

The Sect.

OBSERVATIONS
ON THE
ACTION OF IODINE.

Thomas Blair Harvey.

*M. D.
1935*



While I was resident physician in the wards of the Royal Infirmary, Edinburgh, Dr. Chalmers Watson suggested I should study the injection of iodine intravenously. I chose twelve cases at random, and the following is an account of the preparation used; the technique; and the results.

The preparation used consisted of:-

Iodine	1 drachm.
Potassium Iodide	1 drachm.
Distilled Water	5 ounces.

Minims 20 of the above in 10 cc. Normal Saline was the quantity used for each injection, i.e. gr. $\frac{1}{2}$ of Iodine.

The Technique.

The injection was given intravenously at 11 A.M.

For some days prior to the injection all patients were placed on a uniform diet, etc. with a view to eliminating as far as possible any error arising from altered environment.

Each experiment lasted three days.

Observations were made on temperature, respiration rate, pulse rate, systolic and diastolic pressure; urine per hour (quantity, specific gravity, urea concentration, and abnormal constituents); influence on the leucocyte count; and the Basal Metabolic Rate (B.M.R.)

Careful observations were taken at frequent intervals throughout each day, noting the patients general condition, size of thyroid, and any variations in the symptomatology, both subjective and objective.

On the first day control observations were made. On the second day Iodine was administered intravenously at 11 A.M., and the results carefully studied; while on the third day observations were made on similar lines. For the following few days the patients' condition was carefully watched.

CHART. - (1)

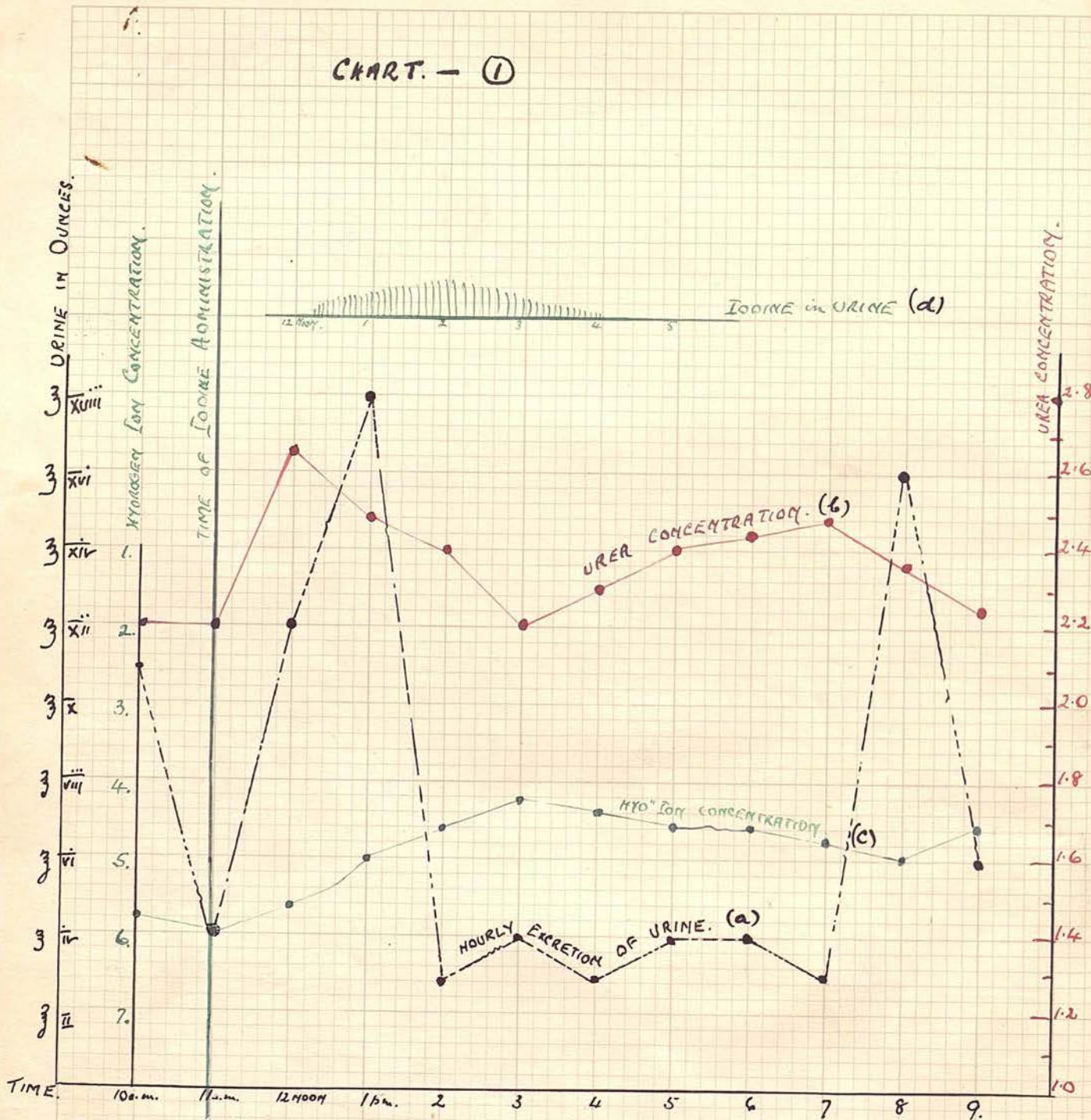


CHART SHOWING.

- 1 HOURLY EXCRETION OF URINE. (a)
- 2 UREA CONCENTRATION. (b)
- 3 HYDROGEN ION CONCENTRATION. (c)
- 4 TIME IODINE DETECTED IN URINE!

NOTE:- IODINE ADMINISTERED AT 11 A.M.

I shall describe one case in detail.

Case B in chart - Mrs. M. McM. aet 45 years.

The urine.

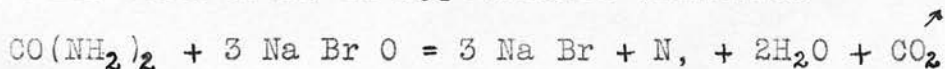
(A) The quantity. See Ward chart and chart 1. Curve (a)

The hourly excretion of urine rose to a maximum in two hours. The quantity rose from 40 ounces on the control day to 100 ounces on the day of the injection of Iodine, and was 71 ounces on the following day.

(B) The urea concentration. Chart 1, curve (b).

The urea concentration rose to a maximum one hour after administration of Iodine, From the chart it will be seen that the rise in the urea concentration occurred just before the abnormally large excretion of urine.

Calculations were made by results obtained from treating 5cc. urine with 25cc. of Hypobromite solution.



(C) The H'ion concentration. Chart 1, curve (c)

The H'ion concentration gradually rose to a maximum about four hours after the administration of the Iodine, but fell on the following day to a concentration below that before administration.

(D) Rate of excretion of Iodine. Chart 1, curve (d).

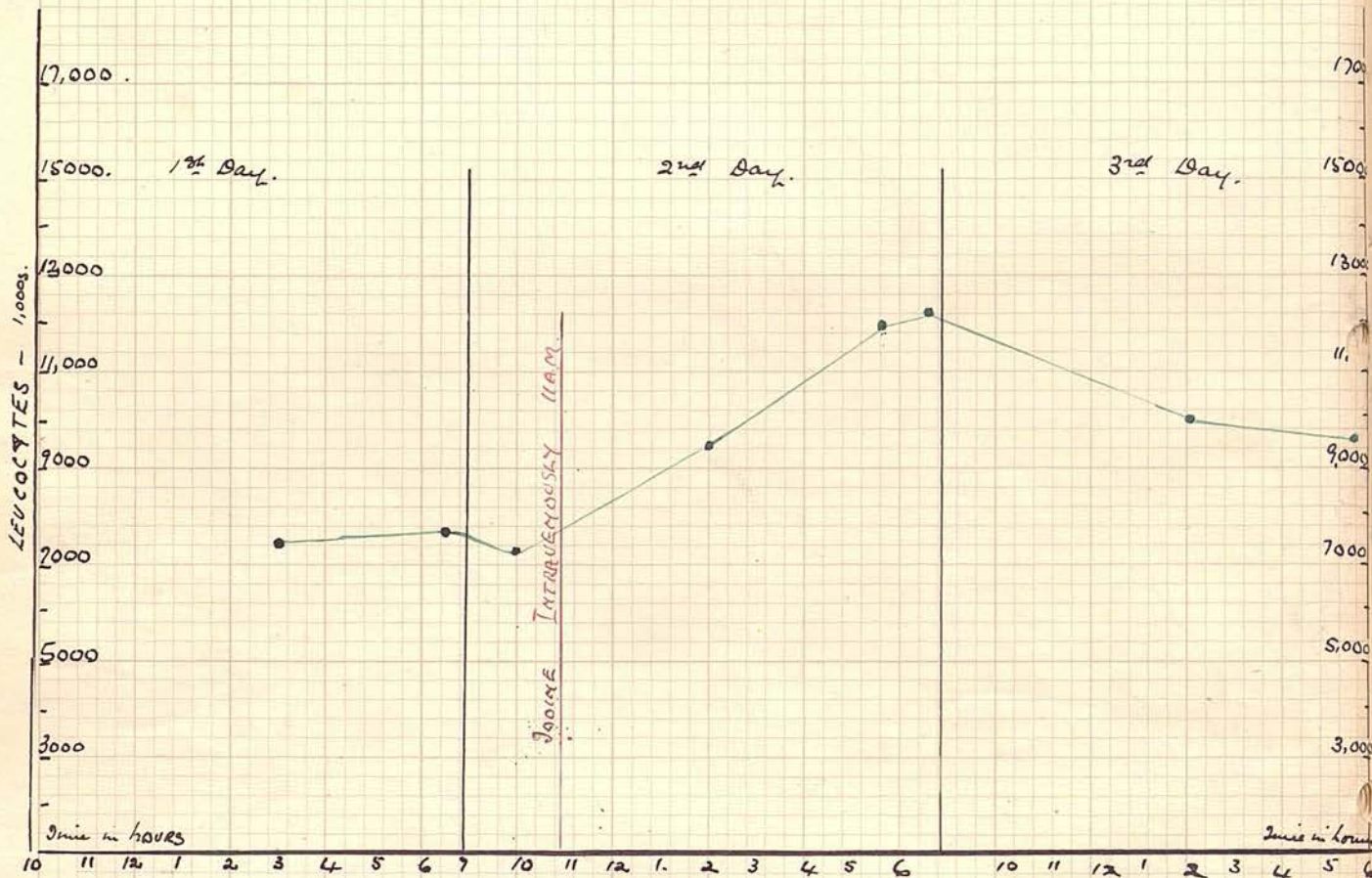
From the diagram it will be seen that the Iodine was detected $1\frac{1}{4}$ hours after the injection, and could not be detected after five hours. It was excreted comparatively rapidly.

The test employed was as follows:-

To 5cc. of urine, 2cc. of concentrated HNO_3 were added; the latter acted as a reducing agent. CHCl_3 was now added, and the mixture gently shaken up. If iodine was present, it was dissolved by the chloroform, and appeared as a pink ring.

At this point it is worthy of mention that iodine could not be demonstrated in the other excreta, viz: the perspiration, the stool, or the saliva. Starch paper, freshly prepared, was used for this test.

CHART - (2)



CURVE SHOWING LEUCOCYTE COUNT.

Case:- Rheumatoid arthritis
B ♀.

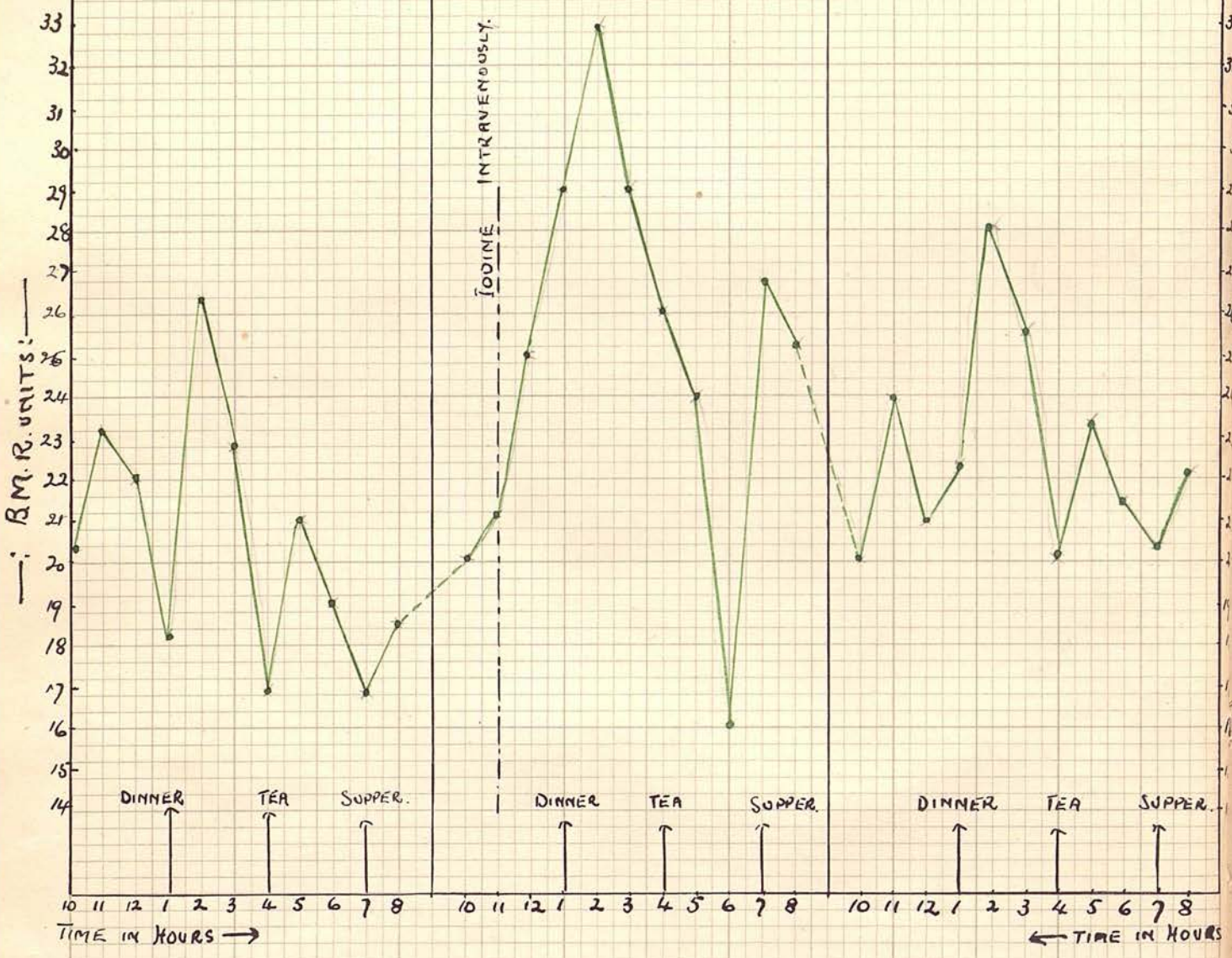
The Blood. Chart 2.

