A STUDY OF FIVE CASES OF RHEUMATOID ARTHRITIS AND ONECASE OF RHEUMATIC FEVER WITH SPECIAL REFERENCE TO THE ETIOLOGY OF RHEUMATOID ARTHRITIS

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V ETIOLOGICAL SUMMARY OF THE CASES

INTRODUCTION

1. I am indebted to Professor D. Murray Lyon and Professor D.M. Dunlop for permission to report these cases which were studied in their Wards at the Royal Infirmary.

2. It is obvious that little progress will be made in the treatment of Rheumatoid Arthritis until the question of Etiology is cleared up and for that reason I have laid most stress on that part of the study.

At the same time the pathology, clinical features, treatment and prognosis are discussed quite fully.

3. The case of Rheumatic Fever is not entirely typical and is used to illustrate points of similarity and dissimilarity between the two conditions and the possible relationship between them. Consequently I have not gone into a detailed discussion of the various aspects of Rheumatic Fever.

4. It will become obvious on reading these cases that I have been searching for certain etiological factors which I have particularly wanted to emphasise and the suspicion may arise that I have carefully selected cases which illustrate these factors. Actually the cases were taken in the order in which they came into the Wards and were, I think, the only cases of Rheumatoid Arthritis admitted to Wards 22, 23 and 24 during my two terms.

This being so, the fact that certain etiological points are shown by several cases is of more significance than if I had hunted for cases which would show certain points in common.

THE CASES

I	MRS. WILLIAMINA RENNIE	AET 60.	WARD 24.
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CASE I

MRS. WILLIAMINA RENNIE. AET 60.

119 Restalrigg Road, Edinburgh.

OCCUPATION: House-wife.

ADMITTED: 19th October 1940.

DISCHARGED: 27th November 1940.

RECOMMENDED BY: Dr. Gilgrin, Edinburgh.

COMPLAINT: The patient complains of pain all through the body, especially in the joints.

HISTORY: Twelve years ago the patient began to experience severe pains which she says were "like growing pains" in the muscles of both legs. The legs were swollen and painful to the touch. She consulted her doctor who said she had "poisoned legs" and gave her some medicine which seemed to relieve the pain for a while, but after a month or two it returned and this time the doctor said the cause was "muscular rheumatism".

This pain lasted intermittently for several months and then as it gradually disappeared she felt her knees beginning to be stiff in the mornings and her legs felt weak. Before long the knees began to swell mainly at night and they became very stiff and very painful. The right knee was particularly bad. The result was that she could only walk with difficulty, using two sticks, and she was unable to kneel to do her housework.

All this time she felt perfectly fit in herself.

A month or two after the knees had become stiff and painful other joints were affected in a similar way. As far as the patient can remember - she is a poor witness, being very uncertain about a number of points in her history - the shoulders were the next joints to become affected. Gradually they became stiff and "creaky" with twinges of pain passing through them on movement; symptoms which she first noticed whilst arranging her hair in the morning. At times she found it impossible to reach the back of her head. Later the shoulders began to swell and at times the surrounding muscles would ache, often for days on end.

Then followed both her elbows and the small joints of the hands. The same process was repeated, stiffness in the mornings first made apparent by difficulty in dressing, then pain sometimes shooting through the joints, sometimes aching in the muscles accompanied by a steady swelling of the joints. The finger joints mainly affected were the metacarpo-phalangeal joints, particularly those of the fore-finger and middle fingers.

Sometime later - all she can remember is that it was in the last few years - her wrist joints became stiff, painful and swollen and to a lesser extent the ankles also.

By now she was almost bed-ridden, although at intervals her condition improved so that for many weeks she was able to hobble about with her two sticks.

During these past few years she has been becoming weaker and more easily tired. Her legs and arms became thin and shaky, her fingers were weak and thin so that the wedding ring kept falling off. Her appetite which had never been large became smaller and she felt no inclination to eat.

A year or two ago she was in the Northern General Hospital for several months and whilst there had her legs in plaster.

For the past year she has been evacuated in Berwickshire during which time she has been greatly troubled with her knees and has poulticed them regularly with hot lint and kaolin. She returned to Edinburgh in August 1940, feeling better than she had felt for some years.

Twelve weeks before admission her condition suddenly became worse. Her appetite which for two years had been very poor now completely left her in spite of trying to force herself to eat. She became extremely weak and for two weeks before admission was almost unable to hold anything in her hands. Severe burning pain developed in all the affected joints and also in the muscles of the limbs and neck. The pain gradually increased in severity, being especially marked in her ankles, under the heels and along the sides and soles of the feet. She felt alternately hot and cold, sweating profusely. In the mornings she wakened stiff all over having "to thaw herself gradually out". Finally sleep became almost an impossibility.

The day before admission the pain reached its climax, radiating all through the body as well as in the joints with the result that her husband sent for the doctor who sent her into the Infirmary.

The stiffness and pain are always worst in the mornings and after she has been sitting still for some time.

Damp, cold weather and eating meat have, she says, an adverse effect.

The bowels used to be regular but have been constipated of late. She takes salts every morning.

There is no breathlessness.

No urinary symptoms.

She suffers from occasional headaches.

PREVIOUS HISTORY

The patient used to suffer from many "colds" and recurrent bronchitis, but since the rheumatoid arthritis started these have entirely disappeared.

Her teeth were very carious for many years but were all removed seven years ago. The gums were quite healthy.

Some years ago she was much troubled with heart-burn and waterbrash.

When aged about 50 she slipped whilst walking and fractured her left "hip".

She has always felt the cold badly and complained of cold hands and feet.

She has never suffered from Rheumatic Fever, Scarlet Fever, Sore throats, Nephritis or Skin Diseases.

FAMILY HISTORY

The patient's father, a butcher, died when she was aged nine of "inflammation of the bowel".

Her mother suffered from asthma and diabetes. She died in Canada about 10 years ago.

The patient has 14 brothers and sisters, being the second oldest. One brother was killed in the last war, one died of an "acute abdomen". One sister suffers very badly from "neuritis" and the rest are alive and well.

SOCIAL AND PERSONAL HISTORY

The patient was brought up in a happy family, although as far as finance was concerned life was always a strain.

She started work in Domestic Service when aged 10, earning 7/- a month and from that time onwards her life has been hard. As a girl she was happy and full of life.

She has been married twice. Her first marriage was when she was 22 years old and was for the most part unhappy because her husband became very addicted to drink, being rarely sober. He died of "liver disease" in 1929. She had no children from this marriage but always wished she had.

For the past 6 months she has been married to a blind man aged 57 and has found him a great trial, as he needs constant watching. She married him "because he seemed so lonely and she was lonely herself".

She is rather emotional, very affectionate, introspective and exceedingly sorry for herself. She craves sympathy, often making statements such as "I would be better dead"; "I'm very patient, aren't I?" She is always disappointed and depressed when the "chief" does not stop to talk to her on his Ward visits.

She appears to have no friends.

Her home is dry but cold.

DIETETIC HISTORY

The diet has always been poor, especially in minerals and vitamins. For several years it has been:

Breakfast: Small amount of porridge.
Small piece of white bread and butter.
Cup of tea.

Dinner: Tiny piece of stew and potato.
Cup of tea and biscuit.

Tea: Bread, butter, jam, cup of tea.

Occasionally she takes a herring or sausage etc. and on rare occasions some fruit and vegetables. She thinks meat makes her condition worse (she was told it would).

EXAMINATION

GENERAL IMPRESSION

The patient is a small, thin, worried looking woman with black hair turning grey. Her complexion is sallow and almost muddy. The face has an anxious, drawn appearance, the lines on it suggesting that she has suffered much chronic pain. There is a considerable amount of hair on her upper lip and chin and this seems to give her a considerable amount of worry. The skin is shiny and moist especially over the malar bones and forehead. The hair is dry and coarse.

She lies with both knees slightly flexed and with the elbows flexed across her chest.

She likes to talk about herself but her memory is very bad and her intelligence is poor.

LOCOMOTORY SYSTEM

HANDS

The skin of the hands is thin, loose and atrophic except over the swollen joints where it is stretched and glossy. There are many discrete areas of brown pigmentation like freckles, running from the dorsum of the hands up into the arms. Thin blue veins are seen clearly under the skin. The hands are warm and moist.

A number of joints, namely, all the metacarpo-phalangeal and proximal interphalangeal joints of both hands show a varying degree of spindle shaped swelling. This is especially seen on the radial sides and the worst joints are the two metacarpo-phalangeal joints of the index fingers. All the affected joints are firm and tender on palpation and are stiff and painful on movement. On palpation over the joints during movement a rough grating sensation is obtained. She is unable to clench either fist completely and the grip is consequently very weak. The distal interphalangeal joints are unaffected except that in the third left finger a small pouch of what appears to be synovial membrane is protruding from

from the joint. This, the patient says, occasionally swells up. The distal phalanges of the thumb are remarkably small and almost club shaped.

On holding the hands out at arm's length marked ulnar deviation is seen and a fine tremor is present.

The small muscles of the hands are very much wasted especially the interossei and the thenar and hypothenar eminences. The result is that the joint swellings are accentuated and the finger movements are weak.

The wedding ring on her finger is very loose and she has put another ring distal to it to prevent it falling off. Actually at the time of examination the swollen joint would prevent the ring falling off - a fact suggesting that muscular wasting occurred before the joint changes.

WRISTS Both wrist joints are slightly stiff, swollen and red but there is little pain in them either on palpation or movement. The range of movement is almost perfect except for a slight limitation of flexion in the right wrist. Definite coarse crepitus is easily elicited on movement and occasional creaks are heard.

ELBOWS The elbow joints are slightly swollen and red. A degree of stiffness is present and there is considerable limitation of movement, notably extension, whilst supination and pronation appear to be unaffected. She can with some difficulty reach her mouth. Active movement produces twinges of pain in the joints and surrounding muscles. On palpation crepitus can be felt.

The swelling of these joints and the wrist joints is accentuated by very pronounced muscular wasting of the forearm.

SHOULDERS No definite swelling can be seen at either shoulder region but both joints are very stiff and painful on movement. Considerable limitation of movement is present particularly in the right joint and this is due mainly to muscular spasm. Flexion and extension are relatively free although accompanied by twinges of pain. Abduction is very painful and limited due to spasm and pain in the deltoid. The most painful movements are external rotation and internal rotation. By steady perseverance the patient can just touch the back of her head with the left hand but cannot do so with the right.

Marked crepitus is felt on palpation.

The muscles of the upper arm and shoulder girdle are greatly atrophied so that all the bony points in the region stand out well.

KNEES — The knee joints are red and swollen and the right feels hot. They are both tender on palpation and exquisitely painful on passive movement. Owing to the pain and muscular spasm the patient cannot move the right joint at all and the leg lies slightly flexed; with difficulty she can slightly flex the left joint. Fluid can be detected in both joints but especially in the right where the patella bobs freely up and down on the fluid.

Considerable wasting of the thigh and calf muscles accentuates the knee joint swellings.

ANKLES — Both joints appear normal. There is no pain, no limitation of movement and no crepitus.

FEET — The arch of the foot is well maintained.
The small joints of the feet appear to be unaffected, there being no swelling, redness or tenderness on movement.

HIP JOINTS — The left hip joint appears to be slightly painful on flexion and abduction although this is difficult to ascertain as the knee joints are so painful.

STERNO-CLAVICULAR, TEMPERO-MANDIBULAR AND CERVICAL VERTEBRAE joints appear to be unaffected.

CARDIO-VASCULAR SYSTEM

PULSE — The rate is about 90 per minute. It is regular in time and force with a normal wave. The vessel wall is impalpable. The Blood Pressure is 140 mm. systolic and 90 mm. diastolic.

HEART

The apex beat is in the 5th space just inside the mid-clavicular line. No other pulsation is visible over the praecordium. The distended external jugular veins are visible in the neck.

No enlargement can be detected on percussion.

On auscultation all sounds are closed. There is slight accentuation of the aortic second sound.

There is no oedema or cyanosis evident.

RESPIRATORY SYSTEM

The chest is of the thin asthenic type with sloping ribs and a narrow subcostal angle.

