aet. 7 (has suffering from scarlatina)

2 boys — aet. 6 alive & well
aet. 5 " "

And 5 are dead :—

(1) aet. 14 yrs. phthisis
(2) aet. 8 m. vaccination (arm to arm)
(3) aet. 8 m. pneumonia
(4) aet. 3½ yrs. phthisis
(5) dead from October 1912.

EXAMINATION

General Facts.

Her weight is 8 stones 10 lbs. & her height 5 ft. 3 in.

The development is good & there are no obvious morbid appearances Except slight oedema of the feet. The laxity of the skin of the abdomen suggests some loss of fat & she says that she once was much stouter.

She wears an expression of care. Her attitude is recumbent: she prefers to lie on her left side, since otherwise she has a vague discomfort.

Temperature 98° F.

Urinary System.

The kidneys are not palpable. The daily quantity of urine varies greatly: it is often of normal amount. The sugar is about 30 grs. per ounce. The more detailed examination of the urine is tabulated:-

Urine Examination.

Name Mrs Reilly Date 9.1.'14

Total 43℥ = 1290 cc

	As mg. N. per c.c.	Total in grams of N.	% N.
Total Nitrogen	11.6	14.96	
Urea ...	9.5	12.30	82.3
Ammonia ...	.46	.59	3.9
Uric acid ..	.11	.20	1.3
Amino acid ..	.03	.06	.2
Creatinine ..		.20	1.3
Creatine ..		.09	.6
Undetermined ..			10.4

Acidity .38 cc N/10 H_2SO_4 per cc : Total = 487.6 cc N/10 H_2SO_4

Spec.Grav. 1042

Albumin —

Sugar 30.8 gr/℥ = 66.6 mgm/cc = 85.9 grams total.

Diacetic acid —

Acetone — ?

Indican —

Microscopically : deposit of mucus.

The sugar was recognised from its reagent to be glucose.

With the very delicate salicylic aldehyde test for acetone (Frommer) a distinct reaction was obtained: but not with the other tests.

Other points will be referred to later.

On admission there was pain & frequency (? from pruritus) — now disappeared.

Digestive System.

The patient has no pain or discomfort on swallowing, or after food: she has a distaste for solid food, to which she prefers liquids. She is troubled with flatulence, which she associates with a costive condition of the bowels.

On percussion over the stomach region, a tympanitic note is obtained to a point ½ inch above the umbilicus: no splashing could be elicited. The liver is found to reach from the level of the nipple above to the costal margin below — 5½ inches in the mid-clavicular line: it is not felt.

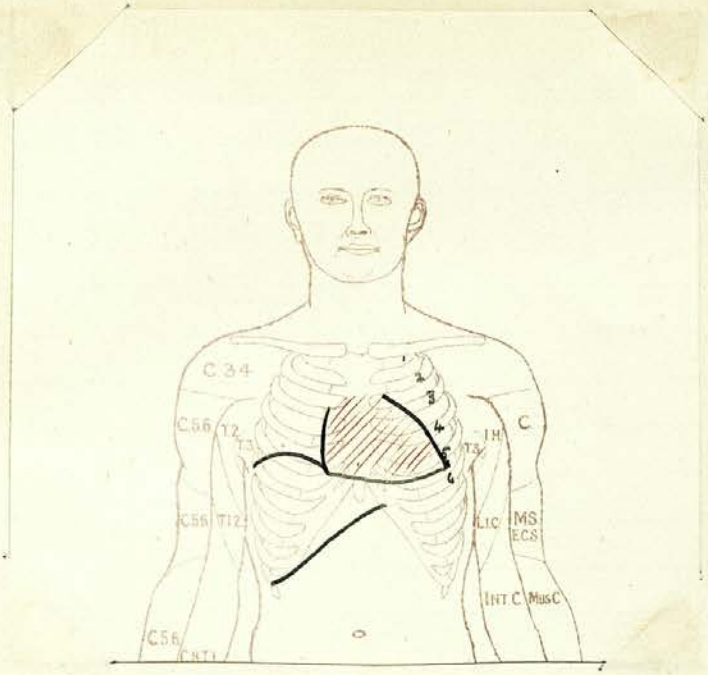
The patient has been constipated especially in the last 2 months, sometimes passing 3 days without having a motion. She sometimes has a bad taste in the mouth.

Circulatory System.

There is no complaint of precordial pain: but she describes the seat of a former pain as below the left breast. Arterial pulsation is seen in the vessels of the neck: it is normal in time & degree. The pulse rate is 70 per minute: the rise of the wave is not abrupt, the apex is well-sustained & the fall gradual: there is no dicrotism or irregularity: the vessel is not thickened or tortuous.

The blood pressure is 150 mm. mercury Systolic & 105 mm., diastolic.

There is no bulging or retraction of the precordia: the apex beat is not visible: but it is felt in the 5th



space — 6" inches from the middle line : on percussion the heart dulness is found to extend 3/4 inch from the right edge of the sternum at the level of the 4th costal cartilage, & 4" to the left of the middle line at the same level : & 6 ins. at the level of the nipple & the apex beat. The beat is regular & of the same rate as the pulse. The beat is not diffuse or heaving.

On Auscultation at the apex the 2nd sound is heard to be as loud as

the first : at the Tricuspid area the same is heard : and at the base, the first sound is faint. There are no morbid accompaniments.

Haemopoietic System.

The thyroid gland is soft but not enlarged : the spleen reaches the mid-axillary line : the superficial lymphatic glands are not enlarged.

The blood examination gave these results :—

Haemoglobin ... 95%
Red Corpuscles ... 4,510,000
Colour Index .... 1·05
White corpuscles .. 4370/c.mm.
Polymorphs ..... 65·0%
Lymphocytes ..... 20·0%
Large mononuclears .. 14·5%
Eosinophiles .... 0·5%
Platelets ..... 210,000/c.mm.

As in the last case there is some leucopenia.

Respiratory System.

The breathing is 20 per minute & of abdomino thoracic type. The patient has no cough. On inspection nothing abnormal is made out: expansion is equal on the two sides. Vocal resonance & fremitus are normal. On percussion the note is of normal resonance. On auscultation the breathing is vesicular & not well heard, especially in expiration: but there are no morbid accompaniments.

Nervous System.

There are no mental or subjective phenomena: nor any sensory or motor change: but the knee jerk was absent or very weak. The plantar response was flexor. The patient complains of failing vision: on ophthalmoscopic examination

some large white patches were seen in the macular region of the right eye: on 31.12.'13 Dr. Lyon reported that the patient had a high degree of myopia, that the left eye showed a staphyloma in the region of the disc & choroidal changes: that the right eye had a much larger staphyloma: that there was nothing suggesting diabetic retinitis & that the condition was due to myopia. She has a frontal headache on wakening in the morning.

Genital System.

Menstruation started at the age of 14: each period lasts 3 days. There have been no such disturbances as dysmenorrhea or menorrhagia, or leucorrhea.

After the birth of the dead born child in October 1912, menstruation recommenced & was regular but the period only lasted 1–2 days. Last period on 12.12.'13.

Integumentary System.

There is a complaint of severe itching in the vulvar region. There is no emaciation evident but the patient states that before her illness commenced she was rather stout. Striae gravidarum are well marked.

PROGRESS and TREATMENT.

The loss of weight & changes in the total urine & sugar daily are expressed in a graph in the Commentary.

On admission the patient was given ordinary diet: she had frequent doses of Magnes. Sulphas; on the 23rd Dec. 1913, a convalescent diet was started.

On the 3rd January the administration of tryparsogen was started: the dose was gradually increased up to 10

thrice daily, until the 2nd of February 1914. No alteration in the patient's condition, nor in the urine (as mentioned later) could be made out.

The patient then commenced a diabetic diet, with, at least, transient benefit. She got up first on the 4th of March 1914.

On the 16th of January she got spectacles: this was followed by disappearance of the morning headache.

The patient was discharged, improved, on the 20th of March 1914.

CASE III.

Chronic Interstitial Nephritis.

Name James Adams

Age 56

Address 6 Lady Menzies Place, Edinburgh

Occupation Ex-police-constable.

Admitted 15th April 1914, Ward XXVIII

Complaint Shortness of Breath

Duration 12 months.

HISTORY.-

Of Present Illness.

April 1913 Some 12 months ago he noticed, to his surprise, that on going up the hound he was very short of breath. This he again observed when at his work the following day. He

Nov. 1913 remained — at work — in this condition: & some 6 months ago noticed the onset of frequency of micturition: this gradually increased until he now rises four times in the

night to pass water; & he micturates constantly in the daytime.