From the diagram opposite, and from the figures, it will be seen that a leucocytosis was produced, which was at its maximum in seven hours, reaching 11,800. This gradually fell, but on the second day, at 6 P.M. the leucocyte count was still over 9000.

1ST DAY.
(CONTROL)

2ND DAY.

3RD DAY.



BASAL METABOLIC RATE.

Case B₀
RHEUMATOID ARTHRITIS.

IODINE given at 11 a.m. on 2nd D

The Basal Metabolic Rate. Chart 3.

On studying the diagram opposite it will be seen that following the injection with Iodine there was a marked and rapid rise, reaching a maximum in three hours. This was followed by an equally rapid fall, reaching low level again in a further period of four hours. A rise again occurred. The following day the B.M.R. was at a higher level than the day prior to that of administration of Iodine.

The times of meals and ward routine are marked on the chart, as these undoubtedly have an influence on the B.M.R. curve.

The B.M.R. was calculated by Reid's Formula, which is as follows:-

$$(\text{Pulse Rate} + 0.9 \text{ Pulse Pressure}) \times 1.683 - 71.5$$

4 HOUR CHART.

DISEASE.

Alumina 4.11.19.

Name Mrs. L. W. S. G.

Age 45

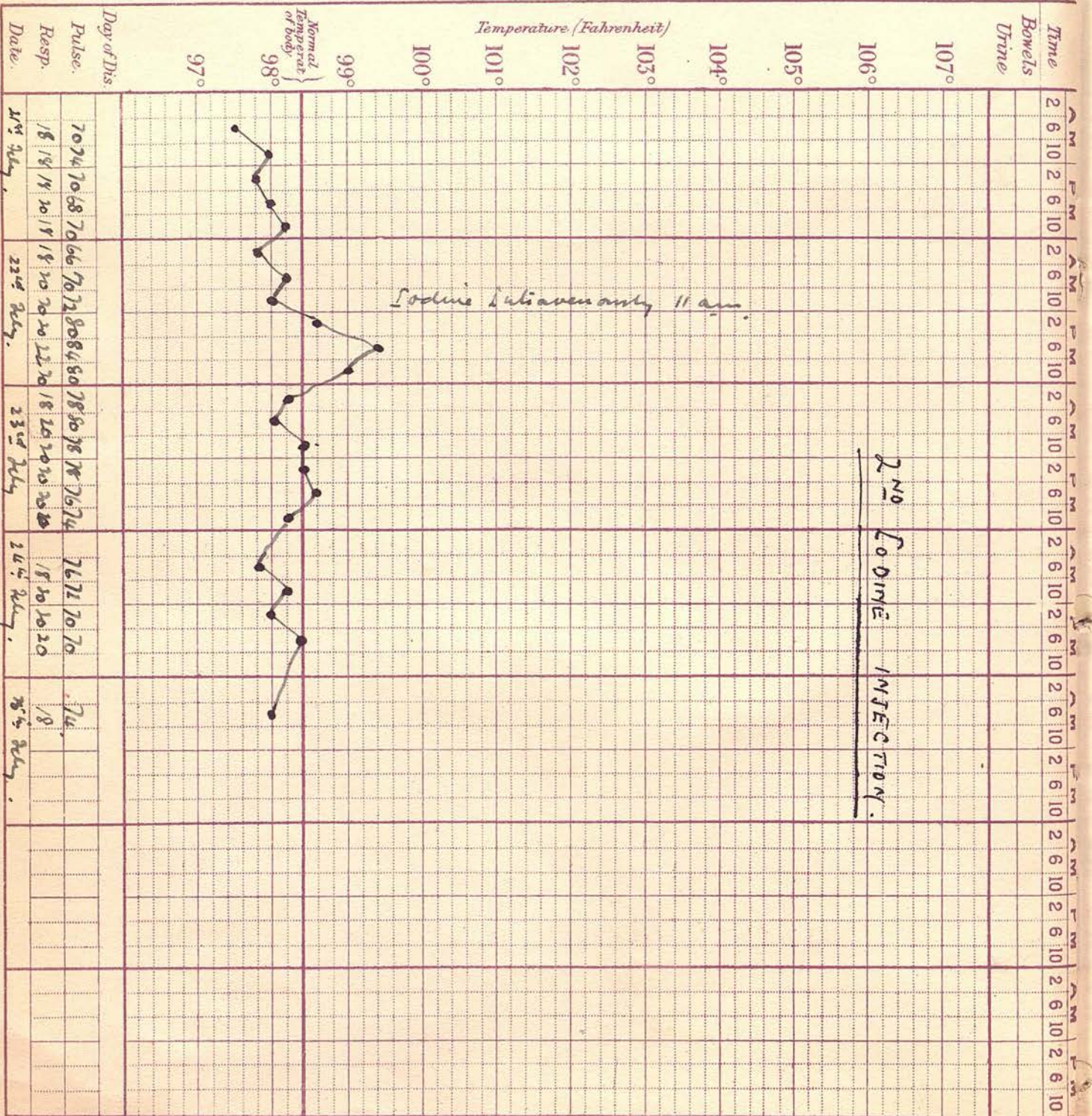
Diet

Case Book No.

Notes of Case

Date of admission

Result



Entered at Stationers Hall.

Printed and Published by Widderspoon & Co., Gate Street, Kingsway W.C.

Goulds Clinical Chart.

4 HOUR CHART.

DISEASE.

Blumelara Muisi.

Name { *H² w. M. S. G.*

Age *4.5.*

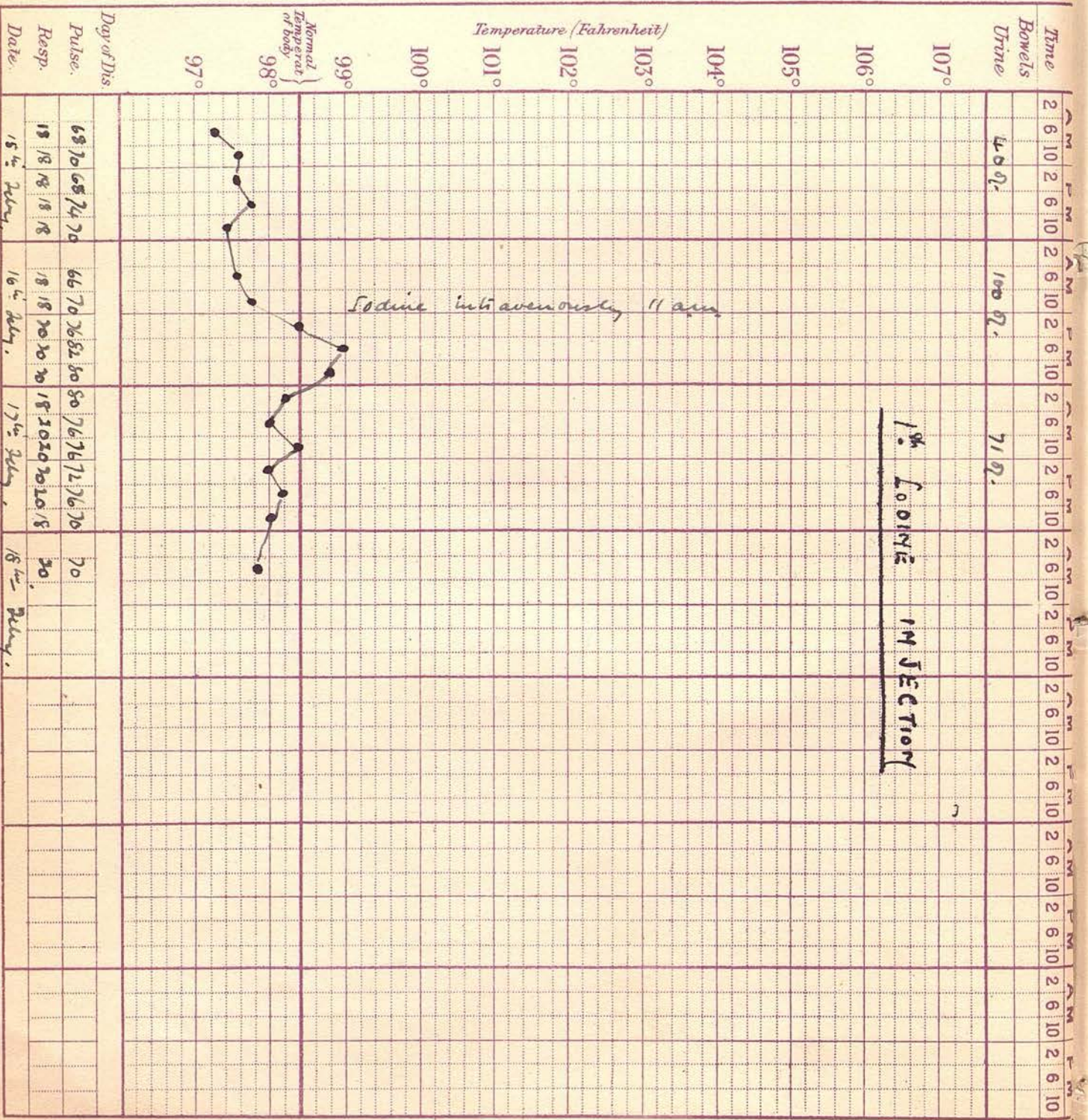
Diet

Case Book No.

Notes of Case

Date of admission

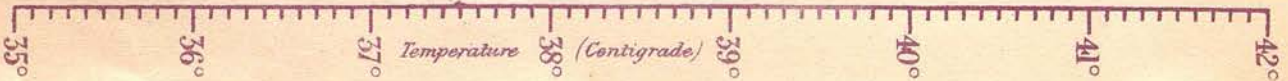
Result



Entered at Stationers Hall.

Printed and Published by Widderspoon & Co. 100, Kingsway W.C.

Goulds Clinical Chart.



The Temperature.

From a miniature of the Ward Chart it will be seen that an evening rise of temperature followed each injection, although the rise was only to 99 F on the first injection, to 99.4 F on the second, and to 98.2 F on the third injection of Iodine.

The Thyroid.

In four hours after the injection of Iodine, the measurement of the thyroid was reduced from $11\frac{3}{4}$ " to $11\frac{1}{2}$ ", and a further diminution to $11\frac{1}{4}$ " was apparent in eight hours. The measurement was taken from the seventh cervical spine round the isthmus of the gland.

Symptomatology.

In half an hour after the intravenous injection the patient complained of shaking of the hands; of tremor; of headache; of slight giddiness; and of intense pain in the fingers plus a marked increase in the stiffness of the joints. She was flushed, and the skin was dry. In an hour the tremor had lessened; the headache still persisted; she was drowsy; she was still flushed; the skin was still dry, and she complained of thirst.

In two hours she felt more comfortable, and the shivering was replaced by a glow all over the body. The joint pains and

and the stiffness were still severe; the thirst continued, but the skin was now moist. In the course of the next half hour the patient was perspiring freely.

The above may be described as a definite rigor.

The symptoms gradually abated. The patient, however, spent a restless night with little sleep; frontal headache being troublesome.

The next day the joint pains were distinctly less painful, and the stiffness was not so marked. She admitted she felt definitely better for the next few days.

A week elapsed before the second injection was given. The clinical findings and the symptomatology were practically the same, though not so marked, with the exception that perspiration was much more profuse and continued for a longer period than that following the first. A definite improvement in the arthritis was noticed.

One week later a third injection was given, followed by a similar train of symptoms, though not so severe as that produced by the first and second.

Improvement was apparent in greater mobility of the joints and less pain. The patient "looked better"; the complexion was clearer, and the skin was acting freely.

QUANTITY OF URINE (HOURLY) in $\frac{1}{2}$ oz.

IODINE GIVEN AT 11 A.M. ON 2ND DAY.

DISEASE.	PATIENT.	SEX.	1 ST DAY.			2 ND DAY.				3 RD DAY.		
			10 a.m.	12 noon.	7 p.m.	10 a.m.	12 noon.	1 p.m.	7 p.m.	10 a.m.	12 noon.	7 p.m.
RHEUMATOID ARTHRITIS.	A	♂	2	1½	4.	2	4	6	4.	5	6	0
"	B.	♀	5	4	4	11	12	18	3.	4	5	6.
"	C	♀	5	7	4	8	11	16	20	4	10	1½.
"	D.	♀	7	5	10	6	8	12	5	10	8	14
"	E	♀	3	0	8	3	8	8	12.	4	6	9
SCIATICA.	F.	♂	2	4	1½.	2	5	9	11	3	0	10
EXOPHTHALMIC GOITRE.	H.	♀	6	5	5½	6	14	30	16	4	11	6.
RENAL CALCULUS.	I	♂	3	2	4½.	5	6½	7½	3½.	4½	3	4.
OBESITY + VARICOSE ULCER.	J	♀	5	13	7.	5½	6½	14	10	6	4	9.
MYXEDEMA.	K.	♀	3	4	6.	4	8	15	6.	6	4	12.
CHRONIC APPENDIX.	L.	♀	3	6	2.	4	10	10	5	6	4	3.
SCIATICA.	G.	♂	2	1½	4	1	2	4½	2.	1½	2	2½.

NOTE: — FIGURES REPRESENT AMOUNT PER HOUR. in OUNCES.

E.g. CASE A
 1ST DAY between 6 + 7 p.m. passed 4 oz.
 2ND DAY " " " 4 oz.
 3RD DAY " " " 0 oz.

Summary of the results from 12 cases.

1. The Urine.

(a) Quantity.

From the figures opposite, which represent the amount of urine in ounces passed per hour, it will be seen that there is an increase in the output of urine occurring in all cases. In the females the increase is definitely more marked than in the males. The patient H. in chart, suffering from ex-ophthalmic goitre excreted 167 ounces of urine during the day of the injection. The average increase in all 12 cases was 36 ounces per 24 hours. The diuresis continued on the second day, but it was not so marked. The increase in the quantity of urine was quite out of all proportion to the increase in ingested fluids produced by the thirst.