Tapping the pectoralis major demonstrates myotatic irritability.

Both sides of the chest move well and equally on respiration.

The percussion rate is resonant and the breath sounds vesicular in all areas. An occasional coarse crepitation is heard over the bases.

ALIMENTARY SYSTEM

The teeth are all artificial.

The tongue is clean and moist but smooth and atrophic.

The tonsils are submerged. The pharyngeal wall appears healthy.

The abdominal wall is thin and moves only slightly on respiration. There are no tender areas and nothing abnormal to note on palpation. The descending colon is impalpable.

NERVOUS SYSTEM

The cranial nerves show no abnormality.

The abdominal reflexes are present.

The plantar response is flexor.

Tendon reflexes are equal and active.

The pupils react equally and well to light and accommodation.

There is no sensory impairment.

The motor power of all the limb muscles is weak although the condition of the joints makes it difficult to gauge this.

HAEMOPOIETIC SYSTEM

The spleen cannot be palpated and there are no enlarged lymph glands.

URINARY SYSTEM

The kidneys are impalpable and there is no tenderness on palpation in the loins.

ENDOCRINE SYSTEM

The thyroid gland cannot be detected on palpation.

Menstrual History

Menarché: 14 years.

Periods: 3/21. Regular. Always slight.

Never any dysmenorrhoea, amenorrhoea or menorrhagia. She had a leucorrhoeal discharge several years ago which cleared up under treatment.

Menopause: about 48-49. (i.e. about the time of onset of the Rheumatoid Arthritis).

LABORATORY INVESTIGATIONS

I BLOOD

19.10.40

Red blood count: 3,520,000.

Haemoglobin: 68% (Sahli).

White blood count: 8400.

Blood sedimentation rate: 88 m.m. /1 hour. (Westergren).

Film: cells normal in size and shape but poorly filled.

II URINE

19.10.40.

Colour: straw.

Reaction: acid.

S.G: 1016.

Sediment: mucus.

Albumin: - ve.

Sugar: - ve.

Microscopic examination: a few epithelial cells and cell debris.

III WEIGHT

23.10.40. 8 stones.

IV HEIGHT

23.10.40. 4' 10½".

(Average weight for a woman aged 60 and height 4' 10½" is 7 st.).

CHANGES IN LABORATORY FINDINGS DURING TREATMENT

I BLOOD

Date	HB%	B.S.R.	W.B.C.
19.10.40	68%	88 m.m. /1 hr.)	8400
21.10.40		88	7100
24.10.40	70%	102	7100
1.11.40	70%	102	8000
5.11.40	75%	105	10,000
7.11.40		95	
9.11.40		95	
12.11.40		87	
19.11.40		71	9800
26.11.40	85%	79	

II URINE

19.10.40 - 26.11.40.

S.G. varied between 1018 and 1028 in the 24 hour specimen.

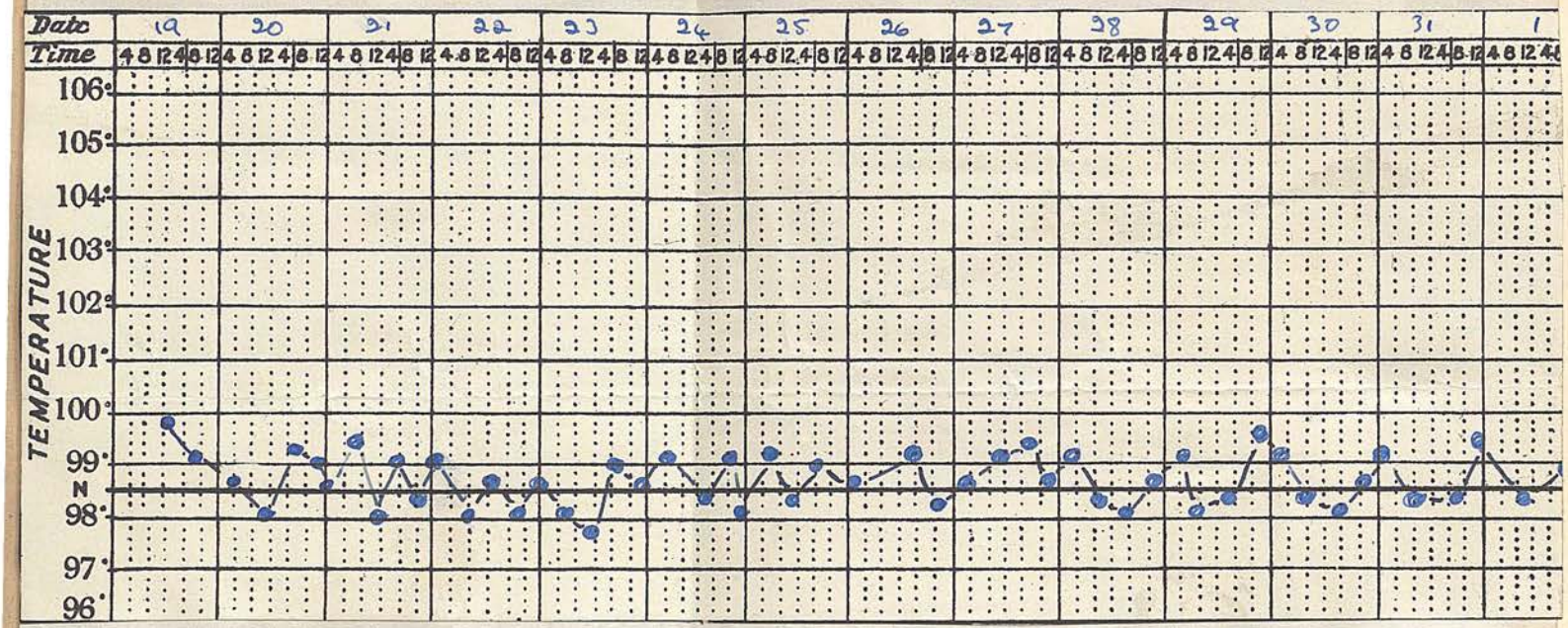
No albumin, sugar or blood at any time.

III WEIGHT

23.10.40. 8 st.

30.10.40 8 st. 2 lbs.

MRS. RENNIE



The temperature chart during the first two weeks in hospital.

Note the irregular low grade pyrexia.

Compare with the chart of the last two weeks in hospital.

TREATMENT AND PROGRESS NOTES

On admission the patient looked acutely ill, with a temperature of 100° and a pulse rate of 92/min. She was suffering considerable pain and as this was likely to continue for some time analgesics were at once prescribed in the form of two tablets three times a day, each containing Aspirin gr. X, phenacetin gr. V and codeine gr. 1/6. The only drawback to this being that codeine tends to be constipating. The bowels, however, were kept open quite regularly with an occasional aloin pill and a soap and water enema.

She was given a light, nutritious, high calorie, high vitamin diet and because of the anaemia ferrous sulphate gr. iii t.i.d. was precribed.

For the first few days the patient was very miserable and the temperature chart shown opposite, together with the B.S.R. of 88 m.m. /1 hour illustrateshow active the diseasewas. The weather at this time was cold and although the patient had extra hot water bottles and plenty of blankets she kept wakening up in the night "stiff and frozen all over". The analgesic tablets at first appeared to have little effect on the pain. The knees were especially troublesome, the patient complaining that itwas "as if there were a lot of little loose bodies rattling about inside" and the leg muscles were constantly going into spasm "like little hard balls inside the muscles". A cage was put over the legs and later on dorsal plaster slabs made to ensure absolute rest and prevent flexion deformity. When she became accustomed to the plaster slabs she found them of considerable value.

On 23rd of October crysotherapy was instituted, the patient being given 0.01 gm. Solganal B. Oleosum i.m.i. The next day she complained of a metallic taste in the mouth and severe pain behind the left clavicle. There was no evidence of gingivitis, stomatitis or glossitis and there was no albumin in the urine. The pain behind the left clavicle was severe during the next few days, radiating up into the neck. The knee and finger joints were also very painful. Gradually under the influence of the analgesics the pain settled down.

On 29th October the second injection of Solganal was given in the same dosage (0.01 gm. i.m.i.) The next day the patient complained that the right knee was very painful and throbbing, but that otherwise "she felt easier through herself and happier". There was no metallic taste in the mouth this time and again no albumin in the urine. The right knee looked very red but the swelling was the same as on admission.

The third Solganal injection was given six days later, this time the dose being raised to 0.02 gm. i.m.i. Next morning

morning there was pain in the neck muscles, the knees and along the soles of the feet. Towards evening the pain lessened and she felt easier in herself and looked happier.

A break was now made in the Gold Therapy in order to try the effect of salicylates. Accordingly, on November 1st the analgesic tablets were stopped and 30 gr. sodium salicylate with the same of sodium bicarbonate was given 3 hourly.

This was a high dosage, being similar to that used in acute rheumatism but the patient tolerated it extremely well, showing none of the toxic effects. Whilst the result of this was not the dramatic cessation of pain which it is customary to find in acute rheumatism there was, over a period of a week, a diminution in the amount of pain. At the same time the complexion became a little clearer, the patient looking less toxic. The salicylates were stopped after a week and the analgesic tablets given again.

Crysotherapy was resumed on the 14th November with an injection of 0.02 gm. Solganâl. This was followed in 24 hours by severe pain behind the left clavicle radiating up into the neck. There was no albumin in the urine and in the course of the day the pain subsided.

The 5th injection of Solganâl was given on 21st November, the dose being 0.05 gm. For the first time since Gold Therapy was instituted there was not an exacerbation of pain on the following day.

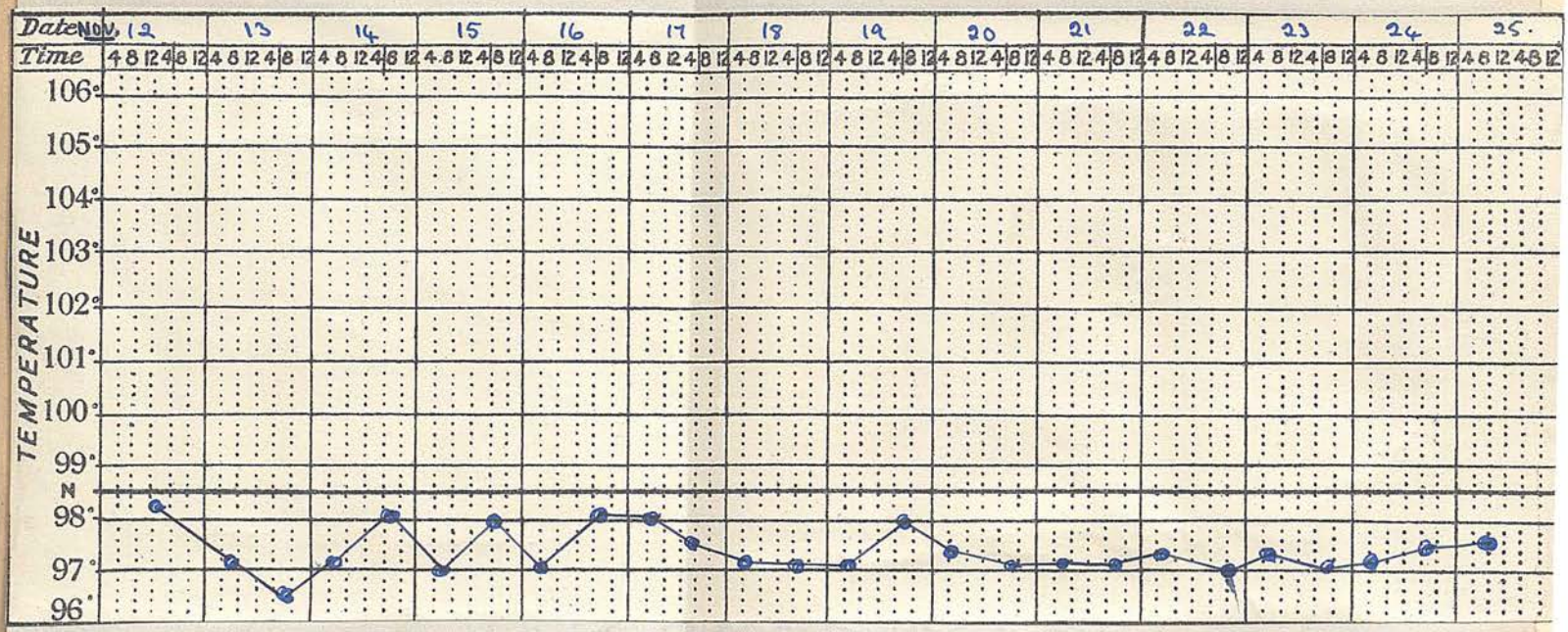
Another week saw little change in the patient's condition and it became quite obvious that the case was an extremely resistant one requiring prolonged hospitalisation. Arrangements were therefore made for removal to a Municipal Hospital and on 27th November, after being 6 weeks in the Ward the patient was sent to Craiglockhart Hospital.