December 1913 In December he consulted Dr. Price & was given medicine.

January 1914 Since the New Year he has had a cough: the sputum was often very frothy & difficult to bring up, especially if he was lying down.

March 1914 In March last, his attention was drawn to the swelling of the lower eyelids: he then saw Dr Barker: & in the same month Dr. Bryce, the Police doctor: he then retired from the service.

April 1914 On the 12th of April, he observed blood in the right eye: & on the 13th of April a similar subconjunctival haemorrhage occurred in the left eye.

On the 15th (the day of admission) he found his feet swollen when he put on his boots in the morning.

Previous History : Surroundings.

1858 He was born at Millerhill, Midlothian: in childhood had measles.

1871-76 He worked in the pit for 5 years

1876 & then enlisted: he left the army

1882 in 6 years & then entered the Edinburgh City Police.

1885 & 1888 He has had rheumatic fever twice & 6 years ago had an attack of

1908 muscular rheumatism.

1914 Because of ill-health he left the Police Force on the 2nd of March last.

Except for the rheumatic fever above-mentioned he has enjoyed excellent health: he is accustomed to have plenty good food & has a comfortable home. When in the army he drank to excess: he now drinks 1-2 pints daily, chiefly of beer. He smokes one ounce of tobacco weekly.

Family History.

Father killed (in pit) aet. 43
Mother died "broken-hearted" aet. 53
Three of the family died in infancy: a sister died aet. 21 of a strained heart: another died (cause unknown) when a young woman: the has two sisters alive one aet. 61 in good health & another aet. 65, who suffers from shortness of breath. His wife died of cancer in the Deaconness Hospital 4 years ago. There have been 6 children & all are alive & well, but one girl aet. 15 who is rheumetic: their ages are 10, 15, 20, 22, 23½ & 26 years.

EXAMINATION

General Facts.

His weight is 10 st. 8 lbs. & his height 5 ft. 8 ins.

The muscular development is good but there is evidence of emaciation in the arms, which are less dropsical than the rest of the body.

The lips & cheeks show cyanosis & there is a greyish pallor. The lower eyelids are markedly oedematous: there is a subconjunctival haemorrhage in the left eye, chiefly in the lower & outer quadrants: & the remains of a similar haemorrhage at the outer canthus of the right eye.

He is short of breath - especially at night: he has most comfort when propped up by 3 or 4 pillows into the sitting position.

His voice — formerly clear — is now husky.

The temperature is 98·8° F.

There is a sword-scar over the first right intercostal space.

Urinary System.

The kidneys could not be felt. Except for the frequency of micturition there are no functional disturbances referable to the urinary tract.

The urine is copious & of low specific gravity: there is a trace of albumen: no casts were found, even after centrifuging.

The urine was examined quantitatively: the results are set down in tabular form:—

Case III.

Urine Examination.

Name James Adams Date 16.5.'14

Total 623 = 1760 cc

	As mg. N. per c.c.	Total in grams of N.	% N.
Total Nitrogen	7.27	12.80	
Urea ..	5.30	9.33	72.9
Ammonia ..	.59	1.04	8.1
Uric acid ..	.09	.16	1.2
Amino acid ..	.24	.43	3.3
Creatinine ..	.45	.83	6.5
Creatine ..	.01 (Trace)		
Undetermined..			8.0
			100.0

Acidity .33 cc N/10 per cc : = 581 cc N/10 H_2SO_4 Total.

Spec.Grav. 1010

Albumin + but not estimable.

Sugar —

Diacetic acid —

Acetone —

Indican +

Microscopically No casts found, even on centrifuging: phosphatic crystals & mucus.

the analysis will be further referred to.

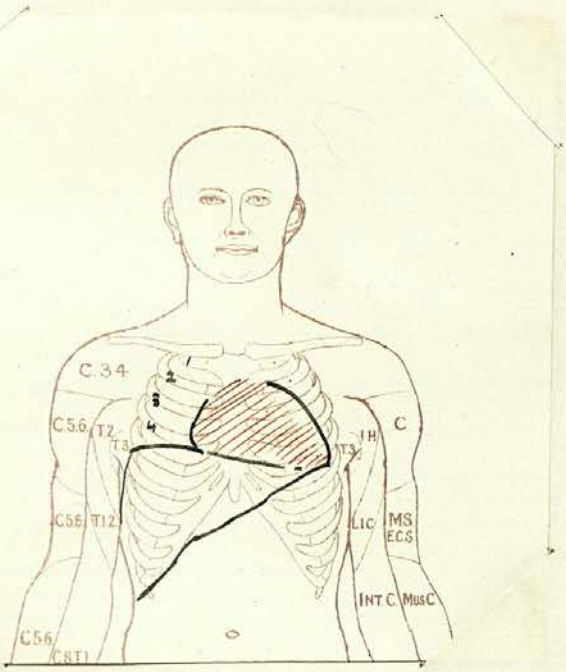
Circulatory System.

There is no pain, palpitation or faintness: there is marked dyspnoea & some cyanosis & dropsy: dilated capillaries are seen on the cheek. There is no visible pulsation in the neck & no capillary pulsation.

The pulse rate is 104: it is regular as to time & amplitude: the rise is not abrupt, the apex well sustained & the fall not unusually slow or sudden. The blood pressure is high — 190 m.m. mercury (Systolic). The radial artery is small: when felt after obliteration it suggests thickening or hypertonicity: the same condition is observable in other superficial arteries eg. the superficial temporal.

The apex beat is not visible: there

is visible epigastric pulsation. There is slight bulging on the left side of the chest as compared with the right side. The apex beat is felt in the 6th interspace $5\frac{1}{2}$ inches from the middle line & below & to the outside of the nipple. The beat is weak & diffuse.



On percussion the heart dulness is found to Extend to the right 2 inches from the middle line at the level of the 3rd interspace: & $4\frac{1}{2}$ inches to the left at that level. The oedema has been referred to.

Auscultation ?

Haemopoietic System.

The thyroid, spleen & superficial lymphatic glands are not enlarged. The blood examination gave these results:-

Haemoglobin ... 56%
Red Corpuscles .... 2,550,000 /c.mm.
Colour index 1.0
White Corpuscles .. 8,080 /c.mm.

Polymorphs ... 70%
Lymphocytes ... 28%
Large mononuclears .. 5%
Eosins. 2%

Platelets 350,000

The coagulation time was unusually rapid.

Respiratory System.

There is marked dyspnoea: the respirations number 30 per minute & the movement is abdomino-thoracic. There is a cough, especially in the morning. The voice is thick & husky. On inspection, palpation percussion & auscultation, no abnormality

was discovered except some dulness at the base of each lung & some medium crepitations ~~there~~ a at the end of inspiration.

Digestive System.

There are no subjective symptoms. On examination no morbid condition was found. A tympanitic note in the stomach region was got to within 1½ inches above the umbilicus: no splashing could be elicited. The liver measures 6 inches in vertical depth in the mid-clavicular line; it reaches above ~~to~~ the 5th rib & below to the costal margin. His appetite is good.

Nervous System.

There are no mental or subjective phenomena. There are no morbid changes in the motor or sensory functions. The knee jerks are both present & the plantar response is a flexor one. The

Subconjunctival haemorrhages have been already mentioned.

TREATMENT and PROGRESS.

The patient has been put at rest in bed: & is on a light, meat-free diet.

Within a few days of his admission he was, at his own request, discharged. His oedema & dyspnoea were less prominent.

CASE IV.

Acute Nephritis.

Name Robert Waad

Age 29

Address 4 East Adam St., Edinburgh

Occupation Tanner's machineman

Admitted 1st May 1914

Complaint Swelling of abdomen & of feet.

Duration Three weeks.

HISTORY.-

Of Present Illness.

April 13 1914 Three weeks ago he caught cold when at his work: with this influenza he was off work for two days: he returned be-

April 15 1914 fore well again & had to leave his work shortly after: he observed swelling of the feet & abdomen & saw, in Dr. Bowie's absence, Dr. Darling

who gave him powders & a bottle of medicine, sent him to bed & told him to cut meat soups etc out of his diet. Some swelling of the face was also observed at this time.

April 20, 1914 He later saw Dr. Bowie who advised his admission to the Royal Infirmary Edinburgh: by this time the swelling had greatly increased & he had great difficulty in walking because of the swollen legs & genitalia. He also had difficulty in breathing because of his abdomen being blown up.

May 1, 1914 This last week his symptoms have been less severe.

Admitted to ward XXVIII, today.

Previous History : Surroundings.

As a child, he had measles, whooping cough & scarlet fever : he has had an accident resulting in the loss of the last phalanx of the left middle finger. He has been otherwise well.