From the foregoing, a diuresis follows the intravenous injection of Iodine: This diuresis is much more marked in females than in males.

Apropos of this, I gave a similar injection of Iodine to a woman aet 38, a case of cardio-vascular disease becoming waterlogged, not so much the result of a failing heart, but the result of peripheral resistance. Oedema lessened; the skin began to act freely, and a diuresis was produced, with clinical improvement resulting.

UREA CONCENTRATION.

IODINE GIVEN AT 11 A.M. ON 2ND DAY.

DISEASE.	PATIENT.	SEX	1 ST DAY.			2 ND DAY.				3 RD DAY.		
			10 A.M.	12 Noon.	7 P.M.	10 a.m.	12 noon.	1 p.m.	7 p.m.	10 a.m.	12 noon.	7 p.m.
RHEUMATOID ARTHRITIS.	A.	♂	2.25	2.0	2.1.	2.1	2.6	2.4	2.0	2.0	1.8	2.3.
"	B.	♀	2.2	2.25	2.14	2.2	2.8	2.5	2.4	2.1	2.0	—
"	C.	♀	2.0	1.9	2.2	1.9	2.4	2.1	1.95	2.1	2.2	2.2.
"	D.	♀	1.95	1.8	1.85	2.1	2.5	2.3	2.0	2.0	2.0	1.95
"	E.	♀	1.7	—	1.65	1.7	2.0	1.85	1.8	1.8	1.75	1.75
SCIATICA	F.	♂	2.2	2.2	1.95	2.0	2.4	2.3	2.15	2.0	—	2.0.
SCIATICA.	G.	♂	1.4	1.4	1.8	1.9	2.2	1.95	1.9	1.9	1.9	2.0.
EXOPHTHALMIC GOITRE.	H.	♀	1.6	1.46	1.6	1.5	2.4	2.0	2.1.	2.2	2.2	2.2
RENAL CALCULUS.	I.	♂	1.0	1.1.	1.1.	1.1	1.3	1.0	1.1.	1.1	1.05	1.1.
OBESITY VARICOSE ULCER	J.	♀	1.15	0.8	1.0	1.1	1.8	1.2	1.25	1.1	1.0	1.2.
MYXOEDEMA.	K.	♀	2.12	1.9	1.9	2.0	2.4	2.2.	2.1.	2.2	2.1.	2.0
CHRONIC APPENDIX.	L.	♀	2.0	1.8	2.0	2.3	2.4	2.0	2.1.	2.1	2.1.	2.0

Urea Concentration.

From the figures opposite it will be seen that in every case with the exception of case J. female, one of obesity, the urea concentration rose. The highest figures were those calculated from specimens obtained one hour after the injection of Iodine. Although diet, nitrogenous intake, etc., was practically the same on all three days, the urea concentration was higher for the two days following the injection than on the control day.

WHITE BLOOD CORPUSCLES.

IODINE GIVEN AT 11 A.M. ON 2ND DAY.

DISEASE	PATIENT.	SEX.	1 ST DAY	2 ND DAY.		3 RD DAY.
			W. B. C's in 1,000x.			
			3 p.m.	3 p.m.	8 p.m.	3 p.m.
RHEUMATOID ARTHRITIS.	A	♂	8.2	10.6	14.0	9.2
"	B	♀	7.5	9.8	12.2	10.0
"	C	♀	7.8	9.6	12.8	11.1.
"	D	♀	8.6	10.4	15.2	11.6.
"	E	♀	9.0	9.2	10.6	10.0.
SCIATICA	F	♂	8.4	8.6	9.8	10.2.
SCIATICA.	G	♂	8.8	12.2	15.8	11.4
EXOPHTHALMIC GOITRE.	H.	♀	7.6	10.0	11.4	10.2
RENAL CALCULUS.	I	♂	9.6	11.2	15.6	10.0
OBESITY + VARICOSE ULCER.	J	♀	8.0	9.4	11.8	10.4
MYXOEDEMA.	K.	♀	8.6	11.6	14.4	11.4.
CHRONIC APPENDIX.	L.	♀	7.6	NO RECORDS TAKEN.		

White Blood Corpuscles.

The results opposite point to a definite leucocytosis in every case; the maximum increase in all cases being 7-8 hours after the injection. Even on the second day there was a definite increase over the count on the control day. The minimum increase was 1,400, while the maximum was 6,700, the average increase being about 4,000.

From the chart it will be noticed that a more definite increase occurred in the female cases than in the males.

BASAL METABOLIC RATE

IODINE GIVEN AT 11 A.M. ON 2ND DAY.

DISEASE	PATIENT	SEX	1 ST DAY.			2 ND DAY.				3 RD DAY.		
			10 A.M.	12.	7 P.M.	10 A.M.	12.	1 P.M.	7 P.M.	10 A.M.	12.	7 P.M.
RHEUMATOID ARTHRITIS.	A	♂	14.6	10.6	10.6	14.0	21.2	11.8	11.0	17.6	10.4	10.2
"	B	♀	21.8	20.6	17.0	21.4	28.6	32.7	27.0	20.1	21.0	20.7
"	C	♀	0.2	0.4	1.8	0.0	5.7	20.4	5.0	1.0	0.2	5.2
"	D	♀	8.2	4.5	11.2	8.4	18.2	20.0	10.4	8.4	7.2	11.6
"	E	♀	18.2	16.0	20.2	17.8	20.8	22.5	26.3	18.4	18.0	21.7
SCIATICA.	F	♂	15.4	13.1	16.9	20.7	25.0	31.3	26.8	21.2	15.4	20.2
SCIATICA.	G	♂	21.5	21.7	4.8	20.6	23.0	28.2	10.3	20.9	22.4	8.2
EXOPHTHALMIC GOITRE.	H	♀	20.0	10.8	9.7	16.4	24.0	10.0	11.8	18.0	13.4	2.0
RENAL CALCULUS.	I	♂	4.5	5.7	4.5	5.7	9.7	18.8	4.5	4.8	5.8	4.5
OBESITY. VARICOSE ULCER.	J.	♀	34.0	27.7	24.0	30.4	38.8	41.2	26.2	32.0	30.0	25.6
MYXOEDEMA.	K.	♀	27.2	19.5	24.1	28.0	32.0	38.8	30.6	30.0	28.4	28.6
CHRONIC APPENDIX.	L.	♀	18.2	12.7	20.3	17.0	24.4	29.6	32.3	19.2	19.0	21.0

Note:— The B.M.R. is positive(+) except where indicated.

The Basal Metabolic Rate.

The results opposite are perhaps the most interesting of the whole of the investigations. In all cases a rise in the B.M.R. was definitely produced, allowances being made for meals, excitement, etc. Again the male cases did not give so marked a rise as the females. The maximum increase in practically every case occurred within 1-2 hours following the injection.

On the second day the figures again show a higher rate than on the control day.

In all cases the B.M.R. was calculated by using Reid's formula, as previously stated.

TIME THE IODINE REMAINS IN URINE.

DISEASE	PATIENT	SEX	IODINE IN URINE
RHEUMATOID ARTHRITIS.	A	♂	6 HOURS
RHEUMATOID ARTHRITIS	B	♀	4 HOURS.
RHEUMATOID ARTHRITIS.	C	♀	7 HOURS
RHEUMATOID ARTHRITIS	D	♀	5 HOURS
RHEUMATOID ARTHRITIS.	E	♀	6 HOURS.
SCIATICA	F	♂	5 HOURS.
SCIATICA	G	♂	4 HOURS.
EXOPHTHALMIC GOITRE.	H.	♀	6 HOURS.
RENAL CALCULUS.	I	♂	4 HOURS
OBESITY ↳ VARICOSE ULCER.	J	♀	6 HOURS.
MYXOEDEMA	K	♀	4 HOURS
CHRONIC APPENDIX.	L	♀	7 HOURS.

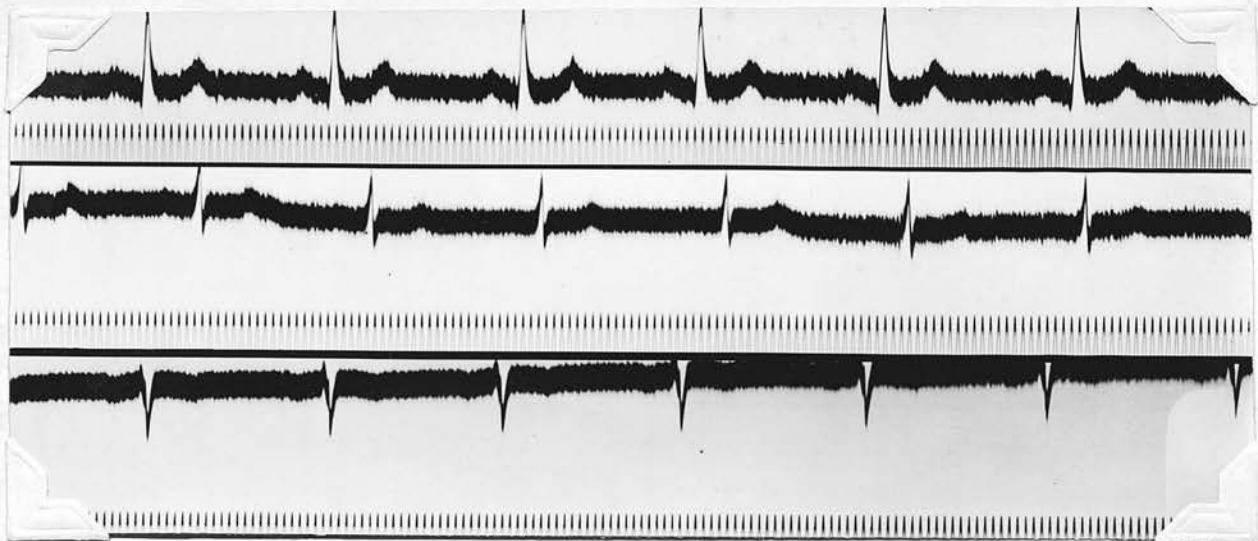
Excretion of Iodine.

From the figures opposite it will be noticed that the Iodine was excreted in every case comparatively rapidly, seven hours being the maximum time taken for all the iodine to be excreted, while in four cases out of the twelve, the iodine had disappeared from the urine within four hours of the injection. In no case was iodine detected in any of the other excreta.

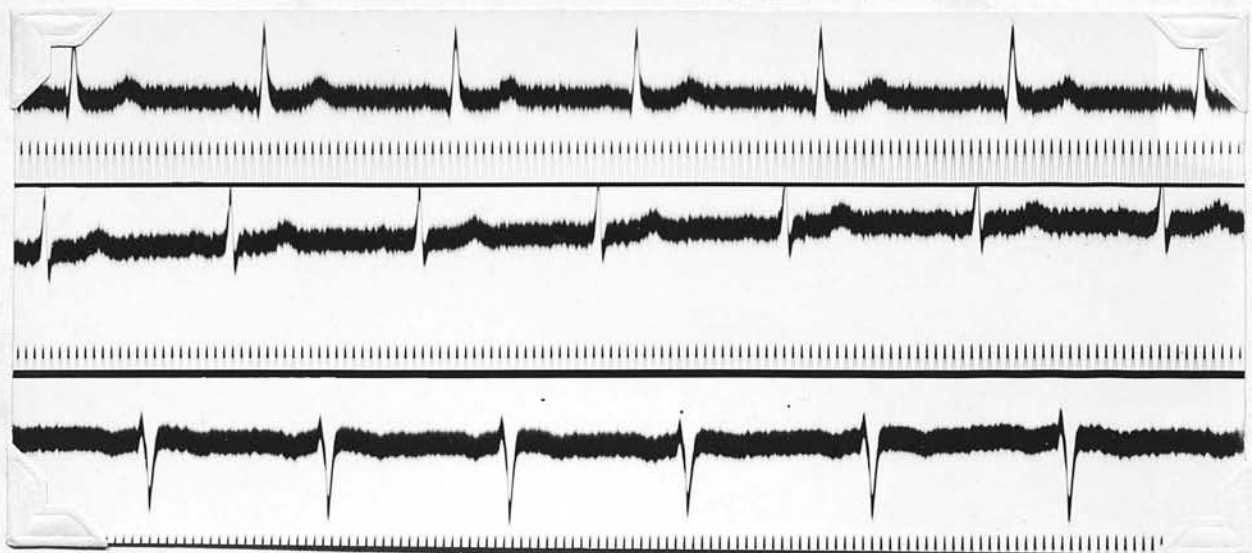
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ELECTROCARDIOGRAPHIC

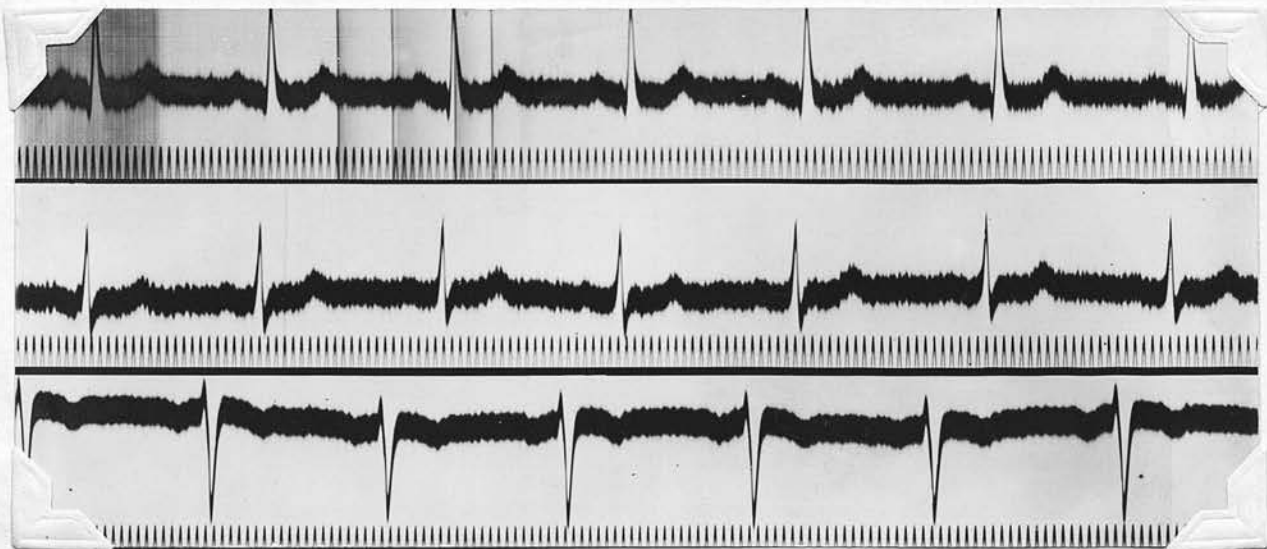
CURVES



TAKEN BEFORE IODINE (INTRAVENOUSLY). (29-3-27)



TAKEN FOUR HOURS AFTER INJECTION.