Comparison of her condition on discharge with that on admission did not show much obvious change. The size of the joints was approximately the same, whilst the pain and stiffness varied considerably from time to time e.g. one day the pain would be only slight whilst the next day it would be severe. On the day of departure there was practically no pain. The range of movement had not increased appreciably except in one or two joints viz. the shoulders (she could now reach the back of her head more easily) and the left hand (she could now clench the fist fully).

The B.S.R. was still very high and as the graph shows, the last reading had risen again.

During all this time the patient's mind had never been at rest. As she lay in bed she was in a constant state of anxiety about herself and her husband. She was introspective and anxious. She never appeared to read or knit but would just

MRS. RENNIE



Temperature chart of the last two weeks in hospital.

Note how the temperature has settled down to a normal level but is still inclined to be slightly unstable.

just lie on her back all day, sitting up with difficulty for her meals, moving her arms occasionally and then lying still again. On the day of departure she was very depressed, saying she was "being taken away to die".

Several points of improvement were noted.

(1) The temperature chart shows clearly how the temperature had settled down from the first few weeks when it was between 98°-100° and the last two weeks when it was between 97°-98°.

(2) The haemoglobin level had risen from 68% to 85%.

(3) The appetite had improved, she had gained some weight and the general health was improved.

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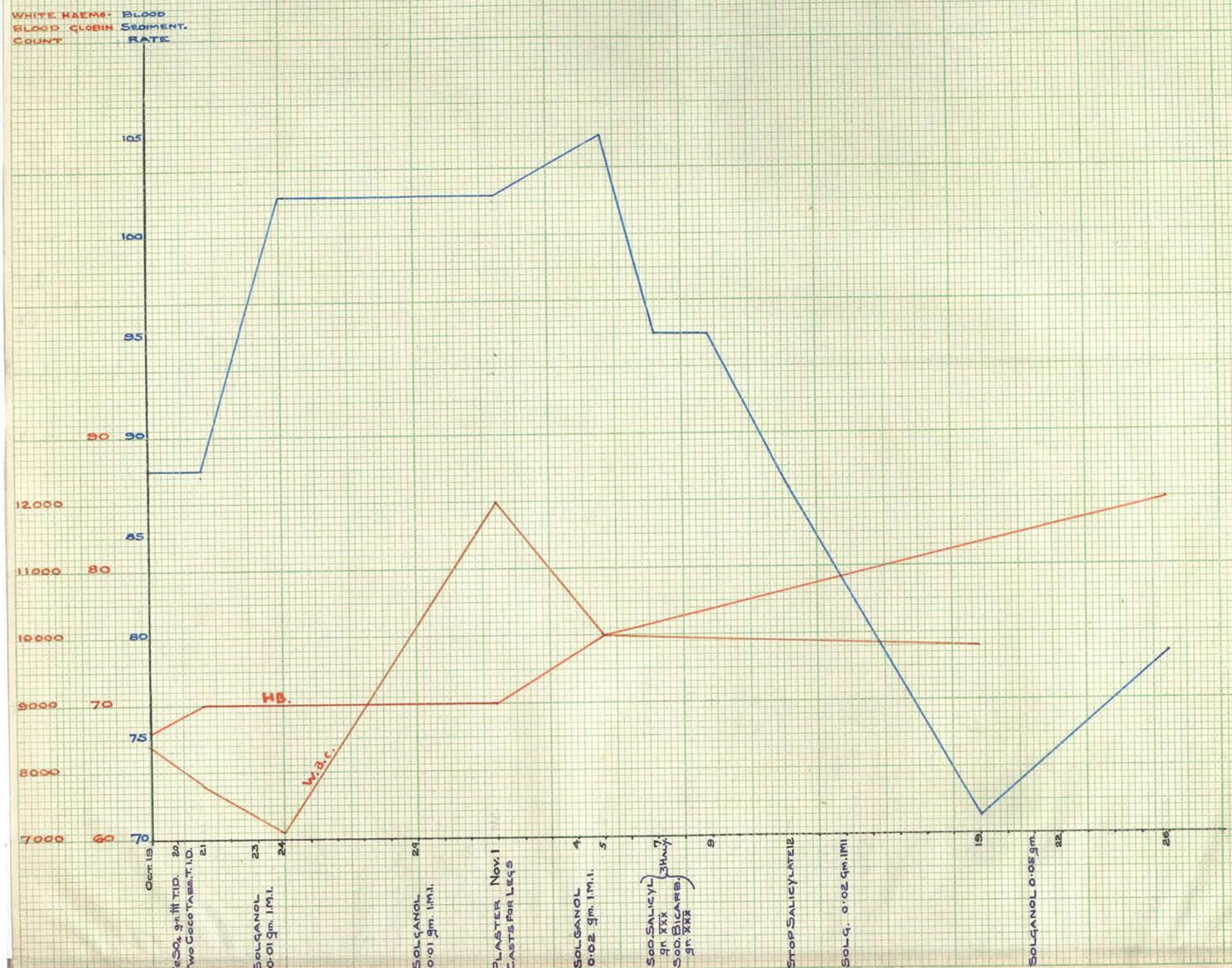
Effect of Treatment on Blood Sedimentation Rate White Blood Count and Haemoglobin



SUMMARY OF TREATMENT

1. Rest in bed with analgesics and splints for legs.
2. Diet - nutritive, light, high vitamin content.
3. Crysotherapy - total of 0.11 gm. Solganål B. Oleosum i.m.i. given in doses of 0.01, 0.01, 0.02, 0.02 and 0.05 gm.
4. Sodium salicylate gr. 120 a day for 7 days.
5. Iron for anaemia.

SUMMARY OF PROGRESS

1. Pain slightly lessened.
2. Stiffness and limitation of movement slightly lessened in several joints.
3. Haemoglobin level raised.
4. Appetite improved and weight increased.
5. Temperature brought to a steady normal level.
6. B.S.R. reduced but still very high.
7. Mental depression unaffected.

ORDER OF AFFECTION OF JOINTS

1. Knees.
2. Shoulders.
3. Elbows.
4. Finger joints.
5. Wrists.
6. Ankles.

SUMMARY OF THE IMPORTANT ETIOLOGICAL POINTS IN THE CASE

(These are emphasised here and discussed in the General Discussion).

A. POINTS FROM THE HISTORY

1. Onset with muscular pain - suggesting a systemic upset.

2. Onset at menopause - suggesting an endocrine upset. Absence of children also suggests an endocrine deficiency.

3. The psychological aspect is interesting -

   (i) Worrying, introspective type.

   (ii) Unhappy married life with no children.

   (iii) Second marriage to a blind man late in life.

4. Diet has been very unsatisfactory.

5. Patient's life has always been one of domestic duties.

6. She gives no previous rheumatic history.

7. The family history is interesting in that two separate predispositions are evidenced viz:

   (i) A rheumatic predisposition - sister has "neuritis".

   (ii) An allergic predisposition - mother had asthma.

B. POINTS FROM THE CLINICAL FEATURES

1. Sex is quite typical of the disease.

2. Constitution - patient is of the anxious, introspective, asthenic type with a low haemoglobin and a sallow complexion.

3. A focus of infection was not found at this stage but the teeth which were removed 7 years ago might have been a focus and the leucorrhoea might have indicated a chronic cervicitis.

4. Note the teeth were markedly carious.

5. Certain features suggest that an infective process was at work:

   (i) Irregular pyrexia and tachycardia.

   (ii) Raised B.S.R. and W.B.C.

   (iii) The sweating.

   (iv) The toxic appearance and low haemoglobin level.

C. POINTS FROM THE PATHOLOGICAL CHANGES

1. Larger joints involved first which is unusual and may be associated with the onset at the menopause.

2. The joints are symmetrically involved.

3. Marked atrophy is present of skin, muscles, ligaments and bone.

4. Peri-articular swelling - proliferative arthritis.

PROGNOSIS

The prognosis in this case is poor, the disease having been present for many years and all hope of any marked improvement gone. The case illustrates the importance of early thorough treatment before much cartilaginous and bony damage has been done. It is doubtful if this patient will ever walk again and the great danger now will be ankylosis of the joints with permanent deformities.

The patient's poor general health and depressed state of mind will greatly lessen her resistance to any intercurrent disease such as pneumonia which might easily prove fatal.

SUMMARY

A very resistant long standing case of Rheumatoid Arthritis, beginning at the menopause, affecting many joints and showing little response to treatment, the patient being of the anxious introspective type.

CASE II

WILLIAM SPIERS. AET 30.

Leith.

OCCUPATION: Commercial Traveller. Married.

ADMITTED: 29th August 1940. Ward 22.

DISCHARGED: 27th December 1940.

RECOMMENDED BY: Dr. Kerr, Leith.

DATE OF EXAMINATION: 1st October 1940.

COMPLAINT: Pain, stiffness and swelling of various joints.

DURATION: 8 months.

HISTORY: In January 1940 the patient had an attack of "neuritis" in the right upper arm of such severity as to confine him to bed for 10 days and to prevent him from moving his arm. This pain was especially bad at night, although if he put his arm outside the bedclothes he managed to get some relief.

Whilst confined to bed he noticed that the proximal interphalangeal joints of the middle and little fingers of the right hand had become swollen and were very stiff in the mornings. There was no pain in them.

In a week or two other joints were similarly affected, namely the interphalangeal joint of the right thumb and the proximal interphalangeal joints of the left index, middle and ring fingers.

Then followed his left ankle joint which became swollen, stiff and painful and the doctor mentioned that his instep had fallen. This was quickly followed by pain of a gnawing type and morning stiffness in both wrist joints.

May saw little change in the condition and the constant gnawing pain and stiffness in the joints caused him to become very depressed and worried and so his doctor sent him to the Infirmary, where he was given massage and radiant heat. This treatment, to quote his own words "started the knees off" which gradually

gradually and insidiously began to swell and became stiff whilst occasionally they would ache for hours on end. His legs became weak and shaky so that walking was a difficulty and running an impossibility.

In June, whilst boarding a tramcar he was jolted and sat down on his flexed fingers with the result that the proximal interphalangeal joint of the right middle finger became considerably more swollen, very painful and stiff and has remained since then the most swollen and painful joint. It was put at rest in semi-flexion in a plaster splint for 3 weeks.

Occasionally throughout these months he felt an occasional twinge of pain in the temporo-mandibular joints and they have been slightly stiff at odd times.

A month before coming into hospital his condition quite suddenly became worse. All the affected joints became swollen and very painful especially the knees which were so painful and weak as to necessitate his going to bed. Whilst in bed pain and stiffness developed in both shoulder joints, which up to this time had been unaffected and this was accompanied by another severe attack of "neuritis" in the right arm. The 1st metatarso-phalangeal joint of the right foot was also affected at this time, becoming hot, swollen, stiff and painful; and he felt the back of his neck stiff. He was in bed 4 weeks and was then admitted to hospital.

The joints are always most stiff after prolonged immobilisation as when he wakens in the mornings or after sitting for a long time and gradually loosen as he moves them and warms them in hot water.

He says that damp has no effect on the joints but cold and wind increase the pain and stiffness.

He has always sweated easily but especially so in the past few months.