He gets plenty good food : & only takes an occasional glass of beer. Though his work is not heavy, he is much exposed to draughts.

Family History:

Father is aged 59 & is alive & well
Mother is now in Hospital with heart disease.
He has one brother & one sister, both alive & well.
His wife is aet. 28 & is well : there is one child aet. 2½ alive & well : since ~~that~~ the birth of that child there has been one miscarriage.

EXAMINATION General Facts.

His weight is 12 stones 8 lbs.: & his height 5 ft. 8 ins.

The patient is well-built & muscular: he is pale: there is puffiness of the face & especially of the lower eyelids. There is no embarrassment of respiration & his attitude is comfortable & his expression placid.

The temperature is 98° F.

There is oedema all over — legs, flanks, face & in the peritoneal cavity, where a fluid wave can be elicited in the iliac fossae.

The urine is smoky from the presence of blood & contains albumin & casts.

Urinary System.

The kidneys are not palpable. Urine analysis gave these results:—

Urine Examination.

Name R. Wood Date

Total 1460 cc.

	As mg. N. per c.c.	Total in grams of N.	% N.
Total Nitrogen	6·84	9·99	
Urea ..	5·17	7·55	76·2
Ammonia ..	·32	·47	4·7
Uric acid ..	·07	·10	1·0
Amino acid ..	·36	·53	5·3
Creatinine ..	·34	·49	4·9
Creatine ..	—	—	
Undetermined..			7·9 / 100

Acidity ·41 cc N/10 H_2SO_4/cc : 598 cc N/10 H_2SO_4 Total

Spec. Grav. 1017

Albumin + Blood + Urine smoky → 5 gr per ℥ i.e. 1·84 mg N per cc.

Sugar —

Diacetic acid —

Acetone —

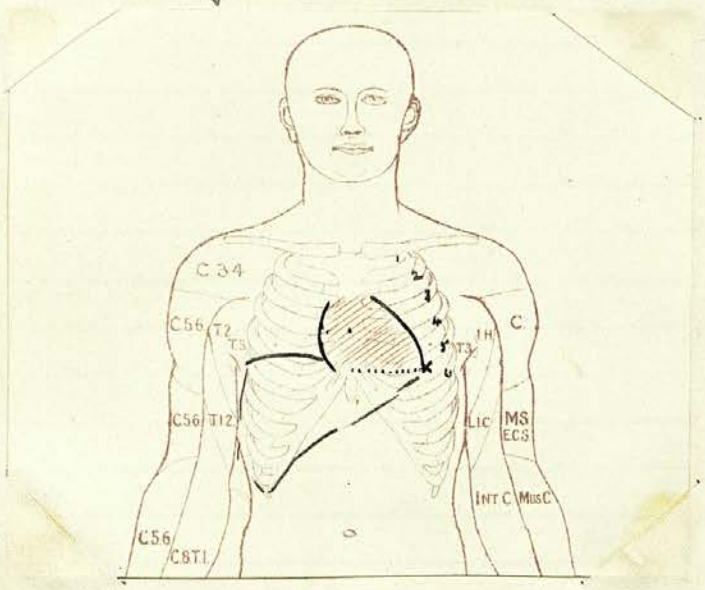
Indican —

Microscopically Blood corpuscles: granular casts: hyaline casts.

Circulatory System.

There are no subjective phenomena. The pulse rate is 64 per. minute – the same rate as the heart beat : the wave rises & falls with normal rate & amplitude & the apex is well-sustained. The blood pressure is 130 m/m. mercury (systolic)

On inspection no abnormality is seen : the apex beat is observed in the 5th left interspace 4¼ inches from the middle line. On palpation the beat is felt to be strong & heaving both sounds being "felt".



On percussion the deep heart dulness is found to extend at the level of

the 4th costal cartilage for 1/4 inches to the right of, and 2 1/2 inches to the left of the middle line. On auscultation no abnormality was discovered in any area.

Respiratory System.

There are no symptoms such as cough or dyspnoea. The respirations are 18 per minute & of abdominal type of movement. On inspection no asymmetry is seen: the chest wall is well clad with muscle & subcutaneous tissue. On palpation & percussion the normal conditions were found. On auscultation some medium crepitations were heard at each base. There were no other morbid accompaniments: & the breathing was of vesicular type all over.

Digestive System.

The patient has no complaints concern-

ing this system. Examination of the abdomen reveals no abnormality except the oedema & slight ascites already mentioned. The liver dulness reaches from the 4th interspace above to the costal margin below & measures 7 inches in the midclavicular line.

TREATMENT and PROGRESS.

On admission the patient was put on a milk diet: the oedema is notably less day by day & the patient's face looks less & less bloated. He is given hot air baths.

On the 12th of May he started a diet containing fish: & on the 15th, chicken.

He was given Pulv. Jalap. C. gr. LX t.i.d. from the 14th May & mV of Tr. Ferri Perchlor. t.i.d. starting 15th May. The patient is now very much improved.

CASE V.

Subacute Nephritis

Name John Blackie

Age 44

Address 5 Milne's Court, Edinburgh

Occupation Billiard marker

Admitted 7th May 1914

Complaint Swelling of Legs.

Duration A month

HISTORY.-

Of Present Illness.

10th April, 1914 About a month ago patient observed swelling of his feet and a pain in the back: he had about this time a "fainting turn": he knows of no cause for these symptoms & does not relate them to the other conditions (infra) from which he was already suffering.

20th April, 1914 The swelling has increased to

that for the last fortnight he has had some difficulty in walking. His appetite has become poor: for this last week he has had a dull pain in the left side of the chest below the nipple.

May 1, 1914.

He has become aware of gradually increasing thirst, especially at night: he passed large quantities of urine but noticed no abnormal frequency.

Previous Health: Surroundings.

His surroundings at home & at work are good: his work is not heavy. He is temperate with alcohol ("occasional glass of beer") & smokes one ounce of tobacco weekly, but formerly smoked 3 ounces.

1870 He was born at Leith: & as a boy, had measles & whooping cough.

1881 When aet. 11, he had a fall & hurt his forehead: the wound was stitched. Just after this there appeared a curvature of the spine for which he was admitted to the Old Infirmary under the care of Prof. Spence: he was off school for 6 months.

1883 When aet. 13, the right wrist became diseased & he entered the Royal Infirmary, where Mr. John Duncan operated on him, removing the wrist: further a gland, on the inner aspect of the arm just above the right elbow, was removed.

1884 12 months later the right little finger was removed by Mr. Hadsdon.

1890 When he was 20 years of age, he "ruptured" himself: the hernia was on the right side & entered the scrotum: since then he has worn a truss, with satisfactory result.

1913 Last June a painful swelling appeared in the left inguinal region: for this he was admitted to ward XII & Mr. Wade opened an abscess, which had closely simulated a femoral hernia.

In October, he started work again but had to leave it in 10 days, because the abscess reopened & discharged. He remained off work

1914 until January 1914: the abscess closed again in February: & at this time he had a "bilious attack": since January he has been at work until May 5th.

Family History.

Father is aet. 69, alive & well.
Mother died aet 36, of consumption.
His wife is alive & well; there are no children
He has 2 brothers & one sister: they are alive & well.
His grandparents all reached old age.

EXAMINATION

General Facts.

Patient's weight is 7st. 3¾ lb. His height is 4 ft 7½ ins. : & his temperature : he lies recumbent & appears comfortable. He has little subcutaneous fat for example on the chest.

There is no cyanosis or dropsy about the face : on admission there was marked oedema of the lower limbs & genitals : there is now pitting.

When?

nip on pressure, as high as the knees.

There is a spinal (kyphotic) curvature in the mid-dorsal region: there is no local pain or tenderness.

There is a scar & beneath it some bony thickening in the right supra-orbital region, referable to an accident in boyhood.

There is a scar in the right epitrochlear region, due to former operation: the right hand shows scars of previous operations in which there have been removed the 5th metacarpal bone & finger & most of the carpus: the fourth finger is very lax & weak: the other fingers, and the thumb have almost complete extent of movement: but when he flexes the hand there is some ulnar deviation.

In the left inguinal groove there is a scar where the abscess was opened. He wears a spiral truss for a right sided inguinal hernia: he states that it does not come down on coughing but would do so if he were to walk: it is controlled by the truss: the external ring & the canal are slightly enlarged & there is an impulse on coughing.

Urinary System.

The pain he complains of is a dull one & in the small of the back.

The kidneys are not palpable.

There is now no frequency of micturition. The urine is copious & contains albumin & granular casts. The analysis is as follows:—

Case V

Urine Examination.