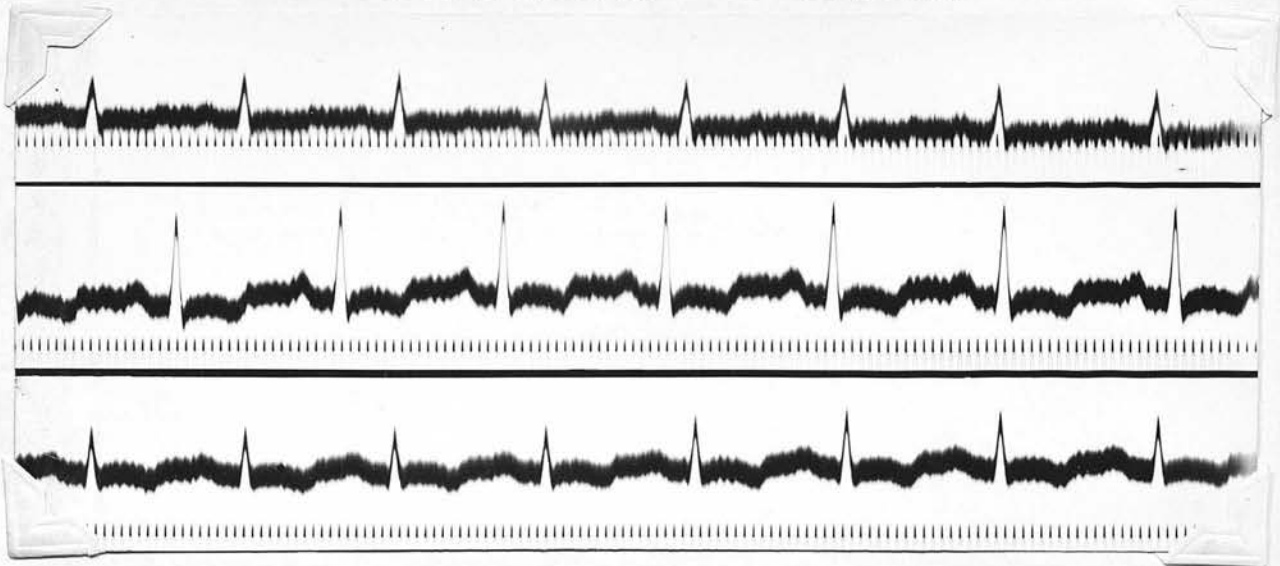


TAKEN 23 HOURS AFTER INJECTION OF IODINE. (30-3-27)

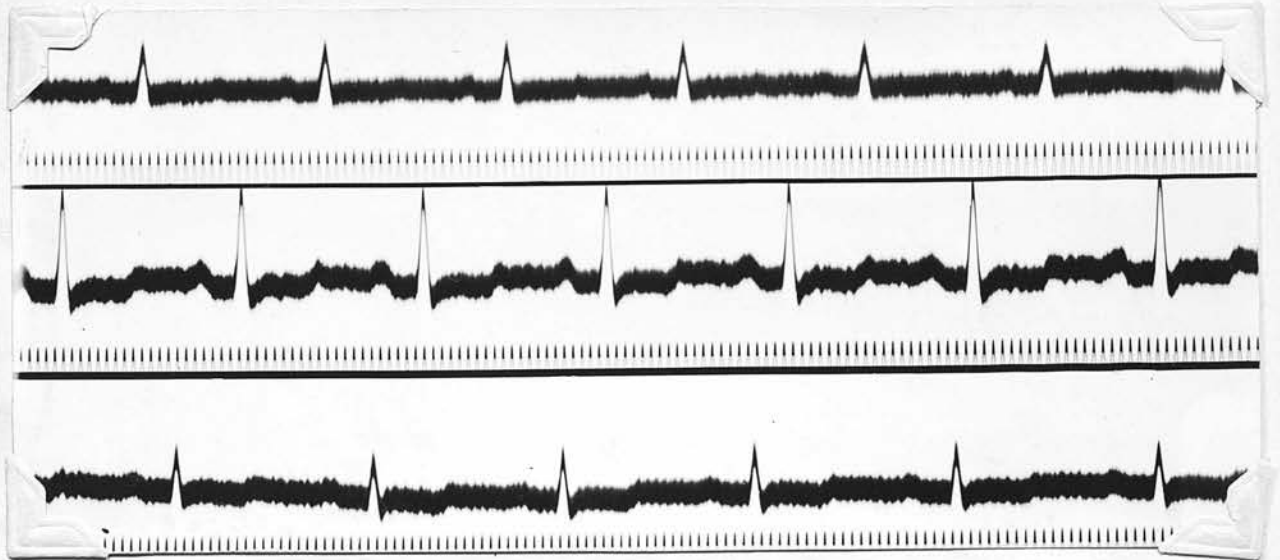
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ELECTROCARDIOGRAPHIC

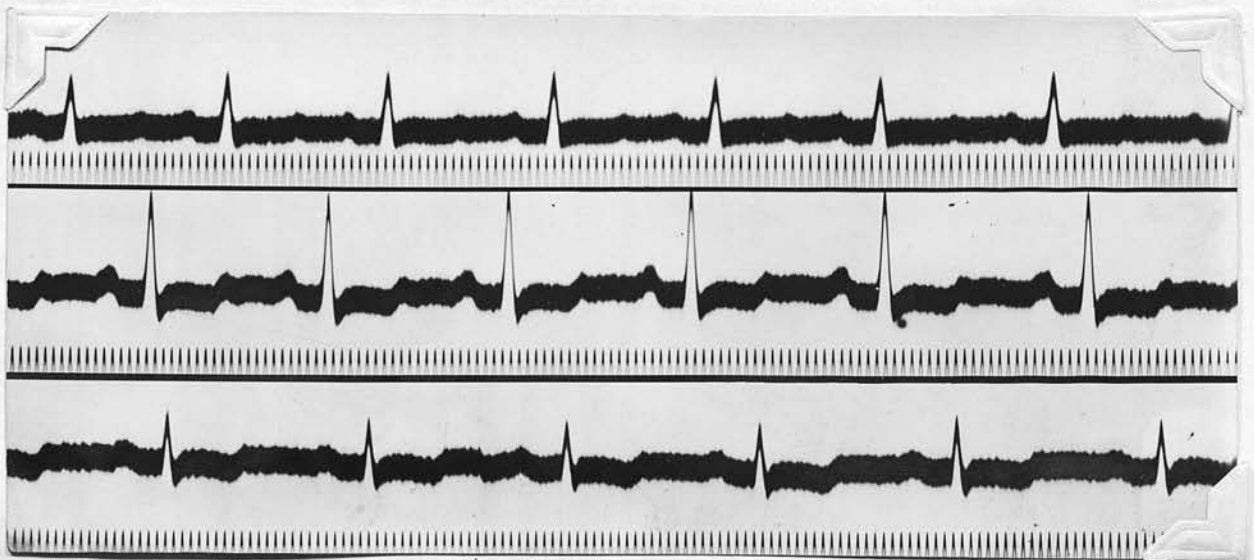
CURVES.



TAKEN BEFORE IODINE (INTRAVENOUSLY). 29-3-27



TAKEN 4 HOURS AFTER INJECTION. 29-3-27.



TAKEN 23 HOURS AFTER INJECTION. 30-3-27.

Pulse and Temperature.

Copies of the charts in two cases are given.

In the majority of cases there was only a slight rise in temperature. In four cases the daily temperature level rose from 97 F. - 97.5 F. to 98 F. - 98.4 F. It remained at this level for six or more days following the administration of Iodine,

In the majority there was only little influence on the pulse rate, corresponding with the influence on the temperature. The pulse rate was perhaps slightly accelerated.

In two cases electro-cardiographic curves were taken before and after iodine was given. There was practically no change. Graphs are given on the opposite page.

Symptomatology.

The symptoms of case B. have already been fully described. I will therefore only mention the main points, and make this a summary.

In the twelve cases, subjective disturbances were experienced, varying in intensity, more marked in females than in males. Drowsiness, headache, tremor and thirst were the predominating early symptoms. The drowsiness came on as a rule in half an hour, and persisted for from three to eight hours.

Frontal headache, often very severe in character, was complained of in every case, and persisted for from 12 to 24 hours.

Tremor commenced on the average 15 to 30 minutes after the injection. This symptom was infinitely more marked in the female cases than in the male. It may be mentioned that in the case of the patient suffering from ex-ophthalmic goitre the tremor was of such severity that the patient literally "shook the bed", and the rigor could be compared with the shivering stage in a case of malaria.

Another important symptom was the diaphoresis. This commenced as a rule in about two hours and lasted for 24 hours, often longer. For some days following the injection the skin, although extremely dry before administration of the Iodine, continued to remain rather moist. This change was most noticeable in the case of general endocrine disorder. The following is a short history of the notes

on this case:-

A female, aet 37 years, para 8: She exhibited not one condition, but a sea of troubles. The most marked change was a fibrous one, and this appeared to have affected the uterus more than any other organ. On admission to the R.I.E. her skin was myxoedematous in type; was extremely dry and glazed; the subcutaneous fat was most unhealthy. Her bowel was overloaded. She suffered, too, from a degree of neurasthenia.

The treatment was on general lines, viz: rest, suitable diet, aperients, etc. Intravenous iodine administration had extraordinarily beneficial results. The character of the skin was profoundly altered; dry before treatment, it became moist, the patient even perspiring. The unhealthy myxoedematous fat gradually disappeared, and the character and colour of the skin improved vastly. She felt, in herself, infinitely better; the lethargy and the weakness disappeared. The Iodine appeared to influence her whole endocrine system, re-establishing harmony once again.

Thirst was experienced in eight of the twelve cases, but the quantity of ingested fluids did not adequately account for the diuresis and diaphoresis.

The majority of cases felt a glow all over the body; their faces were flushed, and they had alternating sensations of heat and cold in the limbs, indicative of a marked vaso-motor disturbance.

In four cases tenderness was evident on palpation over the left upper quadrant of the abdomen close to the middle line. This may have been produced by irritation of the sympathetic plexus of nerves lying posterior to the stomach.

Case E. Female, arthritis, complained of tenderness in both iliac fossae, perhaps due to some ovarian disturbance.

In all cases of rheumatoid arthritis there was an exacerbation of the existing pain and stiffness in the affected joints; pain was also experienced in the other joints. This phase passed off in twelve to fifteen hours, and was followed by a spell of comparative freedom from pain, and a period of increased movement. Even in the more advanced cases the discomfort was appreciably relieved. In all cases beneficial results were obtained, varying, of course, in degree.

Summing up, no case out of the twelve was adversely affected by the treatment after the first twelve to twenty-four hours. The cases of sciatica, and those of rheumatoid arthritis, derived greatest benefit, and it was because of these results that I decided to investigate further the results of Iodine in rheumatoid arthritis and allied conditions. The cases will be described later in this paper.

After an interval of five to seven days a second injection of iodine was given. The results were very similar to the results of the first injection. The rigor was less marked, while the skin acted much more easily, and it remained moist for a longer period.

In case H., (Ex-ophthalmic goitre), all the symptoms were much more severe, both subjective and objective. For further investigations on this type of condition a modification in dosage is essential.

To summarise the foregoing observations, when Iodine, gr. $\frac{1}{2}$ (in Potassium Iodide and Normal Saline) is injected intravenously, a definite reaction is produced: This reaction is more marked in females than in males.

It increases the basal metabolic rate.

It stimulates the skin to activity, as evidenced by profuse sweating, followed by a period when the skin is definitely moist.

It produces a diuresis, and raises the urea concentration in the urine.

It produces a leucocytosis, varying in degree.

The temperature is raised above the previous existing level.

It influences the vascular system which is controlled by the autonomic nervous system, evidenced by flushing of the skin, feelings of heat and cold, etc.

In females the endocrine system seemed to be influenced, as evidenced by the varying size of the thyroid during experiments; tenderness over the ovaries; also the marked beneficial results in the case of endocrine disorder previously mentioned.

Comparison of Iodine with Thyroid and its Active Principles.

At this point it is of interest to give a short historical note.

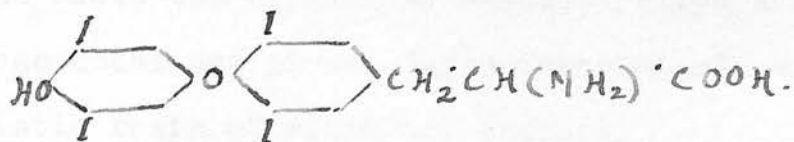
The treatment of certain diseases by the administration of thyroid and its extracts is one of the most satisfactory examples of rational therapeutic progress. As far back as 1882-3, Kocker and Reverdin published observations made on patients whose thyroids had been totally extirpated. Myxoedematous symptoms supervened.

The next advance came when these symptoms of myxoedema could be removed by grafting pieces of thyroid. Horsley was the first to suggest that myxoedematous patients should be treated by similar grafting. Then Murray introduced the treatment of this condition by giving subcutaneous injections of "Thyroid Juice". Later, similar results were obtained by giving it by the stomach. By giving up such treatment, symptoms of myxoedema returned, which proved conclusively that thyroid substance was of value in treatment.

A globulin, Thyreoglobulin, was extracted from the gland. This substance had the therapeutic action of thyroid, and contained a small percentage of iodine. Baumann's detection of this element was the first intimation that iodine existed in the tissues of the higher animals and of man. More recently, Kendall² isolated a white crystalline substance from the thyroid, and called it Thyroxine.

Harrington has succeeded in greatly increasing the yield of thyroxine from the gland, and has shown that the substance is a tetra-iodo derivative of the hydroxyphenyl ether of tyrosin, with an

empirical formula of $C_{15} H_{11} O_4 NI_4$ and a structural formula as follows:-



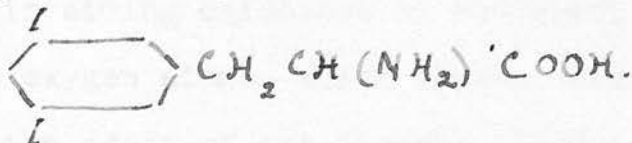
This was confirmed by Harrington and Barger.