The bowels are very regular. He "never misses a day".

Since January he has been losing weight steadily and becoming thin and weak.

His appetitite used to be good but lately he has been "off his food".

PREVIOUS HISTORY

Mumps and measles as a child.

There is no history of sore throats, rheumatic fever, scarlet fever, chorea, nephritis or skin disease.

He has had occasional attacks of nasal catarrh. No headaches.

Up till January he enjoyed perfect health and was a great walker.

FAMILY HISTORY

Mother died when he was very young. Cause not known.

Father is in perfect health - very fond of exercise.

Two brothers and two sisters from his father's second marriage all alive and well.

No history of rheumatism, asthma or skin disease in the family.

SOCIAL AND PERSONAL

Since the outbreak of war the patient has been acting as a Special Constable in his spare time. At the beginning of January 1941 he was put on a very cold beat, a stretch of sea-front at Newhaven which he patrolled from 7 p.m. until midnight on alternate nights. The weather was bitterly cold at this time. He used to return home with hands, feet and neck "absolutely frozen stiff and blue".

The patient says he is of the worrying, anxious type, being very conscientious about his work and tends to be very particular about details. His job as a commercial traveller has caused him a great deal of worry and mental strain, particularly so as he always felt a little inadequate for it.

He makes friends easily and is very affectionate, especially towards his father.

Life at home in the few years just prior to his marriage was not very happy. His step-mother used to

to criticise and "cast things up at him" and he thought that she did her best to show him that he was not her son. His sensitive nature was deeply hurt at times but for his father's sake he would try to say nothing and keep things to himself until he felt all "worked up inside"; then he would "let fly and have some terrible rows with his step-mother".

He has been married 3 years, living a happy married life in a comfortable home. He has no children but his wife is now pregnant.

He smokes 15 cigarettes a day and does not touch alcohol.

DIETETIC HISTORY

The diet has always been very satisfactory. He is fond of meat, fruit and vegetables.

Food has no effect on the condition of his joints.

EXAMINATION

GENERAL IMPRESSION

The patient is a tall, thin, rather anxious looking man with fair hair and a pale, sallow complexion. The eyes look tired and are surrounded by dark rings.

His conversation is ready and intelligent with a cheerful optimistic outlook. He is very interested in himself and the rest of the Ward.

He lies with both knees slightly flexed.

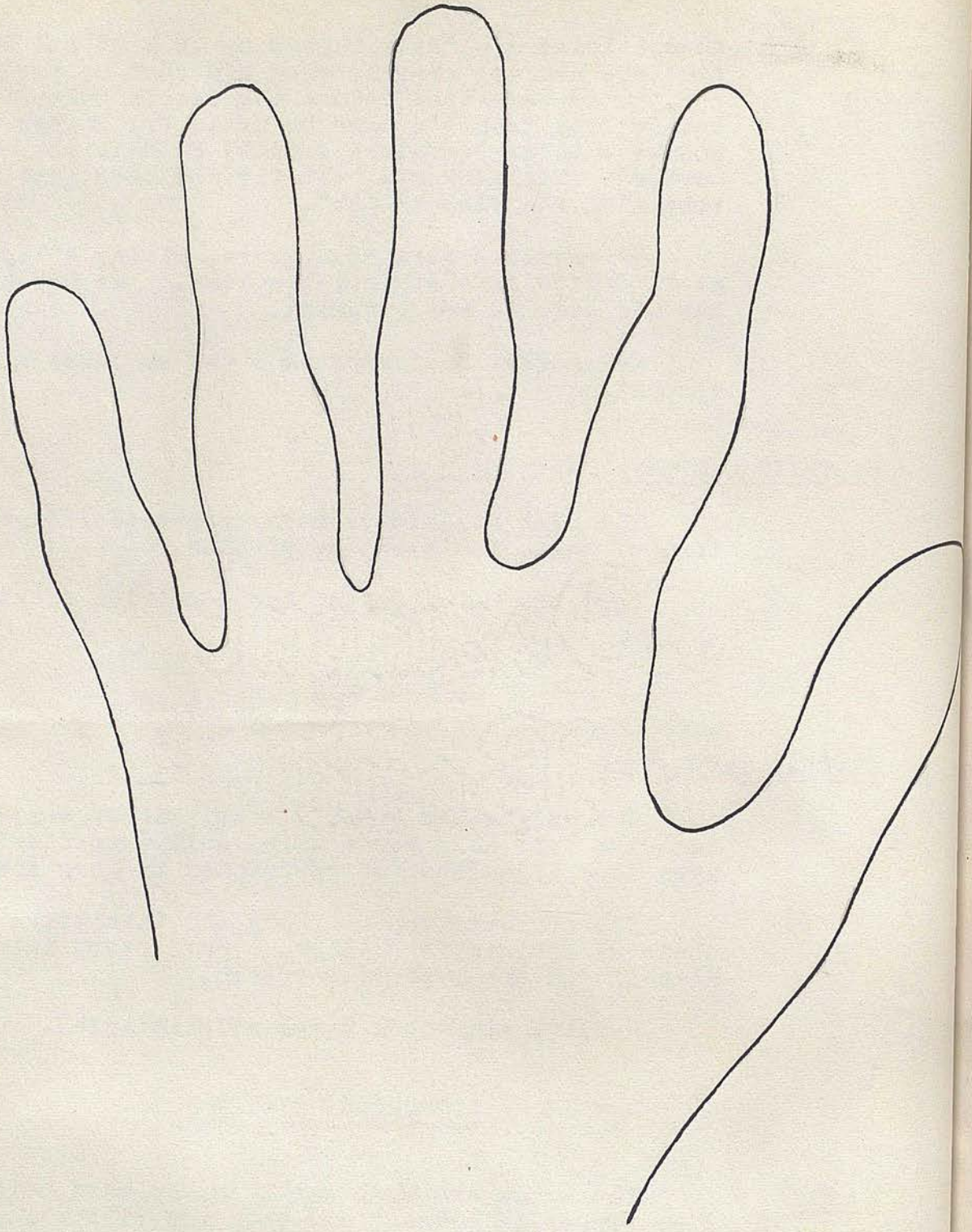
LOCOMOTORY SYSTEM

HANDS

The hands are long and thin and when held out a fine tremor is present and both are slightly deviated to the ulnar side. The skin is white, moist and fine with no areas of pigmentation and the nails have a faint bluish tinge.

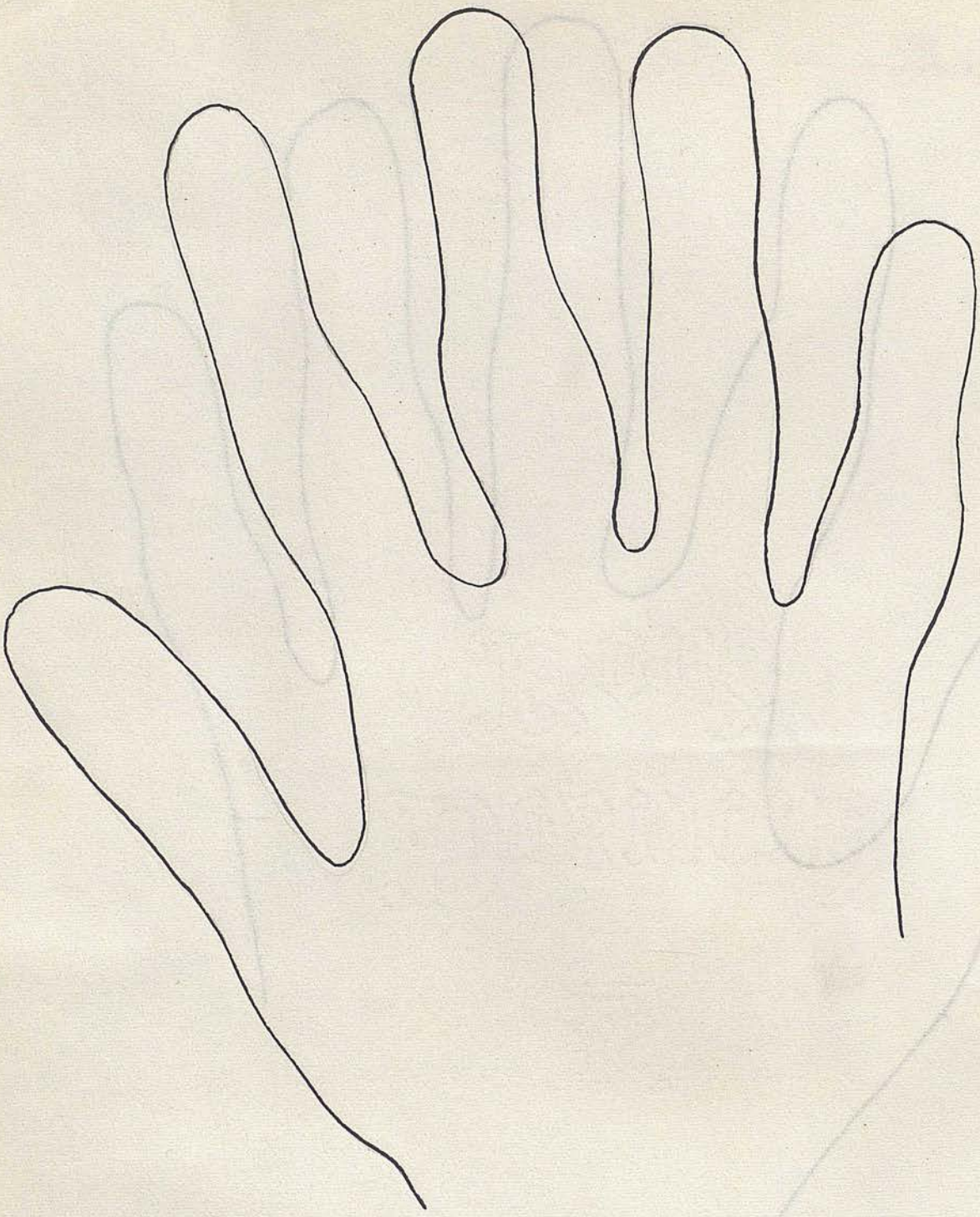
The proximal interphalangeal joints of the left index and ring fingers are swollen as can be seen from

OUTLINE OF LEFT HAND OF WM. SPIERS



The same points are shown as noted under the right hand.

OUTLINE OF RIGHT HAND OF WM. SPIERS



Note

(i) Long thin fingers.

(ii) Swelling of the proximal interphalangeal joints.

(iii) Distal interphalangeal joints unaffected.

from the diagram opposite. On firm pressure these joints are painful and owing to pain and stiffness the fist cannot be fully closed. These joints are not reddened nor do they feel hot.

On the right hand there is a fusiform swelling of the proximal interphalangeal joints of the index, ring and middle fingers and a slight swelling of the interphalangeal joint of the thumb. The outline of the hand, opposite clearly shows that the joint of the middle finger is greatly swollen producing a very ugly deformity. The joints are firm on palpation and slightly painful. Flexion is more limited than in the left hand.

Muscular wasting, especially of the interossei and thenar and hypothenar eminences is very marked resulting in weakness of all the finger movements.

WRISTS

A slight swelling of both wrist joints accentuated by marked wasting of the forearm muscles is present. The joints are not red nor do they feel hot. The wrist movements are quite free, only flexion being slightly limited owing to pain. Firm pressure over the radial side of the dorsum of the wrists produces pain.

ELBOWS

The elbow joints are stiff and swollen. The swelling is especially seen on the medial aspects of the joints and is more marked on the left side. There is a faint red mottling round the left joint but neither joint feels hot.

Supination and pronation are unaffected but flexion and extension are accompanied by pain and although flexion can with difficulty be completed extension is limited, due to peri-articular swelling and adhesions within the joints.

Marked crepitus can be felt and occasional creaks heard on moving the joints.

SHOULDERS

All the muscles round both shoulder joints are markedly atrophic so that the bony points are easily palpated. No obvious swelling of the joints is present but the right shoulder region is red and hot.