Name J. Blackie Date 9.5.'14

Total 80℥ = 2270 cc.

	As mg. N. per c.c.	Total in grams of N.	% N.
Total Nitrogen	2·39	5·43	
Urea ..	1·72	3·90	71·8
Ammonia ..	·14	·42	7·7
Amino acid ..	·15	·33	6·1
Uric acid ..	·05	·11	2·0
Creatinine ..	·10	·22	4·2
Creatine ..	—	±	
Undetermined..			8·2
			100

Acidity ·40 cc N/10 acid per cc : 9080 cc N/10 H_2SO_4 total

Spec.Grav. 1013

Albumin 6 gr. per ℥ = ·014 gm. of N per cc.

Sugar —

Diacetic acid —

Acetone —

Indican +

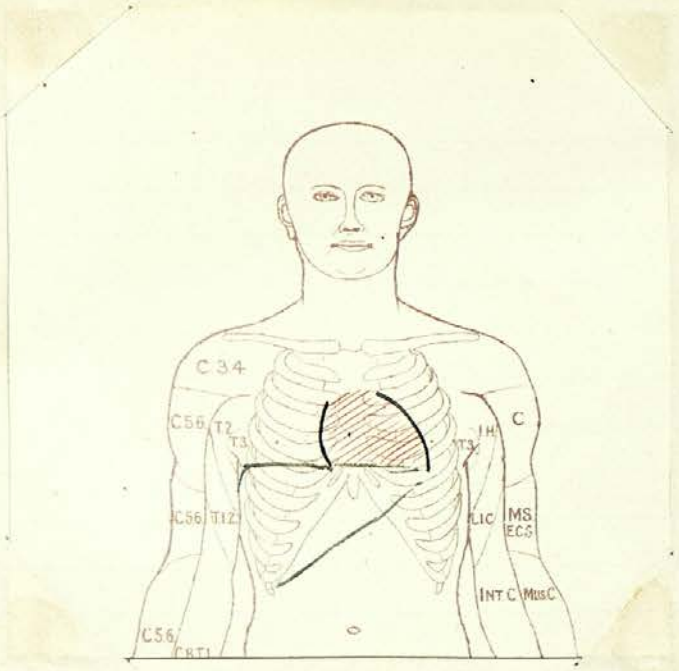
Microscopically Granular Casts : mucus.

Circulatory System.

There are no subjective phenomena: the patient formerly had a pain in the left side of the chest below the nipple: it was not severe & has now quite gone.

The pulse rate is 88 per minute: it is regular in time: but there is a slight & occasional irregularity in force. The rise & fall of the wave are of normal rapidity, the amplitude of normal extent & the apex is well-sustained. The artery is thick but not tortuous.

On inspection, pulsation is seen in the 5th interspace 3 inches to the left of the middle line. On palpation the apex beat is found 4¼ inches to the left of the middle line in the 5th interspace, and ¼ inch below & internal to the nipple: & a diastolic thrill is felt over the precordia.



On percussion the deep dulness is found to extend at the level of the 4th costo-chondral junction for 1 inch to the right of & 2½ inches to the left of the middle line. The apex beat is 4¼ inches to the left of the middle line.

On auscultation at the mitral area the first sound is obscured by a short pre-systolic bruit propagated in a 2 inch circle round the apex and along an area leading up to the inner end of the

3rd left costal cartilage where it is best heard. The second sound has no morbid accompaniments.

Respiratory System.

There is no embarrassment of breathing: the patient has some morning cough: the expectoration is small in amount but not difficult to bring up. The respirations are 20 per minute & the movement is chiefly abdominal. The chest is short in vertical depth because of the spinal curvature. The chest wall is thin.

On palpation the vocal fremitus is found to be diminished at each base: there is also, in those regions, dulness & on auscultation medium crepitations.

Digestive System.

The patient has no discomfort or pain in relation to food. He suffers from flatulence and from eructations. The bowels move daily. The liver reaches from the 5th rib above to the costal margin below — a distance of 3½ inches in the mid-clavicular line. The splenic dulness does not come in front of the mid-axillary line.

Nervous System.

There are no subjective or mental phenomena. The knee jerks are both active: the plantar response is a flexor one. There are no symptoms referable to the cranial or other nerves.

TREATMENT and PROGRESS.

4.5.'14 The patient was put on a milk, & then, on a meat free diet (8.5.'14) : on May 8th he was given Pulv. Jalap. Co. gr. XXX t.i.d. By May 9th the swelling was very much less & the patient much more comfortable. He is still under treatment.

C A S E VI.

Progressive Muscular Atrophy.

Name Matthew Bruce

Age 51

Address 8 Kildonan Terrace, Bellshill.

Occupation — (formerly a miner)

Admitted 11th April 1914, Ward XXVIII.

Complaint Muscular weakness.

Duration 12 years.

H I S T O R Y.-

Of Present Illness.

1902 The weakness started 12 years ago in the right foot. It became slowly worse & on the advice of

1904 Dr. Service, he left the pit face for the lighter work of driving a horse: in a few months he left this for the Western Infirmary, Glasgow, where he was treated

by electricity : some improvement resulted, & he then worked at the pit for short
1905 periods. About three years after the weakness of the right foot was observed, he noticed a similar condition of the left foot. He spent 3
1908 years at a Bridge Works & then became idle, for nearly 6 months. He then obtained a stocktaking job : he states that he could write as well as formerly at this time ; one day he stumbled & fell while running. His appetite was
1909 failing, & in view of this & his weakness, he ~~sh~~ went to New Zealand : he returned in 3 years
1912 & came under the care of Prof. Greenfield (ward XXIII, R.D.E.) for 10

weeks : by this time he noticed the approach of weakness in the right hand & then in the left hand. He was treated by massage & electricity & was much benefited : since he could not walk easily, & formerly his foot went down with a "flop" in walking.

1914 Since then he has been at home, never confined to bed, as he prefers to keep going about, although with difficulty. He has never had any pain in connection with this weakness of the limbs, nor any cramps: he has never observed tremor or fibrillation. He entered the Royal Infirmary again, on Dr. Muir's recommendation.

April 1914

Previous History : Surroundings.

1863 He was born in Ayrshire : he does not remember about the diseases of childhood.

1880 When aet. 17 he had rheumatic fever & 3 years later — he had en-
1883 teric fever

He has otherwise had good health, & has had no venereal disease.

He is teetotal : has a good appetite & is comfortable at home. He does not smoke.

Family History.

Father died aet. 68 in epileptic fit.
Mother died aet. 80 of pneumonia.
He has one brother, alive & well: & 4 sisters, of whom two aet. 53 & 39 are alive & well : & 2 died (1) aet. 35 who was "weakly" & (2) aet. 40 of "paralysis."

EXAMINATION

General Facts.

His weight is 9 stones 12 3/4 lbs. (22.4.14)
His height 5 ft. 1 in. When in the Infirmary 2 years ago he weighed 10 stones.

The muscular development, in parts free of the atrophy, is good: the subcutaneous fat is present in good quantity. There is no dropsy, cyanosis or jaundice.

He wears a contented expression: & lies "well down" in the bed because of the helplessness of his shoulders & back: he usually lies on his left side.

The temperature is 99°.

Nervous System.

A. There are no mental phenomena.

B. Subjective phenomena such as pain, numbness are absent: he feels the extremities cold — as they are.

C. Motor Functions.

Upper limb: he can abduct & flex at the shoulder joint: extension is weak. He can raise the arm from the side till it forms a right angle with the chest, but not any farther: he just manages to touch the back of the neck with the right hand: & can do this a little more easily with the left hand. When he puts the arms forwards in front of him, both scapulae are strongly winged: & the body of each scapula seems to be

thickly clothed with tissue of the consistence of muscle, suggesting a hypertrophy of the supraspinatus, infraspinatus & subscapularis muscles. A similar condition of the deltoid muscle was observed on each side. A swelling was found over the vertebra prominens: the relations were only with difficulty made out & suggest that the swelling is a kyphotic curve due to the drooping of the head.

At the elbow joints the movements are free and strong. There is no marked atrophy of the upper arm. The forearm shows some atrophy & its muscles are flabby.

The muscles of the hand are markedly atrophied: the thenar & hypothenar eminences are both flat:

& the movements greatly interfered with: he cannot, for example, touch the little finger with the thumb: nor can he flex the thumb or fingers to the palm. The "average" attitude of the hand is as approaching the classical "main en griffe", of Duchenne.

Head & neck: the muscles of the face do not show any morbid change. The head droops forwards & he cannot raise it up: & when it is raised up for him & slightly overextended, it presently falls backwards of its own accord, as the centre of gravity is displaced. The sternomastoid muscles are lax: the trapezius cannot be felt below but as it crosses the neck it is apparent: its edge is

thin.