The yield of Thyroxine from fresh gland is .027 per cent., or .12 per cent. of dried gland.

The activity of the thyroid is probably due to its thyroxine content.

Recently a second compound has been isolated, viz:

Diiodotyrosin, possessing the formula



Thus, both active preparations contain Iodine.

The United States of America have standardised their preparations of thyroid upon their iodine content requiring .17 per cent. to .23 per cent.

Thyroxine contains 65.1 per cent. iodine, and has a molecular weight of 585.

3

Kendall looks upon the iodine in thyroid as an "activator".

The Action of Thyroid and Thyroxine.

By the mouth the results of administration are well known, and if large doses are given, "Hyperthyroidism", with all its characteristic train of symptoms, appears.

Hunt⁴ states that "the effect of one milligram of Thyroxine, given intravenously, is an increase of basal metabolic rate of 2.8 points". - This is a much smaller dose than Iodine which was given in the previous experiments:- "Thyroxine has a specific dynamic action increasing the metabolic rate in proportion to the quantity actively present in the body".

Kendall has suggested the probability that its specific action lies in aiding oxidation by rendering more readily available nascent oxygen atoms, which agrees with the theory of Plumer, that the active agent of the thyroid gland is a catalyst that accelerates the rate of formation of a quantum of potential energy in the cells of the organism.

Kendall⁵ states that Thyroxine increases the B.M.R. and continues to exert its influence within the body for a period of 8 - 10 days. This is also true of Iodine, (cf. previous results), but not over such a long period.

The other effects of Thyroid or Thyroxine medication include sweating; raising the temperature level; loss of flesh; thirst; and an increase in the output of urine. In some cases, absence of symptoms may be due to the preparation having been made from thyroids containing little iodine.

The main feature of thyroid medication is undoubtedly the altered and increased metabolism. This is also the striking feature in all cases treated with iodine intravenously.

With thyroid all the nutritive processes are accelerated. The amount of nitrogen in the urine is increased: The increase in nitrogen is accounted for almost entirely by the increase in the urea (cf. increase of urea concentration in chart and figures.)

The removal of the body fluid via skin, urine, etc., has been put down to a definite action on the kidney, but it may be due entirely to the kidney's reaction to the presence of an increase of urea, etc.

Recently it has been shown that administration of Thyroxine is followed by a marked mobilisation of water and sodium chloride, which, entering the blood stream, produces a high degree of hydraemia, and that an increase in urine is due to the response of the kidney to this condition. The excretion of sodium chloride may become excessive. No explanation is forthcoming as to the causes of the changes, except that they are due to an action on the periphery as they occur in animals after section of the cord. Nor are they due to the ordinary changes in metabolism, as the diuresis occurs early, while the metabolic changes do not reach their maximum for some time.

From the chart opposite page 10, the increase in urea concentration also occurs before the marked increase in the metabolic rate.

Cushny⁶ states that by giving iodine by the mouth in a case where the thyroid gland is intact and capable of functioning, beneficial results follow; suggesting that the iodine or iodides lead to the formation of Thyroxine.

Hammett⁷, in his experiments on young rats, found that thyroidectomy caused marked loss of development of the ovary and uterus, and loss of weight; while in the males growth of the testis and epididymus was not greatly retarded. From these experiments, thyroid is more essential in females than in males. The influence of iodine in the twelve cases previously described showed much greater reaction in the female cases than in the male.

From the foregoing it will be seen that Thyroxine and Iodine bear distinct resemblance in their action following intravenous medication. They both increase the B.M.R. They both increase the urea concentration in the urine. The temperature level is raised by the exhibition of both.

CLASSIFICATION OF RHEUMATISM, ITS AETIOLOGY,
AND COMMENTARY ON CASES TREATED WITH IODINE.

Before giving a commentary on the cases of "Rheumatism" treated with iodine, a brief summary of the vast subject "Rheumatism" is necessary - also its aetiological factors.

There is no better classification of arthritis than that given by the British Ministry of Health in its report on "The Incidence of Rheumatic Disease" which has been adopted by the International League Against Rheumatism. It divides rheumatism into three main groups, as follows:-

- a) Rheumatic Fever and Subacute Rheumatism.
- b) Muscular Rheumatism, Lumbago, Sciatica and Brachial-neuritis.
- c) Chronic Joint Changes.

The last of these groups constitutes arthritis, and this group is subdivided into four separate entities.

1. Rheumatoid Arthritis (Infective peri-arthritis).

Usually begins with an initial attack of pyrexia of considerable length: Many smaller joints affected, especially the first and second phalangeal joints: Changes mostly peri-articular in character, often accompanied by much fibrosis: Lesions often bilaterally symmetrical: Nutrition almost invariably bad: Most frequent in females.

2. Osteo-arthritis, including *Malum Coxae Senilis*.

Usually afebrile: Gradual onset, often at first confined to one large joint: Fewer and larger joints affected, especially knee and hips. Grating, lipping, eburnation, osteophytes: Lesions often symmetrical: Patients usually well nourished.

3. Gout, acute and chronic.

Polyarthrititis with a definite history of repeated attacks of acute gout, or presence of tophi.

4. Chronic Joint Changes Unclassifiable.

Chronic joint changes which cannot be allocated to any of the above.

Dr. G.L. Kerr Pringle, of Bath, England, still further analyses rheumatoid arthritis into three types:

A) An adult, male or female, commencing in one joint: Usually slight pyrexia: May be healthy individual, but evidence of focal infection; teeth, tonsils, bowel, etc.

B) Patient had an attack; subsided, and all infection apparently at an end, but many joints have been injured. There is wasting of muscles; ankylosis of joints; frequently distortion; contraction and hyperextension of fingers; or, in some cases there may be undue mobility from previous over-distension of capsules. The patient is usually thin and anaemic.

C) This variety occurs mainly in women; in fact, it is very doubtful if it is ever seen in males. This is the most difficult form of the disease to treat. This is the variety, (amounting to one sixth of all cases) which is associated by the general public with the dreaded term "rheumatoid arthritis". Its commencement is slow and insidious, attacking both hands and feet, or, first on one side and then on the other. Its progress is usually centripetal and symmetrical. Frequently there are associated nervous phenomena of trophic nature; sweating and glazing of the skin; atrophy of the muscles and bones; and occasionally Raynaud-like changes in the skin of the extremities. It occurs in young female adults who follow an indoor life, dressmakers, stenographers, Store clerks, etc. Kent Spender⁸ gives a very graphic picture of this type:-

"A patient comes before us, of a spare habit of body, and slightly forward attitude, with a halting gait. We note the ovoid face; the melasmic tinge round the eye, and the shining yellow smear on the forehead. We feel the moist, cold hands; we glance at the swollen fingers; and our diagnosis is made.

Etiology.

The causal factors at work come under three headings:-

1. Infectious.
2. Deficiency.
3. Metabolic.

All play a part; in some types one more than another, e.g. in acute rheumatic fever the joint lesion is part of a general infective process, and is definitely of the infectious or bacterial type. By far the larger proportion of cases of arthritis the local infection in the joint is secondary to some focus of infection. The micro-organisms most commonly implicated are the streptococcus and the gonococcus. The acuteness or chronicity of the arthritis seems to depend, not so much on the nature of the infection, as upon the directness or indirection of the joint invasion. If the joint is the primary seat of the germ-infection, it is apt to be acute; if the joint lesion is the result of toxins from a remote focus, it is likely to be subacute or chronic. Miles J. Breuer, of Lincoln, Neb., gives the following list as the commoner source of trouble, in the order of frequency:-

Mouth and teeth; throat and tonsils; paranasal sinuses; middle ear and mastoid; cervix uteri; prostate and seminal vesicles; vermiform appendix; colon; rectum; kidney and pelvis; urinary bladder; gall bladder.

We may, or may not, agree with this list, but whatever the source of infection, satisfactory treatment of rheumatism is impossible without removing the source of infection.

D.E. Markson⁹ gives figures on teeth infection; Stanley Collyer¹⁰ of London stresses its importance; while Pavey Smith of Bath points out the importance of tonsillar infection in arthritis.

The classification of Rheumatism is more or less a differentiation, and there is no hard and fast dividing line.

M.B. Ray¹¹, in his opening chapter, gives a section of it to "Diathesis", and ancient concept in the aetiology of disease. He points out that areola tissue, the fascial layers, the peri-articular structures, and the components of the joints, are all derived from the same embryonic element - the mesoderm - and they moreover all contain transudates from the blood system (also of mesodermal origin). He also states that "the cartilaginous surfaces of the joints, the synovial linings of the articulations, and their fibrous capsules, are not highly differentiated structures any more than the connective tissue and white tissues which send their pronotations everywhere to form coverings of muscular bundles, and their tendonous attachments as well as the sheaths of the nerve fibres". The reaction of such a tissue, low in cellular hierarchy, to irritation, bacterial or toxic, is simple and is mainly inflammatory. Achard gives the name "lacunar" to this unified connective tissue system. From the above it is obvious there must be a marked association in the various types of rheumatism previously mentioned.

Ray also gives a brief account of the physiology of the Skin; its protective functions; its blood vessels; its glands, etc., and shows how the heat regulation is controlled by the sweat glands and skin vessels. Again, the autonomic nervous

system largely controls the cutaneous nerves of the skin. This is divided into two systems; the para sympathetic system (extended vagus), and the sympathetic nervous system (gang-loined cord). These are antogonistic in their action, and their equilibrium keeps the body in a state of health. Bield, Eppinger, Hess Falta, and others have found that exaltation of the sympathetic accelerates and strengthens the heart; also metabolism is interfered with when there is not harmony in their action. There is, too, free and intimate as-sociation between this autonomic nervous system and the voluntary nervous system. Again, the endocrine system bears a very close relationship to the autonomic nervous system. The endocrine system is composed of antogonistic elements; the thyroid, pituitary, and adrenals oppose the pancreas in metabolism, and the thymus and pineal body in development. The thyroid is stimulated by the sympathetic, while the pancreas is stimulated by the para-sympathetic. Furthermore, mental states, excitement, fear, etc., have a profound effect on the endocrine and autonomic nervous system.

In all cases of rheumatism, the cardinal manifestations are **pain**, limitation of movement, and deformity; and as Ray¹² described, are aetiologically dependant on certain pathological changes.

- a) Inactive skin, and subnormal temperature.
- b) Stasis in capillary areas and blocking of lymphatics.

c) Sluggish metabolic activity, enabling bacterial toxins and "toxic-end products" to accumulate in the tissues, and provoke irritation therein.

d) The formation of adhesions in and around the joints; the presence of inflammatory thickenings, and fibrous deposits in the sheaths of muscles, tendons and nerves, as well as in the subcutaneous tissues.

From the conclusions enumerated on page 18, it will be seen that iodine given intravenously exerts its influence in the right direction, and has a beneficial influence on the fairly constant aetiological factors.

That Rheumatism, excluding Type A, (acute and subacute rheumatic fever), and hypothyroidism go hand in hand, evidence in the literature is abundant, and that benefit by administration of thyroid is derived. Dr. Francis C. Hall,¹³ Boston, found that thyroid deficiency appears to be one of the contributing factors. Among 150 patients with hypertrophic arthritis, symptoms and signs of hypothyroidism occurred with great frequency. Basal metabolic rates were below 10 in fifty per cent., and below 15 in thirty-four per cent. of 108 patients. Treatment with thyroid gland was of permanent value to forty-nine per cent. of 116 patients to whom it was administered. Mutch¹⁴ is of the same opinion, and in his series of 200 cases of rheumatism, minor forms of hypothyroidism were very common, while well defined myxoedema was present in fourteen per cent. of the total.

Bonchardt¹⁵ considers osteo-arthritis is due to "bradytroph", i.e. a sluggishness of metabolism, - or a premature ageing of the endocrine system.

Llewellyn¹⁶ draws attention to the importance of the study of the endocrine system in its relation to the aetiology of rheumatic disease.

Leopold Levi¹⁷ and de Rothschild hold the view that arthritism is characterised essentially by retarded metabolism, a chronic auto-intoxication, and that hypothyroidism and arthritism are manifested by the same symptoms.

The fact that so many cases of Rheumatism, be it neuritis, fibrositis, or arthritis, are associated with a lowered metabolic rate, dry skin, and subnormal temperature, probably accounts for the value of iodine in treatment.

The following is a list of cases treated with iodine, intravenously: An account of each is given in the appendix.

- 3 cases of osteo-arthritis.
- 2 cases of infective arthritis.
- 4 cases of neuritis.
- 1 case of subacute rheumatic fever.
- 1 case of endocrine disorder.
- 1 case of myocardial degeneration.

Of the above cases, only two were unsuccessful, and both those cases were of marked and advanced osteo-arthritis, with pronounced bony changes.

In York I used iodine intravenously in private practice, but the reaction was pronounced, and I found it difficult to persuade patients to come up to scratch; a trained nurse is almost an essential. The treatment could be carried out in a Nursing Home or Hospital quite easily. I was convinced that the results were sufficiently encouraging, so I decided to carry on the investigations on modified lines.

Leaving York in October 1927, I took up practice in Sutton, Surrey, and used Collosal Iodine (Crookes), intramuscularly in similar cases. I gave 10 cc. ampoules, each containing .2% of Collosal Iodine, and repeated the injections at 4 - 6 day intervals. The injections were followed by very little reaction; no rigors and no profuse sweating. Headache was a fairly common symptom, and in 4 - 6 hours the patient complained of slight increase of pain; this, in cases of arthritis, was often accompanied by pain in other joints. There was no marked increase in the excretion of urine, and it frequently took three or four injections to produce a definite change in the character of the skin.

The dose of Collosal Iodine is very much smaller than the dose which was given intravenously, and, in addition, I gave it intramuscularly, which also modified its action. It is sometimes painful over the site of the injection for about one hour, but otherwise there is little inconvenience to the patients. The results have been satisfactory, but not so

dramatic as those following intravenous therapy.

The following is a list of the cases which are described in the appendix:-

- 5 cases of osteo-arthritis.
- 4 cases of infective arthritis.
- 18 cases of neuritis and fibrositis.
- 1 case of subacute rheumatic fever.
- 4 cases (miscellaneous) including Ichthyosis, migraine, myxoedema, etc.

In the cases of osteo-arthritis, Numbers 14, 17, 19, 21 and 25, three obtained considerable relief; pain was lessened, movement freer, general condition improved. There was no improvement in bony changes. Cases No. 14 and 25 were not materially altered by the treatment.