The various movements are considerably restricted especially in the right joint:-

(i) Abduction. This is the movement mainly affected. After abducting the arm through 45° severe pain is produced in the right deltoid muscle with the result that any further movement is produced by a rotation of the scapula and a swinging up of the whole shoulder girdle.

(ii) External rotation and internal rotation are also very painful owing to spasm in the deltoid muscle and shooting pain in the shoulder joints.

(iii) Forward and backward movements are fairly free but again muscle pain and twinges in the joint cause some difficulty.

The above statements refer to the right joint. The left joint is similarly affected but to a lesser extent.

On palpation over both joints during movement marked crepitus can be felt.

KNEES

There is considerable swelling of both knee joints, especially the right, accentuated by severe muscular wasting of the thighs and legs. Movement is limited, especially extension. The right leg can be extended to approximately 120° and the left can with difficulty be almost straightened. Full flexion can just be reached with the left knee although considerable pain is produced in the joint, whilst the pain and stiffness are so severe in the right joint as to make full flexion impossible.

The right joint looks red at the sides and on palpation it feels hot and is tender. The left joint is also slightly red and hot but is not painful on palpation.

Well marked grating is easily detectable in both joints on movement.

The movements of the lower limbs are weakened in all directions, namely, flexion, extension, abduction and adduction at the hip and flexion and extension at the knee.

ANKLES

Both joints appear normal. All movements, inversion, eversion, dorsi and plantar flexion are complete and painless.

FEET

The feet are long and narrow with fallen arches both longitudinal and transverse.

Around the metatarso-phalangeal joint of the right great toe is a faint diffuse redness and on flexion and extension of this joint twinges of pain are produced. There is no swelling and no crepitus.

All other joints of the feet are normal.

The muscles of the feet are thin, atrophic and weak.

CERVICAL VERTEBRAE

Crepitus can be heard faintly in the joints on auscultation whilst the patient moves his head. There is no pain on movement or palpation.

OTHER JOINTS Normal.

CARDIO VASCULAR SYSTEM

PULSE

(i) 90/min.

(ii) Regular in time and force.
Marked sinus arrhythmia.

(iii) Wave of normal volume and maintenance.

(iv) The vessel wall is normal.

(v) The Blood Pressure is 120 m.m. systolic and 80 m.m. diastolic.

HEART

(i) Inspection:- Apex beat in 5th interspace in mid-clavicular line. Only faintly visible.
No other pulsations visible.

(ii) Palpation:- Position of apex beat confirmed.
No thrill detectable.

(iii) Percussion:- No increase in size of heart detectable.

(iv) Auscultation:- Sounds closed in all areas.

No oedema or cyanosis present.

RESPIRATORY SYSTEM

(i) Inspection:- Long, thin chest with sloping ribs and narrow subcostal angle.

Both sides move well and equally on respiration.

Rate 21/min.

(ii) Palpation:- Some evidence of myotatic irritability of pectoral muscle.

(iii) Percussion:- Resonant note in all areas.

(iv) Auscultation:- Faint vesicular breathing in all areas.
Vocal resonance present and equal.

ALIMENTARY SYSTEM

On the whole the teeth are good although several teeth have fillings.

The tongue is rather flabby and tremulous although clean and moist.

The tonsils are submerged and the fauces and pharynx appear normal.

The abdomen moves well on respiration. It is poorly covered and the muscles are thin. The skin is warm, fine and elastic. Nothing abnormal detectable on palpation. The descending colon is impalpable.

HAEMOPOIETIC SYSTEM

No enlarged lymph glands palpable. Spleen impalpable.

ENDOCRINE SYSTEM

Thyroid gland not enlarged.

URINARY SYSTEM

Lower pole of the right kidney is just palpable. There is no pain on palpation in the renal angle.

NERVOUS SYSTEM

The cranial nerves show no abnormality.

Pupils equal and regular in size and shape. React well to light and accommodation. No nystagmus.

Tendon reflexes are present, very active and equal.

Superficial reflexes (abdominal and corneal) are present and equal.

The plantar response is flexor.

Muscular atrophy is very marked, especially in the limbs, and fibrillary tremors are present in the thighs.

No sensory disturbance can be detected.

LABORATORY AND SPECIAL INVESTIGATIONS

1. BLOOD

30.8.40.

HB. 90% (Sahli).

W.B.C. 11,800.

Film: cells normal in size and shape. Well filled.

B.S.R. 26 m.m. /1 Hr. (Westergren).

W.R. - ve.

G.C.F.T. - ve.

B.P. 120/90.

2. URINE

29.8.40.

Amount in 24 hours 2000 ccs.

S.G. 1016.

Colour: Pale lemon with mucous sediment.

No albumin, sugar, blood or pus.

Microscopic - cell debris and a few epithelial cells.

3. X RAY

The report stated "early rheumatoid changes in the wrists and hands. Synovitis of the knee joints".

These changes were evidenced by osteoporosis especially marked in the wrist and metacarpal bones, but present in all the hand bones including the terminal phalanges. The joint spaces were diminished and in the knees some fuzziness was present.

4. WEIGHT

30.8.40. 9 st. 11 lbs.

5. HEIGHT 6' ½".

(Normal weight for a man aged 30 and height 6' ½" is 11 st. 10 lbs.)

CHANGES IN LABORATORY FINDINGS DURING TREATMENT

1. BLOOD

DATE	B.S.R.	HB.	W.B.C.
30. 8.40	26	90%	11,800
2. 9.40	28		10,400
4. 9.40			9,400
6. 9.40			6,800
8. 9.40	16		6,200
12. 9.40		83%	8,000
16. 9.40			11,400
19. 9.40			7,200
22. 9.40			6,800
24. 9.40	27		7,400
28. 9.40			10,400
1.10.40		85%	8,200
2.10.40	60		8,800
5.10.40	33		8,600
7.10.40			7,200
11.10.40	32		8,600
15.10.40	32		8,400
18.10.40			7,200
22.10.40	28		7,600
24.10.40	48		9,600
1.11.40	27		8,000
5.11.40	20		8,000
12.11.40	18	88%	6,000

DATE	B.S.R.	HB.	W.B.C.
18.11.40	18		6100
25.11.40	12		6,200
2.12.40	22		6,400
5.12.40	16		
12.12.40	11	90%	5,800
18.12.40	8		

2. URINE

Amount varied between 1200 and 3000 ccs. a day.

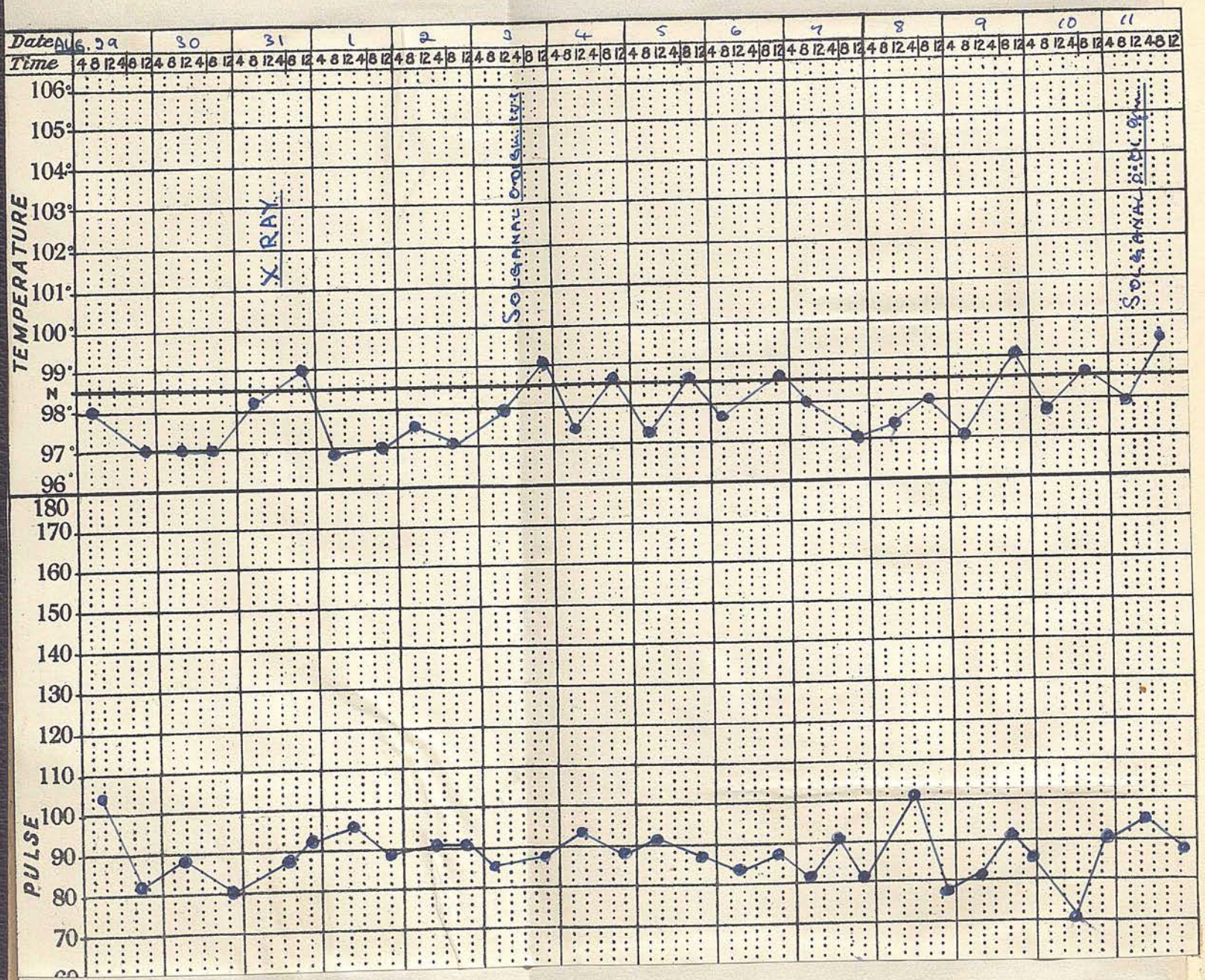
S.G. of 24 hour specimen varied between 1012 - 1026.

Albumin was never present.

3. WEIGHT AND BLOOD PRESSURE

DATE	WEIGHT	B.P.
30. 8.40	9 st. 11	120/90
3. 9.40	10 1	120/80
6. 9.40	10 2	118/80
10. 9.40	10 2½	116/76
17. 9.40	10 3	132/84
24. 9.40	10 3½	130/90
27. 9.40	10 3½	
4.10.40	10 4	134/90
11.10.40	10 4	134/90
18.10.40	10 4	134/90
3.12.40	10 0	130/86
10.12.40	10 0	130/90
17.12.40	9 12½	150/90

WM. SPIERS



Temperature chart of the first two weeks in hospital.

Note

(i) Irregular low grade pyrexia.

(ii) Slight rise in temperature after the X Ray and each Solganal injection.

(iii) Unstable and rather rapid pulse rate.

TREATMENT AND PROGRESS NOTES

The patient was not acutely ill on admission but was complaining of a gnawing pain in the knee joints and so mild analgesics (codeine: aspirin: phenacetin) were given each night and with these he quickly settled down and slept well. The temperature on admission was 98° and the pulse rate 95/minute. The patient was quite cheery and optimistic.

On the day after admission the B.S.R. was found to be 26 m.m./1 hour and the W.B.C. 11,800.

The temperature chart of the next two weeks showed a chart typical of a fairly active rheumatoid arthritis in that the temperature and pulse rates were very unstable. Each evening there would be a slight rise in temperature to about 99°-99.5° and then in the morning the temperature would be down to 98°-97°. In the same way the pulse rate varied irregularly between 80 and 100/minute. It was noticed that slight excitement such as having visitors or minor physical exertion such as going for an X Ray would cause a rise in temperature and pulse rate.