Back. The patient cannot rise to the sitting posture, unless he first turns on his side: & even then it is only with great difficulty. Unless supported he falls back again. The muscles of the back are flabby but cannot be distinguished, partly from that reason & partly from the thickness of the subcutaneous fat.

Lower limb. At the hip joints the movements are strong & free. At the knees, the limbs can be flexed and extended strongly. The muscles of the calf are atrophied but rather firm than flabby. The foot looks

small from the atrophy of its small muscles: it is in a position of plantar flexion & slight inversion. He cannot dorsiflex or evert the foot: he can only move the toes very slightly. The peronei are wasted.

None of the muscles show any tremor or fibrillary contractions.

He can stand & walk only with great difficulty.

D. Sensibility: no abnormalities were discovered.

E. Reflexes.

The Biceps, triceps, extensor & supinator jerks were not obtained.

The knee jerks are weak: or sometimes altogether absent. There is no patellar clonus, ankle jerk or ankle clonus. On stroking the sole there is a marked tickling reflex in which the patient draws up the leg by flexing the knee: what response can be made out is, however, a flexor one.

The pupil reacts sluggishly on accomodation & to the stimulus of light: this sluggishness is a little more marked on the left side: the dilatation is equal & there is no tippus. Both pupils are contracted.

The organic reflexes are unaffected.

F. There are no trophic changes beyond the muscular wasting described.

G. Muscular sense & coordination are apparently normal so far as they can be tested. The reaction to electricity is slight & very sluggish, in the case of those muscles that are undergoing atrophy.

H. Cranial Nerves.

Patient's power of vision is not impaired. There is slight ptosis of the left eye: it was first observed in 1912.

There are no symptoms referable to the other cranial nerves.

Alimentary System.

The patient complains of constipation: he may pass 3-4 days without a motion. He has no other symptoms. His appetite is good: he has no inordinate thirst.

The upper teeth are false: below there are only 2 incisors & both are discoloured. The tongue is a little furred: it shows no tremor or fibrillation or other anomaly.

The abdomen is lax & nothing abnormal is made out on palpation: no splashing could be elicited. On percussion the liver was found to measure $5\frac{1}{4}$ inches in the mid-clavicular line.

Circulatory System.

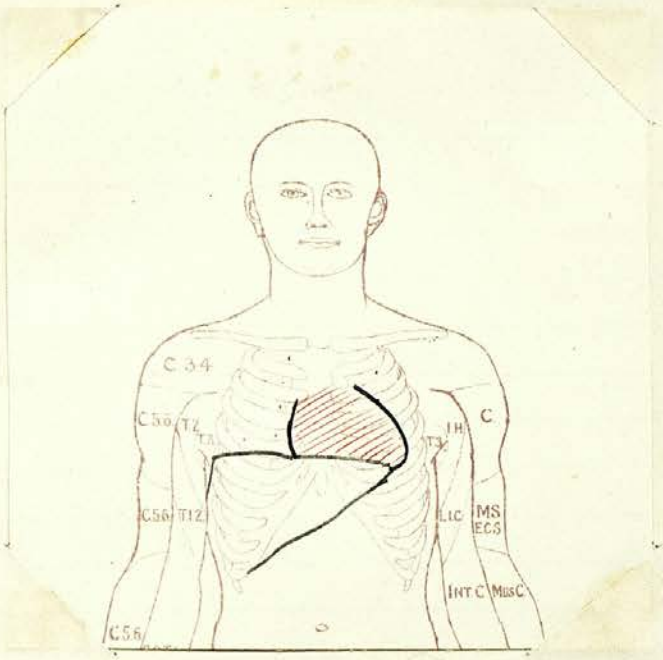
The patient has no complaints such as pain, palpitation.

The pulse rate is 70 per minute: it is regular in rhythm & in amplitude: the rise of the wave is rapid, the apex not long sustained & the fall rapid: the blood pressure is 120 mm mercury (systolic). The radial artery is not thickened or tortuous: nor is the superficial temporal artery.

On inspection no abnormality is visible: there is slight venous pulsation at the root of the neck: the apex beat is not visible.

On palpation the apex is felt 5 inches out from the middle line

in the 5th interspace & ½ inch below the nipple.



On percussion the deep dulness is found to extend 1 inch to the right of the middle line at the level of the 4th costal cartilage : 3 inches to the left of the middle line at the level of the 3rd cartilage : & 5 inches at the apex beat.

There are no murmurs : but at the apex the first sound is fainter than is normal.

<u>Urinary System.</u> The urine analysis is as follows :—

Urine Examination.

Name M. Bruce. Date 26. 4. '14

Total 1000 cc (35½)

	As mg. N. per c.c.	Total in grams of N.	% N.
Total Nitrogen	7.80	7.80	
Urea ..	6.78	6.78	86.9
Ammonia ..	.42	.42	5.4
Uric acid ..	.09	.09	1.2
Amino acid ..	.13	.13	1.7
Creatinine ..	.28	.28	3.6
Creatine ..	.06	.06	.8
Undetermined..			.4
			104

Acidity .29 cc n/10 acid per cc ; 290 cc n/10 H_2SO_4 total.

Spec.Grav. 1016

Albumin —

Sugar —

Diacetic acid —

Acetone —

Indican + but not on all occasions when examined.

Microscopically mucus.

The kidneys are not palpable: the patient has complete control over the bladder & there is no frequency of micturition.

Respiratory System.

There are no subjective changes. The respiratory movements are 20 per minute & of abdomino-thoracic type. There is no cough. The voice is indistinct but not more so than formerly, he says. The chest measures 34½ ins. in expiration, expanding to 36 inches on inspiration. The movements are normal & equal on both sides. The vocal fremitus & resonance are normal & equal in front & behind. The resonance is that of health. The breath sounds are not well-heard, the chest wall being thick:

there are no morbid accompaniments: & the inspiration & expiration bear normal relations one to the other.

TREATMENT and PROGRESS.

The patient is on full diet.

12·4·'14 The administration of liq. Strychnin. mxij t.i.d. was commenced.

15·4·'14 Massage was started.

The patient expresses improvement, especially from the massage.

He is still under treatment.

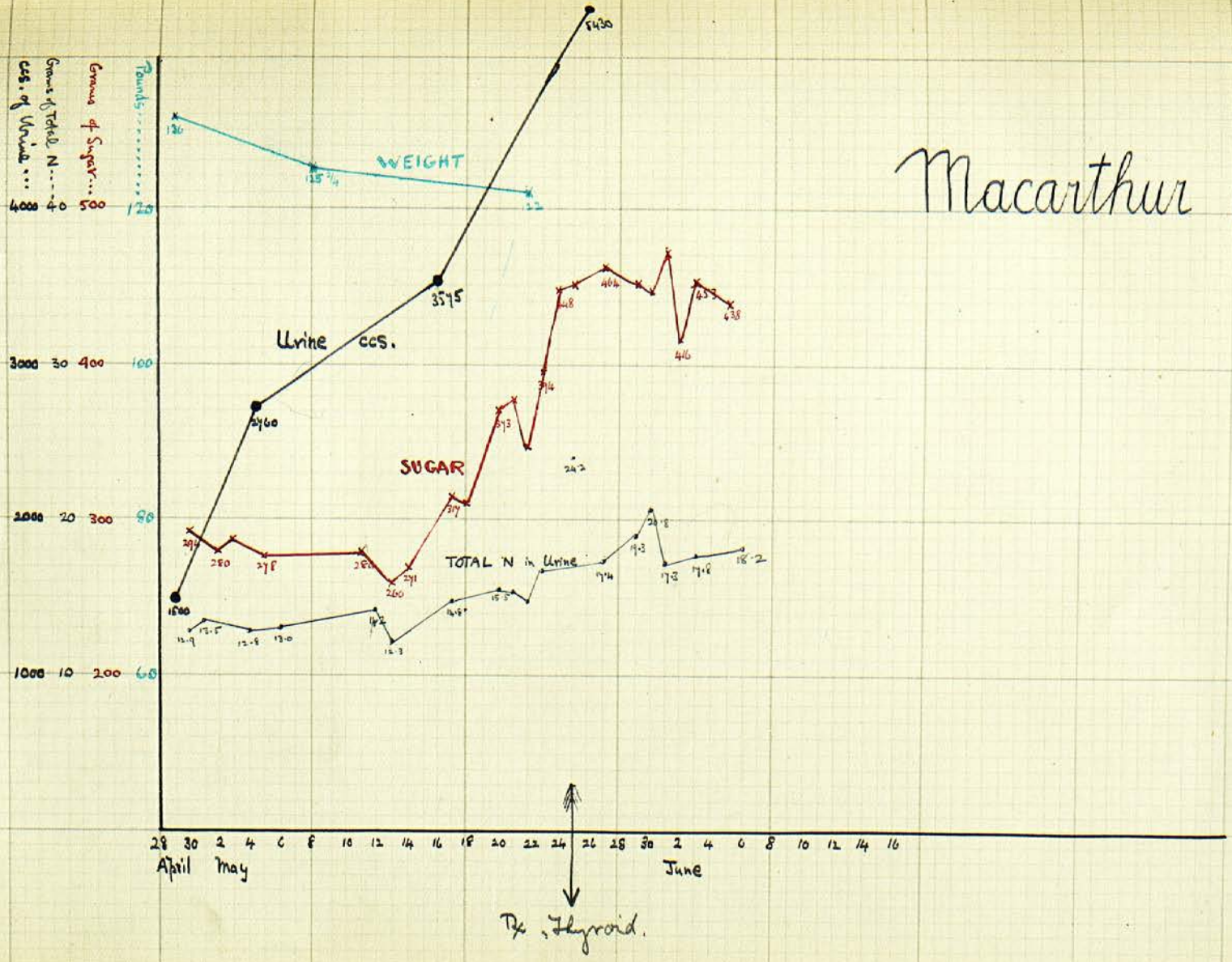
COMMENTARY.