In the cases of infective arthritis, Numbers 15, 18, 24 and 30; No. 24 was the only unsatisfactory case, and although she made some improvement, I was disappointed with the results of the treatment. The other three found definite benefit from the therapy. Each case exhibited definite evidence of hypothyroidism, and in each case the general condition improved.

The cases of fibrositis, neuritis, etc., Numbers 13, 16, 20, 22, 23, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, and 40, were the most satisfactory, and all derived great benefit, and their symptoms disappeared.

It had resisted all the usual remedies. It cleared up after a course of iodine 1 cc. (1% ampoules) being given every second or third day, for four weeks. The dandruff also improved, and the patient noted his hair had lost its dryness.

Case 43 is an interesting case of Ichthyosis, dating back to infancy. He was materially helped by the iodine therapy.

Cases 42 and 44 are cases of endocrine disorder; the former in a lad of seventeen years, who was overgrown, fat and flabby, and who complained of intense headaches, migraine-like in character. Having first tried luminal, calomel, bromides, etc., and a course of thyroid, I decided to try iodine intramuscularly, and the results were most satisfactory. The latter, (case 44), was one of endocrine deficiency, with marked deposit of adipose tissue, coarse skin, etc. She was myxoedematous in type. Curiously, thyroid, even in large doses, had no effect; while iodine has already made a marked difference.

G.F. Walker,¹⁸ in his booklet, states "Thyroid is indeed indicated in A N Y condition in which there is depressed metabolism, and hence it has a range of utility extending from anexoria nervosa to ulcers on the leg". The same applies to Iodine in its uses, and, in addition to the cases mentioned in the appendix, I have used it frequently in private practice, in such cases as depression following influenza; pneumonias making slow convalescence; myalgias which are not responding to the usual remedies; in fact

in all conditions where metabolism is interfered with. By giving it intramuscularly, the effect is much more certain than by the oral method, and its action is more pronounced and rapid. I feel that by giving iodine orally it is broken up, and iodides are formed. These are undoubtedly of value, but in my opinion it is the active principle - iodine - which is of value where the effects of hypothyroidism are met with clinically.

Iodine is by no means a "cure-all", but I have found it of great use in practice, and my own results have been most encouraging.

CONCLUSIONS AND COMMENTARY.

In the first section of this paper I have endeavoured to show the results following iodine intravenously. They have already been summed up on page 8.

Iodine thus administered seems to have a threefold action:

- 1) Due to its own presence in the blood stream.
- 2) Due to its action and influence on the thyroid.
- 3) Due to an indirect influence on the other endocrines by reason of a stimulated thyroid. Its action is catabolic, accelerating tissue waste, and it hastens the elimination of waste products by skin and kidney.

Iodine in its action bears a strong resemblance to Thyroxine,

which also contains iodine; and the thyroid in the United States of America is standardised by its iodine content. Iodine, therefore, may be called an active principle or hormone, rather than a drug. George W. Crile¹⁹ is not far short of the mark when he says that the study of the thyroid "begins and ends with Iodine".

Turning now to the aetiology of rheumatoid diseases, I have shown how in these cases there is frequently evidence of disturbed and impaired thyroid action. This is backed up by findings of many authors. I have shown, too, that in "Rheumatism" there is some focus of infection. The toxin from such infection may be the cause of the impaired thyroid activity. With the thyroid not functioning at its best, the other endocrines are naturally out of gear; the result being a lowered metabolic rate.

I have shown how the areolar tissue, the fascial layers, the joint coverings, etc., are all developed from the same embryonic structure - the mesoderm - and it is these tissues, when diseased, that give rise to the condition known as "Rheumatism". There is no hard and fast line dividing the various types of rheumatic disease. The classification depends on the fascial sheath or covering involved.

With reference to the treatment of Rheumatism, there is no better axiom than that given by Dr. Farquhar Buzzard, which is as follows:-
²⁰
 "The problem involved in treatment of arthritis is the problem of causation, the proper assessment of the causative factors, and the requisite knowledge to prevent or to destroy their influence" -

I have stressed the importance of eliminating the source of infection, be it tonsil, teeth, or bowel; and, from the investigations described in the early pages of this paper, it can readily be seen that iodine could play a large part in the removal of the pathological changes produced by the causal factors.

Finally, the results of iodine therapy in private practice have been most encouraging; complete success following treatment in every case of neuritis and fibrositis, i.e. the simpler manifestations of rheumatism; while in the more serious and more troublesome lesions - infective peri-arthritis and osteo-arthritis - iodine intramuscularly has been followed by marked improvement in the majority of cases. During the last eight years I have made an endeavour to study the relationship of Rheumatism to lowered metabolism and impaired thyroid function.

Iodine, the active principle of the thyroid, has been shown to raise the basal metabolic rate, and it is because of this action I feel that it has a definitely beneficial effect in the treatment of a disease that causes so much loss of work, and suffering - "Rheumatism".

A P P E N D I X.

SUMMARY OF CASES TREATED WITH IODINE INTRAVENOUSLY.

(1). D.J. McC. - Aet 54 - Male Nurse.

1921 - Rheumatic Fever three to four months; knee, shoulder, elbows and ankles affected. After ten months able to resume duties as nurse. Remained fit until 1925. Then complained of pain in left knee, worse on movement; swelling of joint.

1926 - Right knee similarly affected; also right elbow gave trouble; trouble so severe, crutches necessary.

History of occasional sore throats; complexion dirty; malar flushing; nutrition slightly below average; not anaemic.

Tonsils and fauces congested; otherwise, nothing gross pathologically. Wasserman negative, 15/2/27.

X-Ray Report:- Elbow narrowing of joint space with osteophytic formation, especially on under surface of articular surfaces of trochlea and ulna.

Knee Joint:- Both knee joints show marked osteo-arthritic changes.

Results of Iodine intravenously.

16/2/27. Marked exacerbation of pain, stiffness, etc.

17/2/27. Joints freer; movement less painful; perspiration.

22/2/27. Second injection; no increase of joint pain; marked diaphoresis; headache.

23/2/27. Joints if anything less painful, but no material difference. Reaction not so definite as after first administration.

4/3/27. 3rd. administration - Increase in joint pains and stiffness, headache and general malaise; diaphoresis.

5/3/27. Improvement slight in knee joints. Improvement was not definite enough to warrant further trial. After 15 days decided to try T.A.B. vaccine intravenously.

Results. 23/3/27. Rigor: Very marked increase in pains, followed in 10 hours by corresponding amelioration; However only short lived.

28/3/27. T.A.B. vaccine repeated. Rigor, joint pains---, stiffness--, again followed by a short period of well-being.

It is of interest to note that on 2/4/27, i.e. 5 days after the administration of the administration of the T.A.B. vaccine, the patient developed an acute otitis media. It ran a typical course, clearing up in ten days after para-centesis.

The patient certainly improved during the next month, but the joint changes in the left knee were of such dimension that it was considered advisable to carry out complete excision of the joint. This was done, and the patient was certainly freed from pain in this joint.

Commentary.

The Iodine intravenously made no material change to the joints. However, one cannot help thinking that with the skin glands in

healthier condition, and his general tone being better, iodine played a definite part in the improvement.

The T.A.B. vaccine intravenously is akin to protein shock. This treatment is a shade rigorous for most cases.

Case 2. Miss A.P. - Aet 22 - Domestic Servant.

Fifteen months ago complained of swelling in the forefinger of the right hand, followed by pain; swelling gradually extended to the other fingers (interphalangeal joints). The swelling was accompanied by pain and stiffness.

History: Occasional colds; scarlet Fever, and measles. A fairly healthy girl, well nourished, skin dry, and perspiration practically nil even on exertion.

Septic teeth and stump removed in Hospital.

Tonsils, rather large and cryptic: Pus in one or two follicles. Wasserman negative.

Clinical evidence in fingers. Swelling and thickening at interphalangeal joints: Stiffness and pain in movement: X-Ray evidence:- slight atrophic changes in the bones, but no hypertrophy of bone at or near the joints.

There was no evidence of infection in the joints of the foot. The bowel was loaded with faecal residue. This was cleared up by a series of double washouts - 1 quart plain water enemata.

Effects of Iodine.

8/3/27. Headache, shivering, hot flushing, sweating; increase of pains; stiffness.

9/3/27. Freer movement and less pain; perspiration continuing; feeling "better". No increase of temperature following the injection.

18/3/27. T.A.B. intravenously. Rigor: Temperature 102.5 F. Headache marked; general malaise; acute exacerbation of joint pains, settling down in 24 hours.

20/3/27. Skin still moist; joints materially improved.

The above treatment was combined with massage and hot air baths.

Commentary.

This young girl - aet 22, is typical of many: The infective arthritis is part and parcel of a systemic disturbance; septic teeth, septic tonsils, and, shall we say, septic bowel. These were cleared up first. The skin too was unhealthy, poorly nourished, as evidenced by its gloss and state of the skin hairs. The case responded fairly well to iodine therapy: The joint condition and the general condition both improved: Massage and hot air baths played a part.

The prognosis is good if suitable attention is paid to general hygiene, etc.

Again T.A.B. vaccine, although beneficial, created marked discomfort to the patient for 24 hours.

Case 3. Mrs. M. McQ. - Aet 45 - Domestic.

History of onset of joint pain (metacarpo-phalangeal) for two years, accompanied by stiffness and swelling. During the last two years condition gradually spreading, affecting in turn practically all the joints, viz: ankles, knees, shoulders, elbows. At times fairly free from pain, at others gravely crippled. The mandibular joint has, during the past two years, given frequent trouble. In addition to trouble in the joint, patient has suffered from "myalgia" in the back, in the upper arm, and in the thighs.

For the past year she has been losing weight; poor appetite; and has felt chronically tired. Admitted to Hospital 9/2/27. Previous illnesses of note:- Scarlet Fever, 1914; arthritis following, but of short duration, 14 days. General condition is one of a poorly nourished, anaemic woman, with a dirty sallow complexion.

The joint condition is typically one of infective arthritis.

X-Ray reports show atrophic changes in bones; no osteo-phytes.

The teeth were septic (removed in Hospital). Tonsils moderately healthy.

The abdomen showed little or no movement on respiration, and there was distinct tenderness on palpation of the right Iliac region. This condition improved by enemata on successive days. Wasserman negative.

Effects of Iodine.

16/2/27. Intense reaction, headache, shivering; increase in joint pains; perspiration profuse.

17/2/27. "Feeling much easier"; pains and stiffness in joints less; perspiring freely; somewhat drowsy.

18/2/27. Hands more painful than yesterday; otherwise improvement continuing.

20/2/27. Complexion infinitely cleaner.

22/2/27. Second injection of Iodine was followed by fairly acute reaction with marked increase of joint pains and stiffness.

23/2/27. Marked improvement in condition.

1/3/27. Third injection followed by similar result, with marked improvement in clinical picture.

7/3/27. Fourth injection; not so severe a reaction.

9/3/27. Joints materially improved; no pains and little stiffness; swelling less marked.

15/3/27. Patient discharged with little or no evidence of arthritis.

The treatment on general lines, rest, diet and elimination, coupled with massage and iodine intravenously proved of great value to the patient. The improvement in the condition was marked and was rapid, and she was discharged free from symptoms, and with

much more energy.

Iodine had a pronounced and beneficial effect on the condition. The joint condition improved as rapidly as did the condition of the skin. The prognosis is good provided suitable environment is obtainable. The tenderness in the appendicular region was very marked on admission, but on discharge there was no tenderness even on deep palpation.

It is very interesting to note that the patient was re-admitted within six weeks with a return of symptoms, and at the same time with symptoms of a definite subacute appendix. This was removed, and the joint symptomatology cleared up. Again a definite local focus was probably the basis of the infective arthritis.

Case 4. P.R. Aet 65. Oilworker.

Diagnosis: Sciatica and Lumbago.

History: Pain in back for two to three years at intervals. For one year complaining in addition of pain down the back of the left leg. The patient's work is carried out in a shed, and recently he has been blaming draughts for his "rheumatic" pains. The Sciatica did not yield to ordinary measures and external applications, and the condition did not permit of work; so he was admitted to the Royal Infirmary. On examination the main points were:-

(a) Definite Sciatica on left leg, and fibrous nodules in lumbar muscles.

- (b) Septic teeth and gums.
- (c) Tenderness in right iliac fossa with a loaded colon.
- (d) No evidence of pressure in pelvis.

The teeth were removed and the bowel was cleared out. In addition the patient had rest and light diet.

Results of Iodine Administration.

25/2/27. Iodine intravenously; increase of temperature; no headache; increase of pain in leg; thirst, followed in two hours by perspiration and feeling of well-being.

28/2/27. Slightly improved: The pain permits of greater degree of flexion of leg on thigh.

4/3/27 . Much improved: Almost complete flexion.

6/3/27. Second administration of Iodine; followed by increase in pain in leg; increase of stiffness, The injection caused no headache or general malaise; but again a diaphoresis was produced.

18/3/27. Definite improvement in general and local condition.

29/3/27. Discharged from Hospital free from pain: The nodules in the lumbar region were scarcely palpable.

This case undoubtedly benefited by extraction of teeth, and also by the improvement in the bowel condition. One cannot help being of the opinion that iodine played a part in the comparatively speedy recovery. It undoubtedly stirred up an impaired metabolism, and promoted a freer action of the skin and of the kidney, assisting the body to cope with the auto-intoxication which was causing Sciatica to persist.

Case 5. J.C. Male. Aet 47 - Miner.

Diagnosis - Sciatica.

This case is very similar to case 4, only the lumbago is of much longer standing - 20 years - and the sciatica has been acute for four and a half months, and is associated with impaired knee jerk (practically gone), and wasting of the muscles supplied by the sciatic nerve.

Again there was a focus of infection in the teeth, which were all removed. The skin too was very dry, and despite work as a miner, never acted freely on exertion. The Wasserman reaction was negative.

Results of Iodine Intravenously.

19/2/27. First injection, followed by usual train of symptoms, though not severe. The pain along the nerve was not markedly increased, but the following day it felt definitely easier. The skin was moist.

4/3/27. Second Iodine injection: Greater reaction: More headache (frontal): Flushing of face : Perspiration, profuse.

5/3/27. Movement in leg easier and not so limited; not so painful.

22/3/27. Discharged free from pain; walking well.

Commentary.

This case is one of auto-intoxication, probably from the teeth. Attempts at treatment, extending over years, without removing the cause of the infection, proved valueless. The condition clearing up within five weeks after admission to Hospital and within five weeks of the removal of the teeth, is definite proof in itself. Iodine proved of value; it was interesting to note the alteration in the temperature chart in the particular case. Following the iodine administration it rose to a higher level, from an average of 97° - 97.5° to 97.5° - 98.4° . This continued practically throughout his stay in Hospital. Once again the basal metabolic rate was increased.