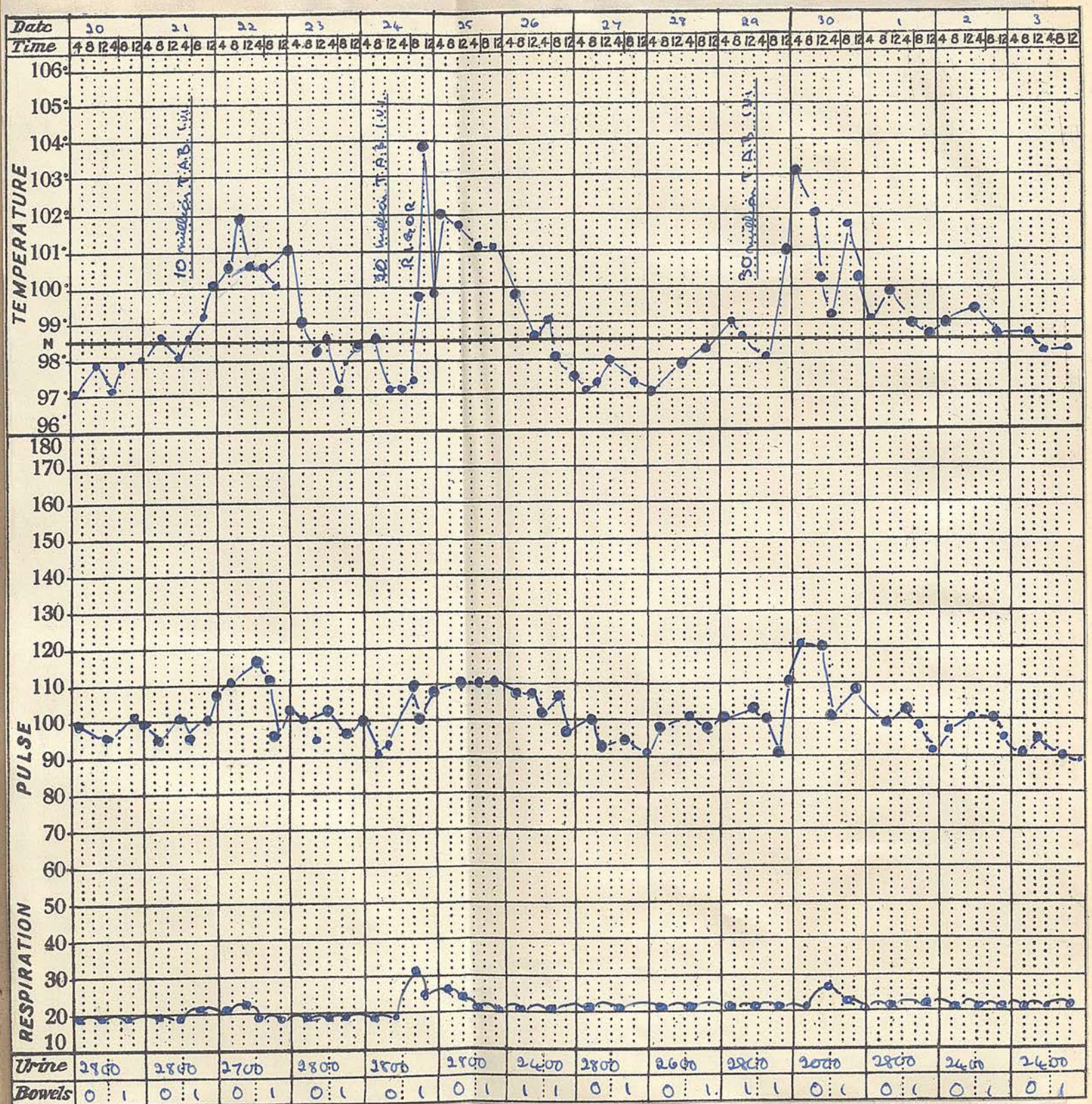
The temperature chart opposite illustrates these points quite well.

These facts, the slight irregular pyrexia, the increase in pulse rate, the raised B.S.R., the raised W.B.C., together with the slight pain and redness of several joints indicated that for the moment at any rate, active treatment in the form of physio-therapy was contra-indicated and rest must be the mainstay of treatment.

During these first two weeks of rest the patient had few complaints except for an occasional gnawing pain in the knees and a very troublesome stiffness of the shoulder joints. He found great difficulty in performing any movement at these joints, especially in the mornings. He was unable to comb his hair and even found that taking his food produced twinges of pain in the joints and surrounding muscles.

For a time the appetite was poor but this soon improved. Strenuous efforts were made to increase his weight which on admission was only 9 st. 11 lbs., as opposed to the average weight of 11 st. 10 lbs. which Price gives for a man of his age and height. To this end a light high calorie, high vitamin diet with a relatively large quantity of animal protein was given. Each day he had 1 drachm Marmite and if possible an orange.

In spite of this diet it was no easy matter to maintain a steady rise in weight. The highest figure reached was 10 st. 4 lbs. and during the protein shock therapy the odd 4 lbs. were lost.



Temperature chart during the Protein Shock Therapy.

Note the marked reactions with fairly small doses of T.A.B. Vaccine.

flatulence and a heavy feeling in the abdomen. These were relieved with soda bicarbonate.

The knees, especially the right were again beginning to be troublesome. He continually kept them in an attitude of flexion and attempts at extension produced severe pain. Accordingly in order to prevent a flexion deformity, to reduce muscle spasm and diminish pain dorsal plaster slabs were made with the legs extended, stretching from the mid-thigh to the toes. On first using these severe shooting pain was produced in the knee joints and thigh muscles but after some days the patient became accustomed to them and found them of great benefit.

A general survey of the case now October 20th did not show evidence of much change since admission 8 weeks ago. The swelling and stiffness in the affected joints was practically unaltered and during the past two weeks the constant gnawing pain in the deltoids, shoulder joints and knee joints had made the patient rather despondent. The graph, however, shows that there were some signs of good prognostic significance, namely an increase in weight which had now reached 10 st. 4 lbs. and a fall in the B.S.R. and W.B.C.

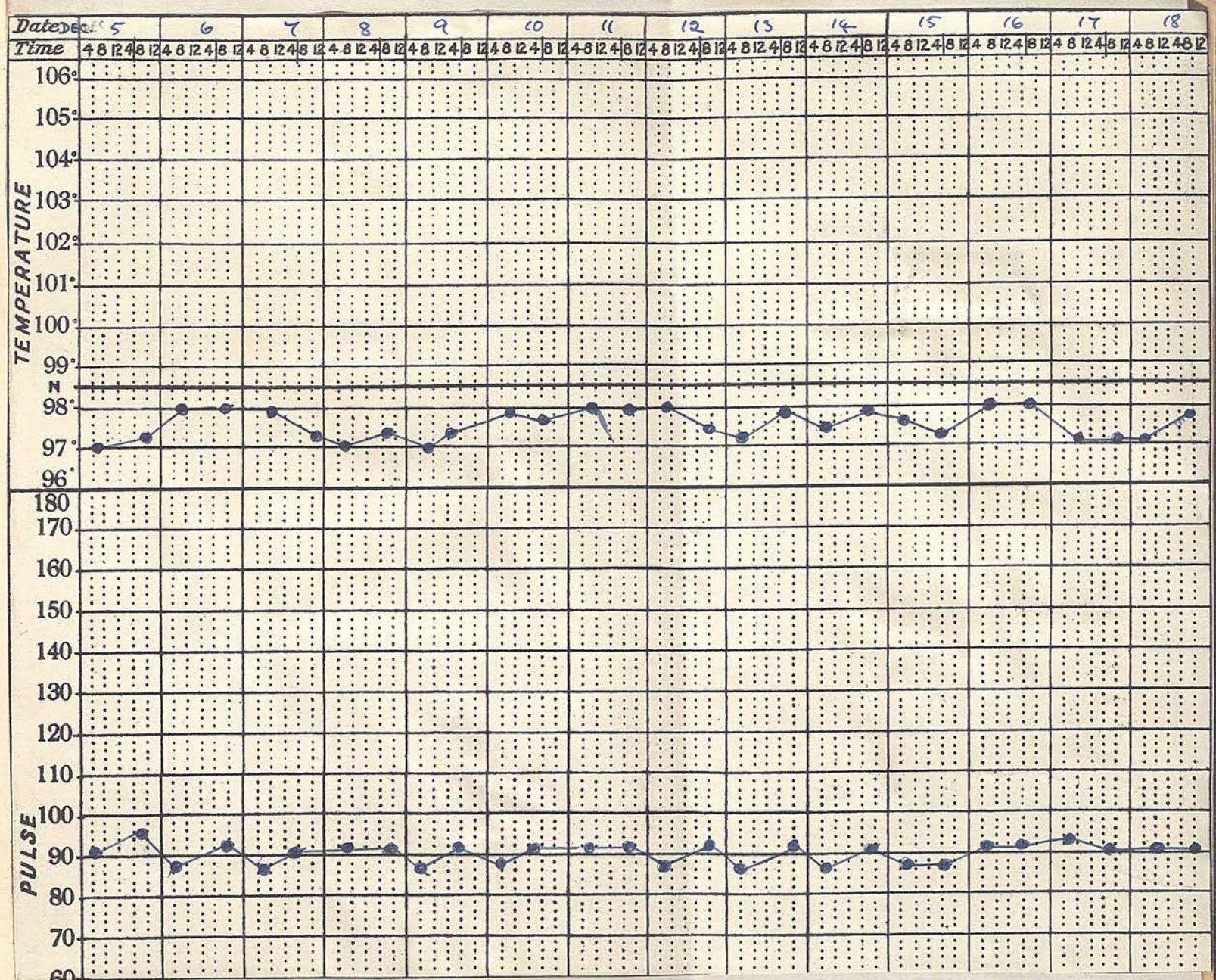
The result of this little improvement in the clinical condition was to bring up the consideration of some other form of treatment. The case was an ideal one for protein shock therapy since the patient was quite strong, the temperature was by now only occasionally elevated and the disease had not progressed to a very severe extent. It was decided therefore to give this form of treatment a trial.

At mid-day on 21st October a dose of 10 million T.A.B. vaccine was injected i.v. At 5 p.m. the patient felt shivery and the temperature had begun to rise. The following day the temperature reached 102° and then gradually returned to normal by the evening of the 3rd day. This was a very good response to a rather small dose of vaccine. The patient's only complaint was a severe attack of flatulence which began one hour after the injection and lasted several hours.

On 24th October 20 million T.A.B. vaccine was given i.v.i. at mid-day. About 6 p.m. the patient had a rigor and felt weak and headachy. Thereafter the temperature gradually came down to normal during the next two days. The patient again complained of severe flatulence beginning one hour after the injection and lasting several hours.

The final dose of T.A.B. was given five days later, this time 30 million i.v.i. Severe flatulence occurred almost at once, lasting two-three hours. During the night the patient was restless, the temperature rising to 103°. Two days later the temperature was still elevated (100°) and there was severe pain

WM. SPIERS



Temperature chart of the last two weeks in hospital.

Note

(i) The normal temperature (compare with first two weeks).

(ii) Pulse rate still rapid.

pain in the right deltoid muscle. On the 4th day the temperature reached normality and although he felt very tired the patient said that all his joints, especially the shoulders and knees felt looser. He found that he could now almost straighten both knees and that for the first time since admission he could comb his own hair.

A second course of Solganâl was started on 5th November with an i.m.i. of 0.02 gm. followed in some hours by throbbing pain in certain of the finger joints and severe pain in the right deltoid.

Three more doses of Solganâl of 0.02 gm. were given at weekly intervals and then two injections of 0.05 gm. at weekly intervals (November 12th, 19th, 26th, December 3rd and 10th). During most of this time the shoulder joints were very troublesome, the chief complaint being a dull ache in the deltoid muscles with stiffness and stabbing pain in the joints on movement. After each gold injection for about 12 hours these symptoms were aggravated. Never at any time did the urine show albumin and no other toxic symptoms appeared.

Towards the end of November radiant heat and massage treatment was restarted and this time it was tolerated well, having a soothing and loosening effect. Each evening local heat was applied to the shoulders either by an electric blanket or by a mud pack of Fuller's Earth.

The patient was allowed up for the first time on November 30th and from then on each day for gradually increasing periods of time. At first his legs were extremely weak and shaky but gradually by dint of perseverance the strength returned and his walking distance increased.