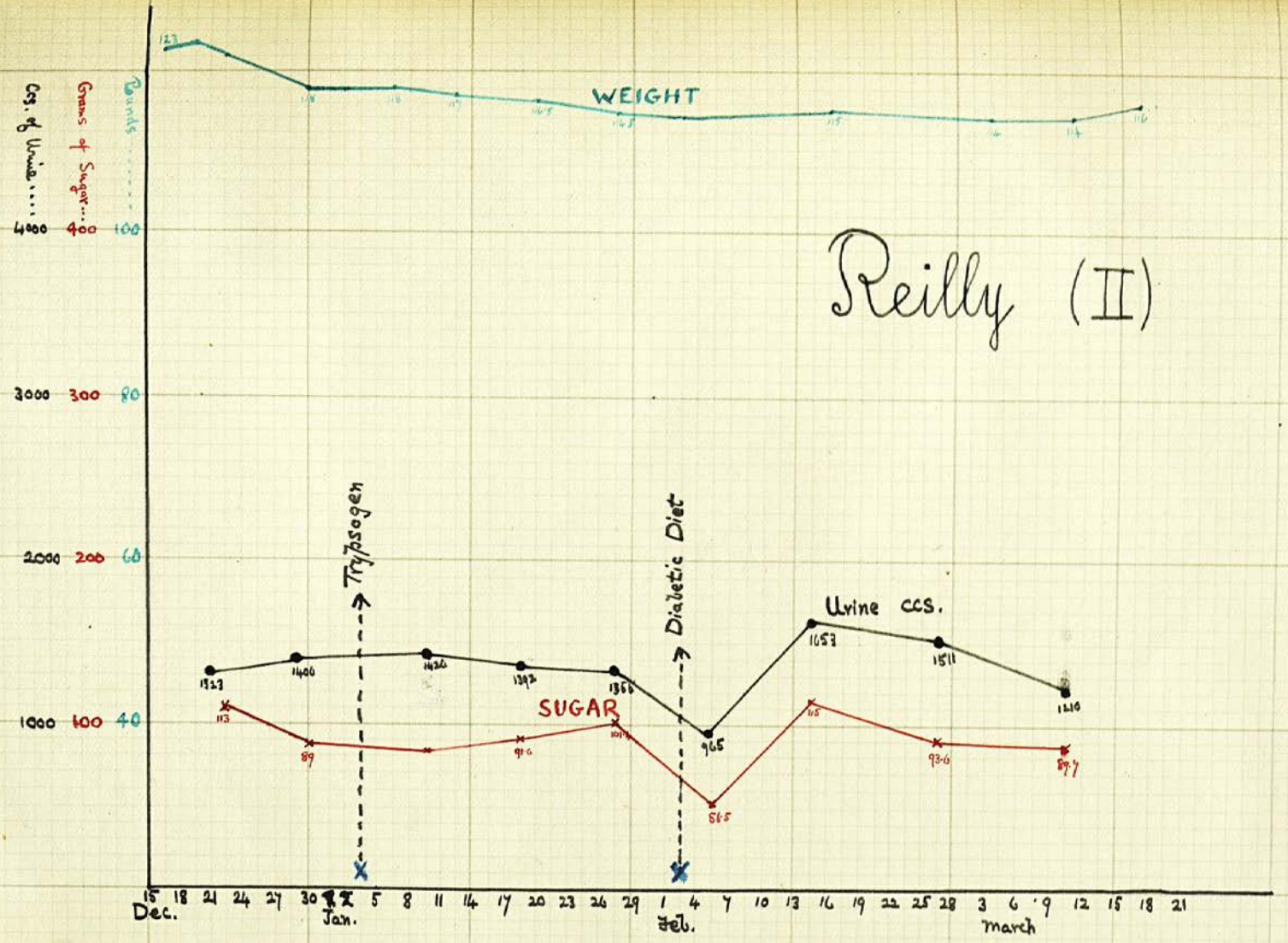
CASES I & II – Diabetes mellitus.

These cases differ considerably in severity. The younger patient (Case I, aet. 21) is worse than the older (Case II aet. 43). This is evidenced not only by the general condition of the patient (as expressed by the rate of loss of weight) but also by the condition of the urine.

The protocols containing estimations of the daily excretion of urine, sugar and, in Case I, of total nitrogen, have been put in the form of graphs: & the loss of weight has been expressed in the same way.

Macarthur (I)


Grams of Total N ... ccs. of Urine ...
Grams of Sugar ...
Pounds ...
4000 40 500 120
3000 30 400 100
2000 20 300 80
1000 10 200 60
WEIGHT
130
125 3/4
122
Urine ccs.
1500
2460
3575
5430
SUGAR
TOTAL N in Urine
28 30 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 2 4 6 8 10 12 14 16
April
May
June
Dr. Thyroid.


Reilly (II)
WEIGHT
Urine ccs.
SUGAR
Trypsogen
Diabetic Diet
Grms of Urine....
Grms of Sugar...
Pounds.....
4000 400 100
3000 300 80
2000 200 60
1000 100 40
1323
1400
1426
1392
1366
965
1652
1511
1210
113
89
91·6
101·4
85·5
115
93·6
89·7
Dec.
Jan.
Feb.
March