Case 6. Mary C. Aet 57 - Office Cleaner.

This case can be dealt with briefly. It was one of typical sub-acute rheumatic fever following a tonsillitis. Iodine was given despite a definite improvement following on the oral administration of salicylates. The iodine was given on two occasions at the interval of one week. Both doses produced a temporary exacerbation of the joint pains. with swelling and increase of stiffness, followed in twelve hours by an amelioration. After both injections a profuse diaphoresis and a diuresis was produced. The inference from this case is doubtful; Iodine may have speeded up a recovery which was taking place with the routine measures adopted in such cases.

Case 7. Mary W. Aet 28 - Domestic Servant.

Diagnosis: Myocardial Degeneration.

Iodine intravenously was given to this patient to see if it would raise her basal metabolism. On admission she was cyanotic, breathless, and had oedema of the legs and ankles. From my notes, on the day the iodine was administered the urine output rose to 56 ozs. from an average of about 30-35 ozs. The skin, too, began to act, and she stated that she "felt better".

Case 8. Mrs. C.M. Aet 37 - para 8.

Severe Endocrine Disorder.

This case has already been fully described on page 16.

Case 9. Mrs. P. Aet 68 - York.

Short History.

Four years ago pain and stiffness in right hip, gradually increasing in severity; limited movement. Harrogate two years, vaccines, baths, etc., no benefit; stiffness and pain continuing.

Clinical Appearance.

Dry skin: Absence of perspiration.

Toxic appearance: thin.

Teeth, false (1912).

Abdomen. flaccid: No tenderness.

Pelvic organs: Nothing pathological.

Hip Joint: Swelling over greater trochanter. Pain, especially on movement. Movement very limited; much creaking; no rotation possible. No other joints affected.

Iodine administration orally for two months, followed by no marked changes.

20/6/27. First injection-- $\frac{1}{2}$ dose.

Two hours after injection increase of pain and stiffness; headache; slight malaise and nausea; thirst; slight shivering; no temperature.

Poor night: Sweating; thirst continuing, and headache.

Twenty-four hours. Pain and stiffness less; feeling better; headache still present, though slight; no nausea; skin moist, and feeling of warmth; thirsty.

Forty-eight hours. Still improvement; no change in joint movement; not so painful; rather drowsy.

25/6/27. Second administration - $\frac{3}{4}$ dose.

Two hours. Same symptoms as previously: More pronounced headache; thirst and nausea; no vomiting; drowsy and shivering. Again poor night.

Forty-eight hours. Feeling much brighter; pain less; still extremely stiff.

Seventy-two hours. Feeling of well-being.

29/6/27. Third administration - Full dose.

Less marked reaction; more sweating and thirst.

On third day feeling extremely well; appetite good; pain gone except on movement; joint still as stiff as before treatment; complexion much clearer; slight abdominal tenderness above and to the left of umbilicus and over appendicular region.

7/7/27. Fourth Administration. Full Dose.

Reaction not so marked; headache, thirst and perspiration still pronounced; inclined to be drowsy for 24 hours. Sleeping better; appetite much better.

10/7/27. Feeling extraordinarily well; bright and cheerful.

14/7/27. Fifth Administration. Full Dose.

Followed by same symptomatology.

21/7/27. Arms tender: Further administration not advised: Taking Iodine (Colloidal).

Clinical Condition. Improvement; complexion clearer; skin clearer and moister, not so waxy; tongue clean; bowels regular: Joint: Absence of pain except on movement; appears to be more ankylosed.

1930. Report from York: Improvement continuing.

Case 10. Mrs. C. Aet 44. Para 3. York.

History. Increasing difficulty in walking and in doing household work for past five years. Backache and headaches.

Clinical Condition. Classical signs of rheumatoid arthritis: Swelling of joints, metacarpal and interphalangeal joints, also similar joints involved in both feet; knees, limitations in movement; swelling, etc. Skin dry, glazed and hairless; hair dry and lustreless.

10/6/27. First injection: Marked increase of pains in joints throughout body. Settled down in 24 hours.

17/6/27. Second injection: Similar increase in joint pains. No marked improvement.

24/6/27. Third injection: Produced all signs of protein shock, shivering, rigor, etc.

No clinical improvement resulting from three injections, I decided to give up treatment with iodine intravenously.

1930 Report: Still worries her medical attendant: No improvement.

Commentary. This case is the type described on page 26, and it is the most disappointing one I have had in practice. Iodine was followed by such a marked reaction that after three injections I decided to discontinue its use in this case.

Case 11. M. Aet 27. Sugar Factory Worker. Single.

Sciatica. May 27th. 1927.

History. Occasionally attacks of pain in right hip and back of thigh for past two years: Had a vaccine; not much success: Not subject to headache or sore throat. Pain so continuous and so acute that had to give up work in July 1927. Treated by Phylacogen; no shock; no reaction; no improvement. Advised rest, and this ameliorated the condition.

Clinical Appearance.

Teeth foul, pyorrhoea and caries; tongue unhealthy; rather constipated: Abdomen, nothing abnormal.

Sciatic Nerve extremely painful throughout whole of course, continuous along line of posterior Tibial.

25/4/27. First Injection: Increase of pain for twelve hours. Sciatica not much better next day.

2/5/27. Second Injection: Pain less severe; freer movement in leg.

8/5/27. Third Injection: Sciatica very much better.

20/5/27. Returned to work. Advised extraction of teeth.

1930. Report: "Quite all right; doing work regularly".

Case 12. Janitor in School. York. Aet 47.

History.

Sciatica for three years with periods of extreme pain.

Always constant dull ache: For past fourteen days unable to carry on duties.

Rather thin; anaemic; toxic in appearance; grey; teeth all removed; bowels rather constipated; no pain or tenderness in abdomen; nothing abnormal in rectum; no joint pains, but definite tenderness along course of sciatic nerve.

1/5/27. First injection of iodine: Pain increased; headache (frontal); shivering; thirst. Temperature 99° F. Settled in 36 hours, and condition slightly improved; able to stretch nerve more freely.

9/5/27. Second injection: Similar symptomatology, but not so marked an increase of pain; again followed by relief.

17/5/27. Third injection: Severe headache; shivering and rise of temperature to 100° F. Diaphoresis after symptoms. Settled in two days; felt much better: Fairly free from pain.

28/5/27. Fourth injection: Not so much reaction; marked improvement in sciatica and general condition of patient; appetite better; skin healthier; more moist, etc., reacting better.

10/6/27. Fifth injection: Little reaction at all.

Commentary. This man undoubtedly improved with iodine therapy. It raised his metabolic rate, and improved his general condition, thus increasing his powers of resistance to disease.

1930. Report. "Quite all right; no further trouble with sciatica.

CASES TREATED WITH COLLOSAL IODINE, INTRAMUSCULARLY.

Case 13. Miss H. Aet 47 - Sutton.

Diagnosis: Neuritis.

Seven years ago she had two or three severe major epileptic fits, treated successfully with bromides and luminal. Unfortunately the patient has been unable to stop taking either the bromide or the luminal; having tried on several occasions, but each attempt resulted in a return of the epilepsy.

24/12/31. Tonsillitis followed by severe neuritis of the facial and trigeminal nerves, also the brachial plexus. Aspirin in large doses (gr.X. 1 dr) was of benefit, but only palliative; patient could make no headway towards recovery. From previous experience I suggested the use of Iodine.

26/2/32. 10 cc. Crookes Collosal Iodine given intramuscularly in the gluteal region. There was no exacerbation of symptoms, and the effects of the injection were not experienced until two days later. Symptoms:- Headache (slight), sensations of hot and cold; slight shivering; profuse perspirations, aggravated by taking of food; mild diuresis. The temperature in three days rose from a persistently subnormal level to an average of one degree F. higher, i.e., 97°F to 98°F. The patient definitely felt better after the third day; the neuritis was still painful on pressure, but the pain was not so acute.

5/3/32. Second Injection. 10 cc. Collosal Iodine: Increase of pain in twelve hours; slight rise of temperature (99°); shivering; perspiration. In 24 hours feeling better; more energy; skin moist; pain in arms less.

12/3/32. Third Injection. No marked reaction; neuritis gone; more energetic; complexion brighter; metabolism brisker, memory improved.

This case is one of auto-intoxication from tonsils: Resistance lowered too, by continued use of bromides: Iodine beneficial by its influence on the basal metabolic rate. The patient was most enthusiastic over the treatment.

During the past three Winters Miss H. has had an attack of influenza each year, and has always been slow in recovery. There has been an associated neuritis, and I have given her a course of four Collosal Iodine (10 cc.) injections, each time with marked benefit.

Case 14. Mrs. C. Aet 58. Sutton Hospital.

This case was one of osteo-arthritis with eburnation and lipping of the joints: The chief joints affected were the ankles and the knees. 10 cc. of Collosal Iodine were given at intervals of seven days for four weeks, but the effects only served to increase the pain temporarily, and no success or benefit resulted from the treatment. This again is a case where there were definite changes in the bone, and unfortunately a similar result to cases 1 and 3 was obtained.

Case 15. Mr. M. Aet 42. Sutton.

Occupation at Water Works.

Diagnosis: Infective Arthritis.

January, 1932. History of increasing difficulty in walking; periodic swelling and stiffness of knee, elbow and ankle joints on both sides. No evidence of bony changes in joints, but swelling of the tissues around the joints, with slight redness; no temperature. Salicylates were of no avail. In this case I used Crookes Collosal Iodine, 1 cc. ampoule, (strength 1%) at three day intervals, and again injected intramuscularly.

18/1/32. First injection produced, in six hours, marked increase of joint pains, swelling and stiffness, which passed off in about ten hours; slight perspiration; slight headache, followed in twenty-four hours by an amelioration of the condition.

21/1/32. Second injection. 10 cc. Collosal Iodine.

Similar symptomatology with marked increase of diaphoresis; a period of well-being followed after the first twenty-four hours.

The following four injections at three day intervals produced similar symptoms in a much lesser degree; the perspiration, however, was still profuse. The sixth injection caused very little discomfort in the joints. At the end of the series the joints were definitely less swollen and painful, and movement was much freer; so much so that he was able to resume work. I gave him 3 drops of Tr. Iodine (French) to take 1 dr.

28/2/32. Improvement continuing, and able to carry on with work without undue discomfort.

By persevering with the iodine, I feel confident that the patient will make a satisfactory recovery. In this case again the iodine was of undoubted value in giving him the extra stimulus to throw off a low infection. The primary source of the toxin in this case was the bowel, but general measures and suitable aperients (cascara and saline) led to considerable improvement.

Case 16. Mrs. H. Aet 74. Sutton - 1933.

This was a case of Fibrositis of the lumbar muscles; also Synovitis of the knee; no bony changes. Combined with treatment on general lines I gave her a course of five injections at weekly intervals. Both conditions cleared up satisfactorily, and until present date she has had no recurrence.

Case 17. Miss H. Aet 69. Sutton. - 1933.Osteo-arthritis.

A long and tragic history of increasing deformity extending over years: Involving the knee joints more than any others. She had had vaccines (autogenous); also "Rheumatic" vaccine, with no benefit at all. The effect of the iodine undoubtedly helped her skin. She felt more comfortable, and the knee became less painful, but during 1934 she took pneumonia, and during convalescence her rheumatic condition became worse again. She is still alive, but I fear her life is a misery, where medicine is of little or no value, with the exception of palliative methods.

Case 18. Mrs. A. Aet 68. Sutton - 1932.

She lived in India for many years where her husband was a missionary. On arriving home she felt the change of climate, and developed an infective arthritis of the knees. Both knees were swollen, and there was hypertrophy of

of the surrounding tissue. The ankles, too, were involved. In addition to this condition she had tenderness over the gall-bladder; also suffered from spastic constipation. Her skin was dry and glazed; and hair was coarse, etc.

She responded exceptionally well to a prolonged course of Iodine (12 injections). In addition she had a course of colon lavage. This Winter, 1934-35, she has remained very fit, and has completely recovered from the infective arthritis.

Case 19. Mr. M. Aet 53. A Company Director.

Osteo-arthritis.

A tragic case of osteo-arthritis; increasing deformity. The joints primarily involved were the smaller ones of the hands and feet. The history dates back for eight years. The patient found it difficult to carry out his usual duties in the Office. I gave this man a course of six injections intramuscularly with no apparent benefit; then gave him the iodine intravenously. The latter injections were followed by an exacerbation of symptoms and increase of swelling. This was followed by a period of well-being. After five such injections he felt better; the pain was less, and he was able to get about, but found it necessary to give up work. He died in 1934, from intercurrent infection.

Case 20. Mrs. W. Aet 31. Para None. 1931.

An interesting case, combining migraine, idiopathic synovitis of the knee and hip, and fibrositis of the muscles of the back. Her metabolic rate was low. She was adipose, and showed early signs of myxoedema. She improved considerably with iodine intramuscularly, (eight injections). The migraine was treated with prolonged courses of luminal.

February, 1935. The fibrositis of back gives no trouble, but migraine still returns if luminal is given up. In 1933 she had her appendix removed (of chronic type).

Case 21. Mrs. H. Aet 57. Para 2. March 1934.

A case of osteo-arthrititis of both knee joints, with definite X-Ray changes, spicules of bones, etc.; in addition, fibrositis of lumbar region, and hypertrophy of tissue around knee joints. Gall bladder removed in 1925. She showed all the usual clinical appearances of rheumatoid; skin, hair, etc. Has suffered from a degree of hypothyroidism. I gave her a course of Iodine injections; ten in all, with a fair degree of benefit. The joint swellings subsided, and she was able to get up and down stairs. In addition she had massage, radiant heat, etc. This case undoubtedly received benefit, although the psychological element was extremely difficult to break down.

Case 22. Mrs. D. Para 2. Aet 47. 1932.

A very interesting case of Reynaud's Disease of both hands - and neuritis of the arm. A hard worker who had, by necessity, to do a lot of washing, etc. She suffered with this condition for approximately ten years; always worse in Winter than in Summer; the tingling and pain being unbearable at times. After persevering with 10 cc. Calcium Sandoz for 6 - 8 injections, (intramuscular), I decided to give her Iodine. The results were most satisfactory; the hands did not feel so cold, and after six injections were more or less normal. I have had to repeat this therapy each year.

Case 23. Mrs. G. Aet 34. Para 2.