The final stage in the treatment was a course of deep X Ray Therapy applied to the knees twice a week.

The patient was discharged on December 27th, 16 weeks after admission, with instructions to report twice weekly for X Ray Therapy.

Examination on discharge showed that considerable improvement had taken place. Both knee joints could now be fully flexed and extended; the shoulder joints were looser and less painful; the finger joints, although still swollen, were less stiff. The B.S.R. was down to 5 m.m./1 hr., W.B.C. was 5800. The temperature was at a steady normal level and the patient's general appearance was much improved. A disappointing feature was that the patient always walked with back bent, seemingly unable to hold himself erect.

SUMMARY OF TREATMENT

1. Rest in bed with sedatives and splints.
2. Diet: high calorie, high protein, high vitamin.
3. Crysotherapy: 1st course of 0.36 gm. in 8 weekly doses.
   2nd course of 1.8 gm. in 6 weekly doses.
4. Protein Shock Therapy - 3 doses of T.A.B. vaccine
   (10 million: 20 million: 30 million
   i.v.i.)
5. Massage, Radiant Heat, mud packs.
6. Deep X Ray Therapy to the knees.

SUMMARY OF PROGRESS

1. General health improved - colour: appetite: vigour.
2. Weight slightly raised.
3. All joints less stiff and painful.
4. Haemoglobin level raised.
5. Temperature, B.S.R. and W.B.C. brought to normal.

ORDER OF AFFECTION OF JOINTS

1. Small joints fingers.
2. Left ankle joint.
3. Knee joints.
4. Tempero-mandibular joints.
5. Shoulder joints.
6. First right metatarso-phalangeal joint.

EFFECT OF TREATMENT ON BLOOD SEDIMENTATION RATE.

SYSTOLIC BLOOD PRESSURE & WHITE BLOOD COUNT & WEIGHT

SUMMARY OF THE IMPORTANT ETIOLOGICAL POINTS IN THE CASE

A. POINTS FROM THE HISTORY

1. Onset with muscular pain - suggesting a systemic upset.

2. Influence of trauma - injury to the finger made the joint worse.

3. Influence of climate - exposure to cold weather preceded the onset.

4. Psychological aspect -

   i. Patient is of the anxious, sensitive, emotional type.

   ii. Unhappy home life before his marriage 3 years ago.

5. There is no evidence of any previous rheumatic or allergic disease in himself or his family.

6. No dietetic deficiency. No evidence of any particular food influencing the condition.

B. POINTS FROM CLINICAL FEATURES

1. Sex - male sex not so common as female.

2. Constitution - long, thin, asthenic type with an unstable vaso-motor system.

3. No demonstrable focus of infection.

4. A number of carious teeth are present.

5. Evidence of a poor peripheral circulation by the blueness of the nails and the marked way in which the patient feels the cold.

6. Certain features suggest an infective process:-

   (i) Irregular pyrexia and tachycardia.

   (ii) Raised B.S.R. and W.B.C.

   (iii) Night sweating.

   (iv) Toxic appearance.

7. Frequent attacks of "indigestion with flatulence" suggest an atonic alimentary tract.

C. POINTS FROM THE PATHOLOGICAL CHANGES

1. Small peripheral joints involved first.
2. Joints symmetrically involved.
3. Atrophy of skin, muscles, ligaments and bone.
4. Peri-articular swelling.

PROGNOSIS

It is difficult to decide what the future progress of this case will be. A considerable degree of improvement has taken place whilst the patient has been in hospital, both in the condition of the joints and in the general condition. The normal B.S.R., temperature and white count suggest that the disease process has become quiescent. On the other hand the joints were still swollen and stiff on discharge and the general musculature was in an atonic state. The most rapid improvement seemed to begin after the protein shock therapy and the prolonged administration of Solganal probably played a major part in bringing the disease to a quiescent stage. The main danger will be the possibility of further joint damage. If the patient can keep up his general health by having a moderate amount of daily exercise, plenty of sleep, freedom from worry and the avoidance of cold, then the disease may become completely arrested at its present stage.

SUMMARY

A case of Rheumatoid Arthritis of widespread joint involvement occurring in a young man of the anxious asthenic type and responding well to treatment.

CASE III

MISS AGNES HARLEY. AET 28

Buckhaven, Fife.

OCCUPATION: Shorthand-Typist.

ADMITTED: 3rd June 1940. Ward 24.

DISCHARGED: 6th September 1940.

DATE OF EXAMINATION: 5th June 1940.

COMPLAINT: Pain, stiffness, swelling of various joints, especially the fingers.

DURATION: 18 months.

HISTORY In March 1939 the patient did her first really big washing and that night she developed a pain in the left shoulder region, "like a toothache pain" which was so severe as to keep her awake. She found that moving the joint made the pain worse. During the night she applied heat and this eased the pain. At the same time the fingers of her left hand felt stiff and weak and she thought she had strained them with the washing. Next morning her left arm felt weak and limp but the pain in the shoulder had gone. During the next few days she began to experience slight aching pain in the fingers of both hands and in both shoulder joints. The finger joints became swollen and were red and burning. The swelling of the finger joints varied in size from day to day e.g. one day one particular joint would be markedly swollen and stiff and the next the swelling was much reduced and another joint was swollen. Once a joint was affected, however, the swelling and stiffness never at any time completely left it. She noticed that in the mornings especially her fingers were often very stiff but if she put them in hot water and moved them the stiffness gradually lessened.

Towards the end of April of the same year she went a long walk and that evening complained of pain and stiffness in the left knee and also to a lesser extent in the left hip. The pain and stiffness in the hip soon disappeared but the knee began to swell slightly and was hot and sharply painful on flexion.

At about the same time she noticed that her feet and toes were stiff and felt very weak and shaky in the mornings with the result that sometimes she could

could only "shuffle about" and had great difficulty in getting to work. Her little toes became swollen, red and painful at the metatarso-phalangeal joints but all the other toes appeared normal.

Her feet improved for a time and then one day she came to Edinburgh and did some shopping, entailing much standing and walking and that night she developed severe burning pain in the right knee which up to this time had been unafftected. Both knees were now painful, slightly swollen and stiff in the mornings.

One day her left wrist swelled up and was red and painful, but in a day or two it returned to normal and has not troubled her since.

In March 1940 all her affected joints became quite suddenly worse - they were more stiff, more painful and more swollen. Other joints which up to now had not been affected became stiff but were not swollen or painful, namely, the back of her neck, her jaw and she felt stiff all down her chest.

More recently both elbow joints have become affected in the same way as the other joints, i.e. pain, stiffness and swelling and she had noticed a little hard lump under the skin on the back of her forearms near the elbows.

The condition of the joints varies a great deal from time to time. Some mornings she can dress and do her hair only with great difficulty, whilst other times she has little difficulty. Some days she can walk easily, whilst at other times her legs are so weak and her knees and feet so stiff that she is bed-ridden. On the whole, however, she feels the joints have been gradually getting worse.

Exercise causes pain in her knees and hips, whilst rest causes all her joints to become stiff. The weather seems to have no effect on the joints but she thinks that eating tomatoes, oranges and rhubarb increases the pain and swelling.

She has found it very difficult and at times impossible to carry on her work during the past year. Typing seemed to jar all the joints and make them very painful and of course her speed has been much reduced.

She has felt quite well in herself during the past year except that she is easily tired and has felt weak. Occasionally she has suffered from aching pains in the muscles of her legs and body.

Lately she has been sweating a lot, especially at night.

Until recent months her appetite was quite good and her diet satisfactory, but in the past two-three months she has lost the inclination to eat. She has lost weight recently and has noticed that her hands especially were getting thinner.

She does not usually suffer from cold hands and feet.

She flushes very readily and always she has been shy and nervous. Occasionally she has palpitations.

For as long as she can remember she has had a fine trembling in her hands and has noticed that they are nearly always moist.

Her bowels have always tended to be constipated, especially at her periods.

PREVIOUS ILLNESSES

A year before her first symptoms appeared she remembers having a pain in her left hip after running. This soon disappeared.

Two years ago she had a severe attack of tonsillitis and since then has had a dryness and discomfort in her throat accompanied by a short irritable cough, lasting a few days, every three months. Before this she only occasionally had a sore throat.

All her life she has been subject to colds in the head.

Apart from these she has always been healthy.

She has never had Rheumatic Fever, Chorea, Skin rashes, Scarlet Fever or Kidney Trouble.

FAMILY HISTORY Her father died in March 1938 after suffering badly from asthma for many years. He had "swollen hands and feet". Patient was very distressed at this time.

Her mother is alive and well.

She has one brother and three sisters alive and well. Her eldest sister has a little girl aet 9 who had "rheumatism" which has left her "pale, delicate and tired".

She has an aunt (father's sister) who is crippled with rheumatism and who suffers from asthma as well.

Her grandfather on her mother's side died of Bright's disease.

SOCIAL AND PERSONAL

She has always been happy at home and at business with no worries, although she does tend to worry about little things and tends to take life seriously. She is very conscientious about her work. In her office she is very popular. Since her illness started, however, she has been worried about herself mainly because she could not do her work so efficiently.

At school she mixed well with other girls, taking part in all the games and joining the Girl Guides, but always felt a bit handicapped because of her shyness and nervousness.

She has never mixed much with the opposite sex and has had no "love affairs".

Her home and office are dry and warm.

EXAMINATION

GENERAL IMPRESSION

The general appearance is that of a small, delicate young woman with an anxious expression on her face and a muddy complexion. Her hair is dark and rather coarse. The skin over her forehead is stretched and shining and round her mouth and nose are a number of small "pimples". She lies with her fingers, elbows and knees all flexed and her forearms pronated.

She enters readily and intelligently into conversation and is very interested in herself. She is a good witness and remembers well all the minor points in her history.

LOCOMOTORY SYSTEM

HANDS

There is a fusiform swelling of several joints of both hands, especially marked on the radial sides. On the right hand the proximal interphalangeal joints of the index and ring fingers and the metacarpo-phalangeal joints of the index and middle fingers show a quite marked spindle-shaped swelling and on the left hand the greatest swelling is at the proximal interphalangeal and the metacarpo-phalangeal joints of the index finger. All these joints appear slightly red and on palpation feel firm, warm and are tender. On passive movement sharp pain is produced and a grating sensation is obtained. All the other metacarpo-phalangeal joints and proximal interphalangeal joints of both hands are affected to a lesser extent with stiffness and slight swelling. The swelling decreases in size from radial to ulnar side. This, of course, is partly accounted for by the fact that the joints on the radial side are normally more prominent than those of the ulnar side of the hand. The result is that she cannot completely clench her fists and the finger movements are all performed slowly. The distal interphalangeal joints are not affected either by stiffness or swelling.

The hands are very thin, due to marked wating of the interossei muscles and the thenar and hypothenar eminences. The grip is weak as are all the finger and thumb movements (opposition, abduction, adduction, flexion and extension). On holding out the hands and separating the fingers a very well marked fine tremor is seen.

A considerable amount of ulnar deviation is present.

The skin of the hands is warm, thin, inelastic and moist and scattered over the dorsal surface of her hands, wrists and forearms are a number of small areas of brown pigmentation like freckles.

WRISTS

There is no obvious swelling of either wrist joint, nor is there any redness. Movement both active and passive is complete and painless in all directions, flexion, extension, abduction and adduction. On palpation during movement fine crepitus can be felt in both joints, particularly the right.

ELBOWS

No visible swelling or redness of the elbow joints is in evidence. Both joints are stiff and there is considerable limitation of movement especially extension. Neither joint can be fully extended either actively or passively. Supination and pronation appear to be unaffected. Flexion and extension cause quite sharp pain especially when the movements are sudden.

On palpation rough crepitus can be elicited in both joints and on the back of each elbow towards the upper end of the ulna area two firm fibrous nodules about the size of a split-pea and lying subcutaneously can be felt.

The skin of the arms is loose and moist and the muscles are wasted and atrophic.

SHOULDERS

No swelling or redness can be seen around either shoulder joint.