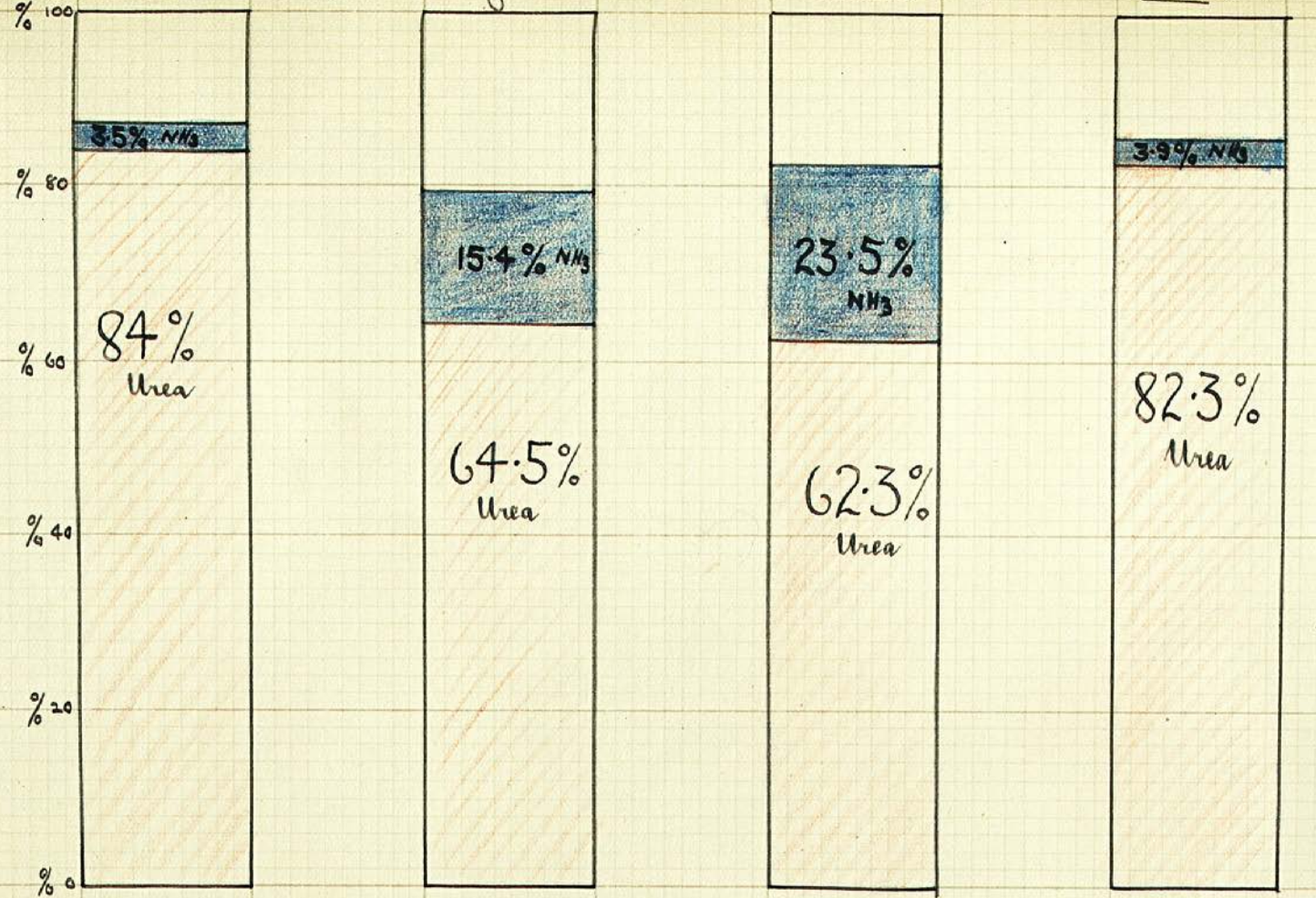
Case I (macarthur) shows a comparatively rapid loss of weight, a rapidly increasing output of urine and of sugar & a gradual increase in excretion of nitrogen, which may be correlated with the loss of weight.

In Case II these changes are much more gradual: the administration of tryptogen as described had no apparent effect on the quantity of the urine or of its constituents. The change to a diabetic diet was followed by a marked drop in the quantity of urine & of sugar: this is seen to be soon succeeded by a rebound in the opposite direction.

[In these diagrams, the points chosen are usually averages of 10-day periods]

In Case I there is evidence of considerable degree of acidosis: or rather of potential acidosis seeing that the acids are, as yet, neutralised & the hyperacidity thus compensated for. In Case II there are no such signs. These facts are illustrated by the relative distribution of urinary nitrogen between urea and ammonia: in conditions of acidosis, the relative (& also the absolute) amount of ammonia excreted is increased, for ammonia is diverted from the ammonia → urea synthesis in order to neutralise the acids. This has been expressed graphically as follows: in Case I it is seen that the ammonia N is increasing as time goes on:

Relative Distribution of N between Ammonia & Urea.



The presence of acidosis is further recognised by the appearance of acetone & diacetic acid in the urine of case I: in neither case were there any symptoms of impending coma. In case II the ordinary tests revealed no such changes in the urine: but the Salicylic aldehyde test* (in which mere traces of acetone give a crimson colour) was positive: the test is, however, so delicate that the presence of minute traces of acetone in normal urine may be revealed.

It has been observed that in diabetes mellitus, there is a diminution in the Excretion of creatin in:

* Described in E. Abderhalden's Biochem. Handlexicon, 1911, I Bd., 485.

To get figures of any accuracy in this direction it is essential that the patients' diet be free of creatinin & of creatin (as in this & the other cases now recorded): the creatinin & creatin excreted under such circumstances is endogenous (Folin). It was suggested by Shaffer* that the creatinin excretion should be expressed as a coefficient = $\frac{\text{mgm. Creatinin in 24 hours}}{\text{Body weight (per kilogr.)}}$

In these ~~the~~ cases the results were:—

	Grammes of Creatinin	Creatin	Creatinin Coeff.
I Macarthur:	·53	·42	5·0
II Reilly:	·20	·09	3·6
Normal:	·60	—	8·1 (Shaffer)

The coefficient is thus low in each case. There is also an excretion of creatin.

* P. Shaffer, Amer. Jour. Physiol., XXIII, 1908-9.

The occurrence of creatinuria in diabetes mellitus was first observed by Krause.* The above figures show the excretion to have been much less in the milder case (II : Reilly) than in the severe case. This abnormal constituent is excreted under other conditions in which there is acidosis e.g. in post-chloroform poisoning & in wasting conditions: its alleged occurrence in carbohydrate starvation (Cathcart) has been recently denied† : creatinuria is found in childhood, in pregnancy, immediately after menstruation (Krause) & post-partum (Shaffer). The possibility of these

* R. A. Krause, Quart. Journ. Exp. Physiol. III. 3. 1910.
† G. Graham & E. P. Poulton, Proc. R. S., B. vol. 87, 1914.

fallacies could here be excluded.

In the more severe case of I (macarthur) there is a high excretion of amino-acids — making 4·5% of the total Nitrogen : in case II the excretion is very low (·2%) : the normal is said to be 2·89 (Landau). The significance of this excretory product is, however, unknown : & the method for its estimation is defective.

In Case I the blood shows a marked condition of anaemia : in Case II, the figures are little below the normal. In the former case (macarthur) an estimation was made of the blood sugar : the

method used was Bang's, as described (infra). A marked condition of hyperglycaemia was found — ·477 grams of glucose per 100 cc of blood, as against a control blood (the writer's) containing ·172 %: these estimations were made at the same time & under conditions as near equality as possible — both about 2 hours after a meal.

The effect of the administration of thyroid in Case I cannot well be estimated: the patient is going downhill, but he was doing so before the exhibition of thyroid.

If beneficial, the thyroid not have checked the "downhill"?

CASES III, IV & V — Bright's Disease.

These cases may be summarised as follows :-

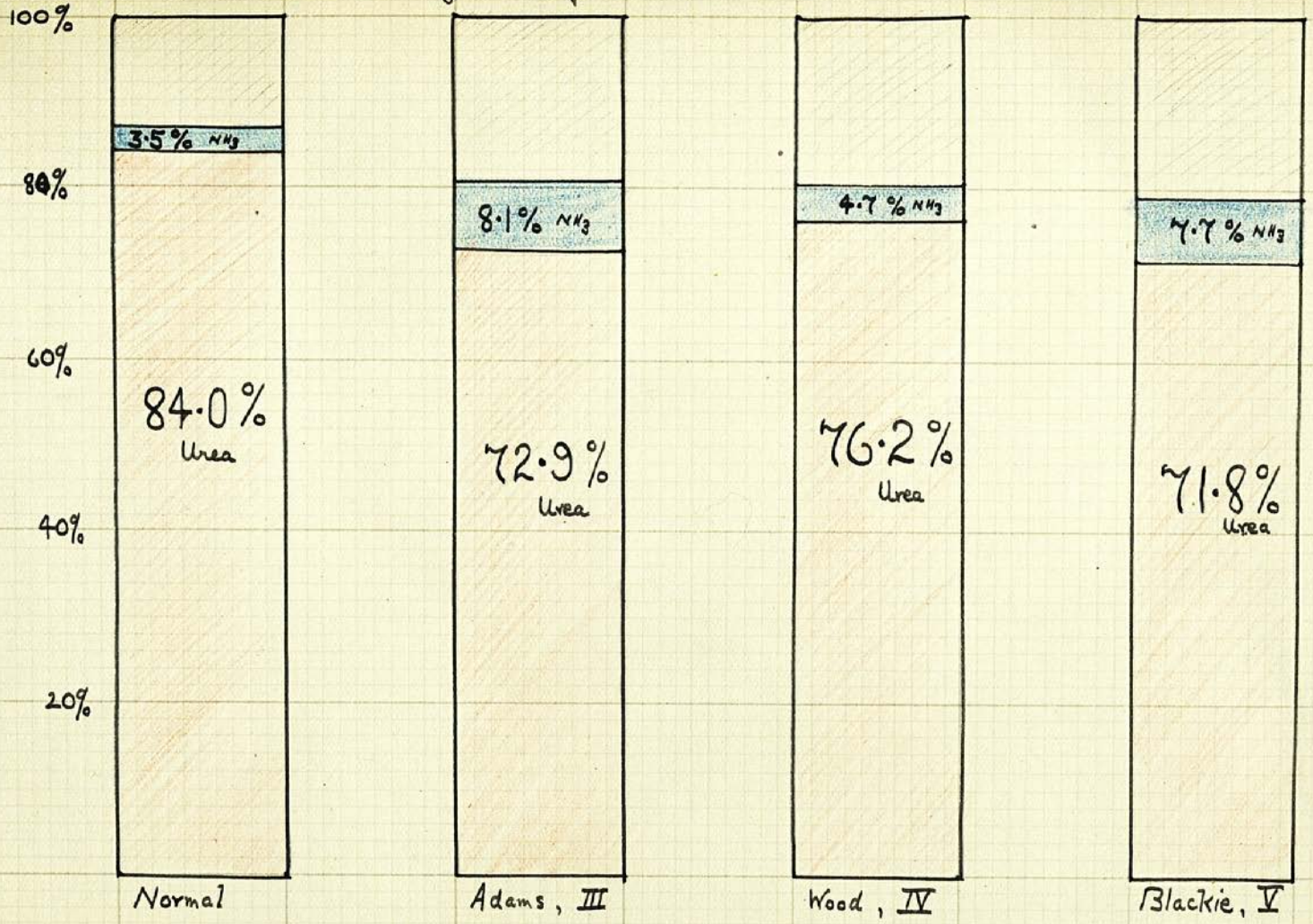
III Adams : shortness of breath for 12 months : alcoholic : polyuria : high blood pressure : cyanosis & dropsy : anaemia : slight albuminuria : subconjunctival haemorrhages.
Chronic interstitial nephritis.