A case of intercostal neuritis, also fibrositis of lumbar and sacral muscles. Septic teeth. Appendix removed in 1920. A psychological element present; dread of developing osteoarthritis like her mother. Saw Dr. John Ryle in London, who reassured her. Results of Iodine therapy, (six injections at five day intervals) were definitely beneficial, and she completely lost her symptoms. Her teeth were also attended to. To the present date, February 1935, she has had no more trouble.

Case 24. Mrs. C. Aet 63. Para 1. Oct. 1934.

She suffered from oedema of ankles; fatty heart; was adipose myxoedematous; had a degree of fibrositis of the lumbar muscles and arthritis of knee with bony changes. She was a worrier; had lost her husband, and had financial worry. I treated her on general lines; heart tonics, etc., and gave her thyroid, and a strict reducing diet. The loss of weight was greater on the exhibition of iodine intramuscularly (eight injections) than when I was giving thyroid. The fibrositis improved, but the knee remained in statu quo. This case was disappointing. I felt she was not adhering strictly to the rather rigid régime as regards diet.

Case 25. Mrs. J. Aet 67. Para 3. 1930.

A case of extensive osteo-arthritis involving most joints of the body, including the spine, giving scoliosis, etc., with all the classical symptoms. A course of iodine, (ten injections), did not modify or improve the condition materially. She drags on, and manages to do her household duties after a fashion. In 1935 the condition is more or less stationary.

Case 26. Mrs. O. Aet 49. Para 4. May 1934.

A case of sciatica, as well as endocrine disorder, with lowered metabolic rate. In 1926 she had a complete hysterectomy done, with removal of both ovaries. Before giving her

iodine, I had given her local treatment, including injection of the nerve sheath with panthesine. The Collosal Iodine 10 cc. intramuscularly, had a definitely beneficial effect. She had a course of six injections, and she completely recovered. She was much improved in her general condition. She has not had a recurrence since.

Case 27. Mrs. S. Para 3. May 1933.

This was a case of early myxoedema, with dry skin; hair coming out; dandruff; altering tone of voice; memory not so good as it used to be, etc. In addition she had fibrositis of the lumbo-sacral regions, and brachial neuritis. Iodine therapy was extremely successful. I gave her a course of six injections. She lost the rheumatic pains; was very much more alert mentally, and generally "felt better". She continued with a course of extract of thyroid, sic. gr.1, for six months afterwards. In January 1935 she suffered from influenza, followed by a period of depression: Three intramuscular injections of Collosal Iodine seemed to have the desired result of aiding and hastening convalescence.

Case 28. Miss D. Aet 63.

Sub-acute Rheumatic Fever, Nov. 1932.

A domestic servant, with a history of rheumatic fever when twenty years of age, but no return until sub-acute attack in 1924. In November 1932 had a sub-acute attack of rheumatic

fever, with swollen and painful joints. She also suffered from auricular fibrillation and myocarditis. The Iodine, in addition to Salicylates, etc., had a definitely beneficial action, producing a diaphoresis and diuresis; and the joints became less painful. During the convalescence I gave her periodic courses of four injections at five day intervals, which seemed to stimulate her. She was able to get out and about again, but unfortunately died in September 1934, from pneumonia.

Case 29. Miss E. Aet 65. October 1934.

An elderly, active lady, who suffered for fifteen years or more from "rheumatic" nodules in the back; fibrositis of the lumbo-sacral muscles. All I can say in this case is, she found quite as much benefit from iodine therapy as she has done at the various Spas throughout the Kingdom! Her purse, dependant on investments, forced her to try remedies obtainable in her own home.

Case 30. Mrs. H. Aet 53. July 1934.

A case of fibrositis, with hypertrophic swellings around the knee joints, and early thyroid deficiency changes. A case, too, showing upset due to the menopause. She derived great benefit from iodine intramuscularly. I gave her six injections. It undoubtedly increased her B.M.R. She lost

weight; her skin was stimulated to activity; and her temperature level rose. She is continuing with ext. thyroid, sic., and is doing well.

Case 31. Miss F. Aet 28. April 1934.

This case was one of fibrositis of the sacral region, (six months), which resisted the usual remedies. She yielded satisfactorily to ungu. denigres c methyl salicylate: She had radiant heat; and in addition she had four injections of Collosal Iodine at four day intervals. The case was one where the iodine therapy probably had the effect of raising the metabolism, and enabled her to put up a better resistance to her toxins.

Case 32. Mr. B. Aet 54. Brachial Neuritis.
November 1934.

This case of neuritis was limited to the brachial nerves of the left arm. I gave him a course of five injections at five day intervals. He made a complete and rapid recovery.

Case 33. Miss W. Aet 20. March 1934.

This case was exceptionally interesting, and I am unable to give a satisfactory explanation of the dramatic recovery. She complained of pain and cramp in the muscles along the

posterior border of the right scapula for six months. It necessitated her giving up tennis and games. She had visited an Osteopath in London, with no beneficial results: She had tried ointments, liniments, etc. On examination she had definite tenderness over the supra-spinous muscle, and in the notch on the upper border of the scapula. I gave her two injections of iodine at five day intervals. After the first she felt definitely better, and since the second she has been able to play tennis, games, etc., and has not complained of any discomfort since. I can only say that the giving of iodine has some marked psychological reaction; I cannot with honesty give the iodine credit for the dramatic change in her condition.

Case 34. Mr. W. Aet 56. February 1934.

This man had a history of injury to his left shoulder while playing golf four months ago: Pain and stiffness gradually increased, and when he consulted me he was unable to raise the arm from the side of the body. There was no X-Ray evidence of damage to the shoulder joint. The muscles around the joint were wasted, and he was very tender over the region on insertion of the deltoid; also over the brachial plexus; the axillary and radial nerves. He had some few remaining septic teeth; these were removed. For three to four months I gave him galvanic and faradic current. In the first three weeks he gave practically no response to the faradic current. In March 1934 I gave him iodine intramuscularly every fifth day. To use his own words

it gave him "much more kick, and a feeling that life was worth while again". He had twelve injections. He made a complete recovery. I saw him on the 27th. February, 1935, and he is able to play golf, billiards, etc., without any inconvenience; and his muscles are equal on each side.

This case was a most satisfactory one. It was a neuritis and fibrositis due partly to trauma, partly to sepsis from teeth. The teeth were removed. He had galvanism and faradism, and iodine intramuscularly. He was most enthusiastic about the effects of the injections, both on the condition in his arm, and on his general health.

Case 35. Miss N. Aet 47. February 1934.

Trigeminal Neuritis and Facial Paralysis.

This case was one of facial paralysis which took six months or more to clear up, despite treatment with the galvanic and faradic current. It took more than two months before I got any response to faradism. Associated with this she had extreme tenderness and pain over the branches of the fifth nerve on the same side as the paralysis. Clinically there was evidence of thyroid deficiency. Before giving her iodine intramuscularly, I had given her aspirin, local remedies, etc., all of no avail. Again, the iodine administration was followed by relief of symptoms. I gave her weekly doses of 10 cc. for eight weeks. She made a complete recovery from both conditions. In addition

she is very much brisker; feels brighter; and in her own words "have'nt felt so fit for years".

Case 36. Miss F. Aet. 31. October 1934.

Fibrositis of Lumbar Muscles +

Synovitis of Sacro-iliac Joint.

A troublesome case of about three years duration. In 1932 had tonsils removed, and condition in back improved. In October 1934 returned; had difficulty in walking and coming downstairs, turning in bed, etc. No evidence of toxins from teeth (X-rayed, also culture from one). No changes by X-ray of sacro-iliac joint. Clinically, she was definitely tender over the joint, and fibrositic nodules could be felt along the muscles near the posterior border of the iliac crest. She was anaemic. I gave her an intensive course of iodine therapy; fifteen injections, (weekly intervals), and a course of diathermy. In addition she had a preparation of iron orally. She has made a satisfactory recovery (February 1935), and the tenderness over the joint has disappeared. The nodules have disappeared also.

Case 37. Miss A. Aet 38. Brachial Neuritis.

May 1934.

A dentist's secretary who found it increasingly difficult to type, etc. She had a definite brachial neuritis, and one or two fibrositic nodules in the right deltoid. She had septic teeth,

which were removed. I gave her six Collosal Iodine injections, which played a part in her satisfactory and complete recovery.

Case 38. Mr. S-F. Aet 72. February 1934.

Brachial Neuritis and Lumbago.

An active and very interesting man of more than three score years and ten. For two years had complained of pain in the back, and also pain shooting down the arm. He had tenderness along the radial nerve, with fibrositic nodules in the deltoid, as well as nodules in the lumbar muscles. He improved following iodine injections. He had septic teeth, but refused to part with them. The climax came in July 1934, when he lost one tooth; a root was left behind, and he developed an alveolar abscess. A generalised acute muscular rheumatism followed, which only yielded when he had complete removal of his teeth. He has made a complete recovery, and in February 1935 has had no complaints to make about his neuritis. The iodine seemed to stir up his metabolism temporarily, sufficiently to enable him to cope with the toxic products from his teeth.

Case 39. Mrs. M. Aet 48. Fibrositis. July 1933.

Little need be said about this case. She responded most satisfactorily. She had five injections of iodine. She showed evidence of impaired metabolism; dry skin, etc. She took thyroid for a considerable time afterwards, and has had no more trouble.

Case 40. Miss B. Aet 71. Fibrositis.

An active elderly lady who was definitely afraid of being crippled by rheumatoid arthritis. She had fibrositis of the lumbar region; also involving the tensor fascia lata, and the pectineus. She suffered from cramp in these muscles. She had a dry skin and the usual rheumatic syndrome. She had a course of ten injections of iodine, with markedly beneficial results, and was delighted that she could once again enjoy her trips to London. Coupled with the iodine therapy she was carefully dieted, and her intake of fluids was increased from practically nil to three pints per day.

Case 41. Mr. E. Aet 28. November 1934.

This case was not of the rheumatic order, but a skin disease. The skin was dry, and over the flexor surfaces of the knees and elbows was eczematous in character, and was itchy. The scalp was dry, scaly, and unhealthy. Iodine 1 cc. given three times a week for four weeks cleared up the condition completely.

Case 42. A.T. Aet 17. November 1934.

A lad 6ft. 1" in height: Weight 13 st. 8 lbs: Very heavy and plethoric in type and movements. Complained of frontal headache for the past three years, sometimes associated with sickness; resembling migraine in character. Giving luminal alone made his

lethargy worse, and he found concentration at School difficult. His temperature was always subnormal, and his basal metabolic rate was low. Iodine intramuscularly had a profound effect. It improved his condition beyond my own hopes. His facial expression changed; his movements were brisker; he was brighter mentally; he took an obviously more intelligent interest in life; his lethargy disappeared, and so also his headaches. I cannot help ~~thinking~~ thinking that the iodine stirred up the thyroid and pituitary to increased activity, and influenced the whole endocrine system. This case was probably the result of some endocrine error in adolescence, producing the rapid growth of tissue and limb; and the lad was unable to cope with it. At the end of February 1935 he has had no return of headaches.

Case 43. Mr. H. Aet 32. Ichthyosis. August 1934.

A very interesting case of "Fish-skin" dating back to childhood. He came to me with a septic condition of the nose and lips which was entirely due to the horny character of his skin. He found it impossible to take a hot bath, and even on the hottest day found difficulty in perspiring, even on exertion. Iodine intramuscularly improved the condition materially. He had ten injections at four day intervals. He persevered with the hot baths, under protest, and now his skin is beginning to act, and he is much more comfortable. He is taking tablets of ext. thyroid, sic. gr.1 per day.

Case 44. Miss S-W. Aet 38. February 1935.

Endocrine Disorder - "Hysteria".

An interesting but unhappy case which has just come under my care. The long history of seven or eight years is briefly as follows:- Trouble with back and difficulty in walking; lateral scoliosis of spine. Treated with manipulative measures; reductions under anaesthesia; splints; corsets, etc., and finally diagnosis of "Hysteria" was made. She developed a spasm of the lumbar muscles which produced an arching of the spine. In addition she had definite endocrine disorder, particularly affecting the thyroid. She was dull, introspective, and suspicious. She is 38 years of age, and looked 58. Her skin was dry and scaly; her temperature subnormal, 96.5° F. She had a superabundance of adipose, rather oedematous subcutaneous tissue, and the skin was bluish in colour.

About two years ago she had been taking gr.20 of thyroid per day. There was a slight loss of weight following this. She continued the treatment for six months.

She is now on a restricted diet, and I have given her 1 cc. Collosal Iodine intramuscularly on alternate days, eight in all. The condition of the skin is definitely improving, and the weight has been reduced by 2 lbs. 8 oz. It is too early yet to hold out any degree of optimism as regards prognosis.

20/3/35. She has lost 7 lbs. weight in four weeks.

B I B L I O G R A P H Y.

1. Cushny. Pharmacology and Therapeutics. Tenth Ed. page 429.
2. Kendall. Endocrinology, 1918. Vol.2. No. 2.
3. Kendall. Endocrinology, 1918. Vol.2. No. 2.
4. Hunt. American Journal of Physiology, January 1st., 1923.
Vol. LXIII, No. 2
5. Kendall. Endocrinology, 1917. page 159.
6. Cushny. Pharmacology and Therapeutics. Tenth Ed.
page 435.
7. Hammett, F.S. American Journal of Anatomy, July 15th., 1923.
8. Kent Spender. Albutt's System of Medicine.
9. Markson, Dr. D.E. Issue of North Western Medicine, March 1928.
10. Collyer, Dr. Stanley, London. Lecture, British Society of
Dental Surgeons.
11. Ray, M.B. Rheumatism in General Practice, page 8.
12. Ray, M.B. Rheumatism in General Practice, page 15.
13. Hall, Francis C. Boston. Journal A.M.A. Sept. 17th. 1932.
The Relation of Endocrine Disturbance to Arthritis.
14. Mutch. Thyroid Extract in Chronic Arthritis.
The Lancet 1921. Vol. 2. page 1266.
15. Bonchardt. See Ray, M.B. "Rheumatism in General Practice".
page 160.
16. Llewellyn International Journal of Medicine and Surgery,
January, 1926.
17. Leopold Levi and de Rothschild. La Petite Insuffisance
Thyroidienne et son Traitement, 1913.
18. Walker, Dr. G.F. The Status of Enzymes and Hormones in
Therapy, page 12.
19. Clinics of George W. Crile and Associates,
The Thyroid Gland, 1922.
20. Buzzard, Dr. Farquhar. Bath Rheumatism Conference, 1928.