IV Wood : dropsy, all over, for 3 weeks : scarlet fever when a child : blood pressure 130 mm : albumin & blood in urine.
Acute nephritis

V Blachè : dropsy for 3 months : tuberculous history : urine markedly albuminous.
Subacute nephritis, becoming chronic.

A consideration of the amounts of excretion of urea & ammonia (expressed as nitrogen) is of interest. As is shewn graphically, the percentage of total nitrogen which is contributed by ammonia is unusually

Distribution of Nitrogen between Urea & Ammonia.



high. This has been observed frequently but not constantly: it is taken to mean, not that any condition of acidosis is present, but that urea is a relatively difficult substance to excrete: the ammonia excretion is therefore only apparently high (von Noorden).

In work on experimental nephritis* induced in rabbits by injection of uranium nitrate, it was found that as nitrogenous waste products accumulate in the blood, the proportion due to urea increases. In Case I the total non-protein nitrogen, & the urea of the blood were estimated: the normal amount of the former is about 25 mgm. per 100 cc of blood, & of this about half is due to urea.

---

* C. A. Hoffman et al., Arch. Int. Med., XII, Sept. 1913.

In case I, the figures obtained were there :- (9.5.'14)

Total non-protein N ... 40.6 mgm/100cc
Urea N .... 22.8 mgm/100 cc

[In another case of nephritis — Edward Telfer, aet. 5, ward XXVIII — the figures were there :- (9.5.'14)

Total non-protein N 50.6 mgm/100cc
Urea N .... 22.2 mgm/100 cc

The condition was severe & anuria persisted for some days].

CASE VI — Progressive Muscular Atrophy.

The muscles affected appear to be:-

(1) all the short muscles of the hand - corresponding to the Ist Dorsal segment.

(2) the flexors & extensors of the fingers & the carpus. It is said that the flexors are affected before the extensors of the forearm: this was not observed.

(3) the muscles attached above to the head & neck & below to the shoulder girdle, notably the trapezius & levator anguli scapulae. The upper third of the trapezius is said to usually escape for long: in this subject it was thin-edged & the patient could not shrug the shoulders properly.

(4) the serratus magnus.

(5) the muscles of the back.

(6) the muscles of the leg, especially

the peronei, flexors & extensors of the toes. (7.) the short muscles of the foot.

The curious condition of the muscles clothing the scapulae & of the deltoid muscles, suggesting hypertrophy, has been mentioned.

The case is atypical in that the disease started in the right foot: Charcot* states that this is most exceptional, & that Duchenne observed it in 2 of 159 cases.

The sex (male) & age of onset (39) are typical. No etiology could be made out: the only suggestion of a "nervous" inheritance is that the patient's father was epileptic.

After taking the usual precautions

* J. M. Charcot, New Sydenham. Soc., Trans. 1881.

as to diet, the urine was quantitatively examined: the products, uric acid, creatinine & creatine are believed to be concerned with muscular metabolism. The total uric acid excretion (24 hours) is ·24 grammes, which forms 1·2% of the total nitrogen: in a case recorded by Spriggs*, the uric acid excretion was also normal (1·3%).

The creatinin coefficient (i.e. = $\frac{\text{mgm. Creatinin}}{\text{per kilo. body weight}}$) is low: it is 4·5 as against the normal 7–11 of health. This illustrates the theory of Shaffer that the creatinin coefficient is an index of muscular development or "efficiency": it was low in Spriggs' case, just mentioned.

* Quoted in Von Noorden, Pathol. of metabolism, 1907.

There is further, a condition of creatinuria: the excretion of this abnormal constituent has been constantly found associated with the condition of progressive muscular atrophy by various observers. The writer has also observed it in two cases of pseudohypertrophic paralysis under the care of Dr. J. J. Graham Brown: the excretion of this body is believed to signify that muscle protein is being absorbed, hence its occurrence in these diseases.

Methods of Analysis Etc.

Urine

The total nitrogen was estimated by the method of Kjeldahl, as modified by Folin: & the urea & ammonia by the methods recently introduced by Folin*. In these methods very small quantities of urine are used, but what accuracy is lost from that cause is restored by the delicacy of the microchemical reaction in which the nitrogen is estimated colorimetrically as ammonia, the solution being Nesslerised: a Duboscq colorimeter was used. Folin's method of estimating urea, while less simple & quick, avoids the fallacies of the hypobromite method in which the nitrogen is derived not only from urea but from other bodies including

*O. Folin, Jour. Biol. Chem., 1912, No. 5, XI.

ammonia & creatinine: nor is the whole of the urea nitrogen evolved as gas.

When "ammonia" is estimated by the formalin method* of Malfatti the result is ammonia + amino acids, since the latter also react with formaldehyde. The amino acids were thus (approximately) estimated as the Malfatti minus the Folin result. The modification of E. W. Brown** was adopted latterly as the end-reaction is then a sharper one.

Creatinine, & creatine when present, were estimated colorimetrically by Folin's method† When acetone & diacetic acid are present in the urine, special means must be taken because these bodies give some coloration in Jaffe's reaction (on which the method is founded): the acetone & diacetic acid are therefore aspirated off & the estimation

* R. H. A. Plimmer, Pract. Phys. Chem., 1910, p. 105.
** Described by F. D. Boyd, Med. Annual, 1911.
† O. Folin: quoted in C. E. Simon's Clin. Diag., 1907, p. 432.

proceeded with, as described by Graham & Poulton.*

Uric acid was estimated by the newer, colorimetric, method of Folin.**

All the above constituents are stated in the protocols ~~as~~ not as such but as the nitrogen they contain & as the percentage they form of the total nitrogen.

Albumin when present was estimated by Esbach's method. To get rid of albumin in order to determine the total incoagulable nitrogen, urea etc Liquor ferri dialysatus was added until the filtrate no longer gave the reactions of albumin: analysis of the filtrate was then proceeded with.

Sugar was estimated by the polarimeter: its nature was ascertained by the formation of its osazone.

* G. Graham & E. P. Poulton, Proc. R. S., B. vol. 87, 1914.
** O. Folin & W. Denis, Jour. Biol. Chem., Dec. 1912, march 1913.

It has been shown that the presence of sugar in urine interferes with its quantitative analysis for urea: to meet this difficulty a modification of the usual method is necessary (Folin)*

Acidity was estimated by titration with , & is expressed as ccs. of N/10 sulphuric acid.

BLOOD

The total non-protein nitrogen & urea were estimated in one of the cases: the methods** of Folin & Denis' were used. [The writer is indebted to Dr. G. M. Braun, who drew off the blood]. The methods only require 5 ccs. of blood & are therefore applicable clinically.

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* O. Folin, loc. cit.

** O. Folin & W. Denis, Jour. Biol. Chem., 1912. XI.

In one of the cases of diabetes, a determination of the blood sugar was carried out by the method of Ivar Bang* which is adapted to dealing with small quantities of blood as two or three drops.

The microscopical examination of the blood was made by the usual methods: blood platelets were counted in a few cases, after staining by dahlia (Brodie & Russell)**: the method is an indirect one & the results only rough.

* I. Bang, Bioch. Zeitschrift, Nov. 1913.

** C. E. Simon, Clin. Diag., 1907, p. 144.