On movement both joints are found to be stiff, painful and limited. The movement particularly affected is abduction and this is more affected in the right joint. She can by much effort and making full use of her scapula reach the back of her head but the movement causes considerable pain. The left hand can be raised vertically above the head but the right upper arm can only be brought through about 90° owing to pain and spasm in the surrounding muscles.

Marked crepitus is easily felt in both joints and occasionally loud creaks are produced.

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All the surrounding muscles are thin and atrophic and are found to be very weak when the various shoulder movements are tested against pressure. The muscles feel hypotonic and no indurated areas can be palpated in them.

KNEES

The right knee joint is slightly swollen and looks rather red. The left joint is not swollen. Both joints show quite a marked stiffness and limitation of movement but there is little pain in either joint except when full flexion is attempted. Neither flexion nor extension is complete although by gentle passive movement the left leg can be almost fully extended.

Both joints show marked grating on movement and the left especially is very creaky.

The thigh and calf muscles are markedly wasted. They feel loose and hypotonic. Flexion and extension at the knee joint and adduction and abduction at the hip are very weak, the resistance of the muscles being easily overcome.

ANKLES

Both ankle joints are slightly swollen and this is mainly noticeable on the anterior aspect. Dorsi-flexion and plantar flexion are found to be slow, stiff and painful whilst inversion and eversion appear practically unaffected.

Again, crepitus is marked.

There is no pitting oedema.

FEET

The longitudinal and transverse arches of the feet are quite well maintained and the tarsal, metatarsal and phalangeal joints appear quite normal except for a slight swelling and redness at the fifth metatarso-phalangeal joints. No pain is produced either by firm pressure or by full movement at these joints, but a slight grating sensation can be obtained.

The TEMPERO-MANDIBULAR, STERNO-CLAVICULAR and CERVICAL VERTEBRAE joints all appear normal. No crepitus can be elicited either by palpation or auscultation over these joints.

CARDIO VASCULAR SYSTEM

PULSE — Is running at about 100/min. Is is regular in time and force except for a quite well marked sinus arrhythmia. The wave is rather small but is well maintained. The vessel wall is impalpable. Blood Pressure is 120/70.

HEART — The apex beat is just visible in the 5th space in the mid-clavicular line. No other pulsation is visible over the praecordium.

No right-sided enlargement can be made out on percussion.

On auscultation a soft non-propagated blowing systolic murmur is heard in the mitral area. In other areas the sounds are closed.

RESPIRATORY SYSTEM

The chest is of the thin, asthenic type with clavicles pointing upwards towards the neck, sloping ribs and a narrow subcostal angle. There is some hollowing below both clavicles but this is accounted for by the muscular wasting.

The lungs are resonant in all areas.

The breathing is of the faint vesicular type. Rate is 20/min.

ALIMENTARY SYSTEM

TEETH — There are no lower molars and only the upper first molars. The rest of the teeth are clean and healthy.

TONGUE — The tongue is large and flabby, showing fibrillary movements on protrusion. It is clean and moist.

The tonsils are slightly enlarged and look red and there is flushing of the anterior pillar of the fauces.

The abdomen is thin and slightly scaphoid in

in shape. It moves well on respiration. The skin is fine and warm and the musculature is thin. There are no tender areas and nothing abnormal to be found on palpation. The descending colon is impalpable.

NERVOUS SYSTEM

The tendon reflexes are active and equal.

The abdominal reflexes are present but only obtained with difficulty.

The plantar response is flexor.

The pupils react well and equally to light and accommodation.

There is no sensory impairment.

HAEMOPOIETIC SYSTEM

The spleen cannot be palpated and there are no enlarged lymph glands.

ENDOCRINE SYSTEM

The thyroid is not enlarged. As already mentioned a fine tremor is present in the fingers and the skin of the hands is warm and moist. The eyes appear quite normal.

MENSTRUATION

Last menstrual period - . . . 15/5/40.

Menarché 13.

Periods 4/28. Regular.

No leucorrhoea, dysmenorrhoea, menorrhagia or amenorrhoea

URINARY SYSTEM

No tenderness on palpation over kidneys or bladder and no abnormality detectable.

LABORATORY AND SPECIAL INVESTIGATIONS

1. BLOOD

24/6/40. R.B.C. 4,700,000.

W.B.C. 4,200.

HB. 72% (Sahli).

Film: cells normal in size and shape but rather poorly filled.

Differential white count:-

Neutrophils 62%

Eosinophils 3%

Basophils 1%

Small lymphocytes 25%

Large lymphocytes 9%

29/6/40. B.S.R. 90 mm./1 hr. (Westergren).

4/7/40 Urea N. 14 mgm.%

Uric acid 3.6 mgm. %

Cholesterol 111 mgm. %

16/7/40. Icteric index - 21.

2. URINE

6/6/40. Straw coloured.

Acid.

S.G. 1012.

Mucus sediment.

No albumin, blood or sugar.

Cell debris and epithelial cells on microscopic examination.

7/6/40. Catheter specimen:-

Film - a few epithelial cells.

Culture - no growth.

3. FAECES — Normal appearance.

Benzidine - ve.

7/6/40. Bacteriological examination showed no increase in cellular exudate. No organisms of typhoid-dysentery group isolated.

4. X RAY — The lung fields show slight emphysema. The heart is normal in size and shape. Both hands, especially the right, show early rheumatoid changes i.e. rarefaction of the bones of the wrist and finger joints with a loss in the joint spaces.

5. ELECTROCARDIOGRAM

4/6/40. Within normal limits.

6. BASAL METABOLIC RATE

3/7/40 + 23%.

7. HEIGHT — 5'2".

WEIGHT (3/6/40) 6 st. 11 lbs.

(Average weight for a woman aged 28 and height 5' 2" is 8 stone).

8. SKIN SENSITIVITY TEST

9/7/40. Using 29 different protein and bacteriological extracts I carried out a skin sensitivity test using the front of the elbows and forearms.

After 20 minutes nearly all the extracts had produced a slight wheal at the point of scarification whilst numbers 1, 2, 5, 8, 9, 13 and 23 in the series produced a definite reaction and number 7, a very marked reaction.

It is interesting to note that number 7 is the vegetable group including tomato, one of the foods which she says makes her condition worse. The other groups are:-

1. Meats.
2. Eggs and milk.
5. Fowls.
8. Vegetables (beans and lentils).
9. vegetables (onions spinach, beet).
13. Nuts.
23. Typhoid - paratyphoid group.

CHANGES IN LABORATORY FINDINGS DURING TREATMENT

1. BLOOD

Haemoglobin	24/6/40.	72%.
	3/7/40.	75%.
	3/8/40.	78%.
B.S.R.	29/6/40.	90 mm./1 hr.
	17/7/40.	45 mm./1 hr.
	2/8/40.	60 mm./1 hr.

2. URINE

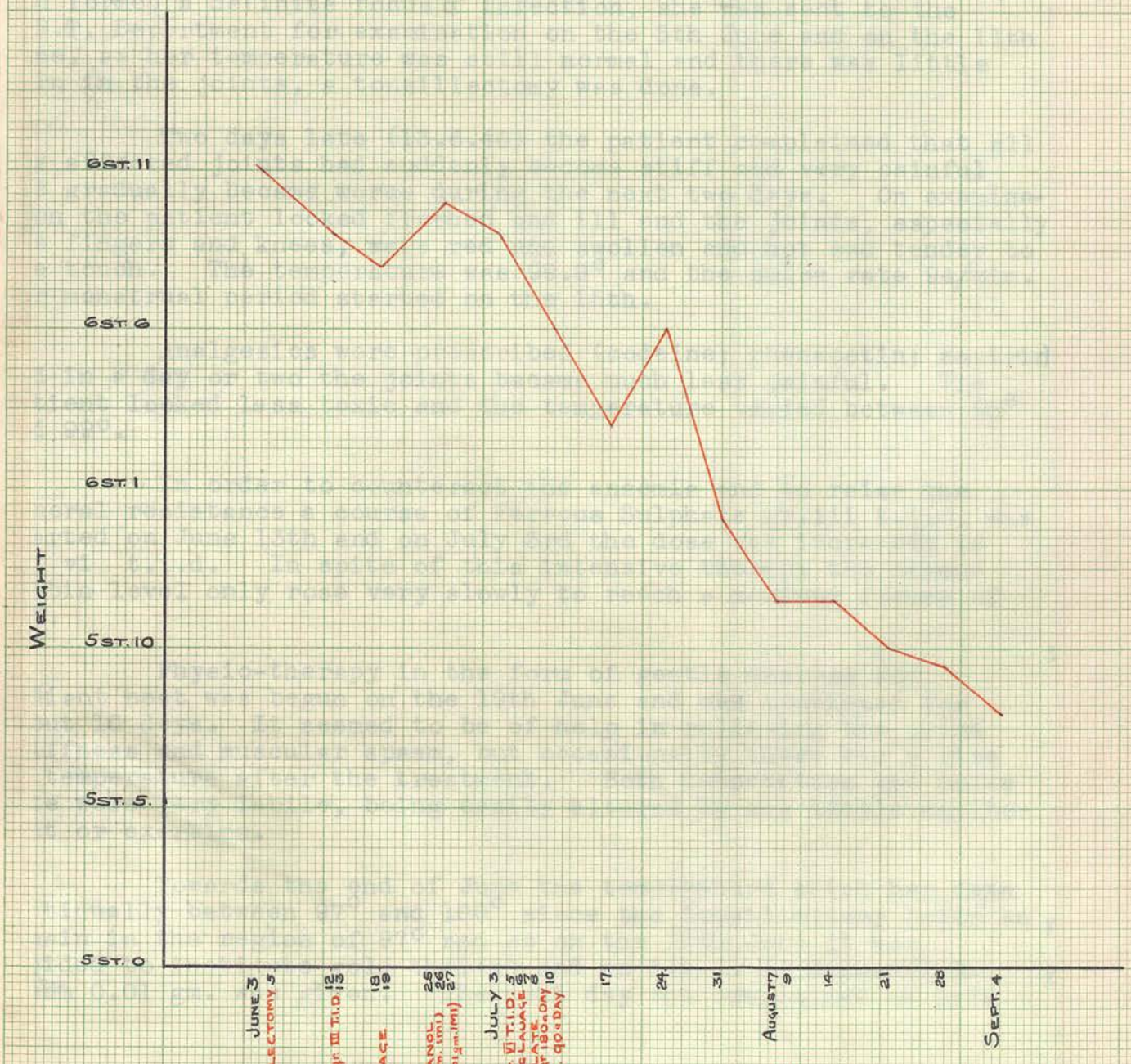
6/6/40 - 6/9/40. No albumin.
S.G. varied between 1018-1030.

3. WEIGHT HEIGHT 5' 2".

3/6/40	6 st.	11 lbs.
12/6/40	6	9
18/6/40	6	8
26/6/40	6	10
3/7/40	6	9
10/7/40	6	6
17/7/40	6	3
24/7/40	6	6
31/7/40	6	0
7/8/40	5	11½
14/8/40	5	11½
21/8/40	5	10
28/8/40	5	9½
4/9/40	5	8

Agnes Harley

Showing the Steady Fall in Weight in Spite of Treatment



TREATMENT AND PROGRESS NOTES

On admission the patient appeared quite comfortable and did not complain of any pain in the joints. Her temperature was 97° and her pulse rate 85/min. and for the next week or so the temperature and pulse rate varied between 97-98.4° and 80-90/min. respectively.

She was kept at rest in bed, being allowed up for sanitary purposes and as she was thin and under weight she was given a nutritive, high calorie, high vitamin diet.

As it was quite obvious that the tonsils were unhealthy and formed a definite focus of infection, she was sent to the E.N.T. Department for examination on the 5th June and on the 11th June, as her temperature was still normal and there was little pain in the joints, a tonsillectomy was done.

Two days late (13.6.40) the patient complained that all the affected joints had suddenly become stiff and very painful and gradually became worse during the next two days. On examination the patient looked flushed and ill and the joints, especially the fingers and knees, were red and swollen and hot and tender to the touch. The temperature was 99.8° and the pulse rate 94/min. Her menstrual period started on the 15th.

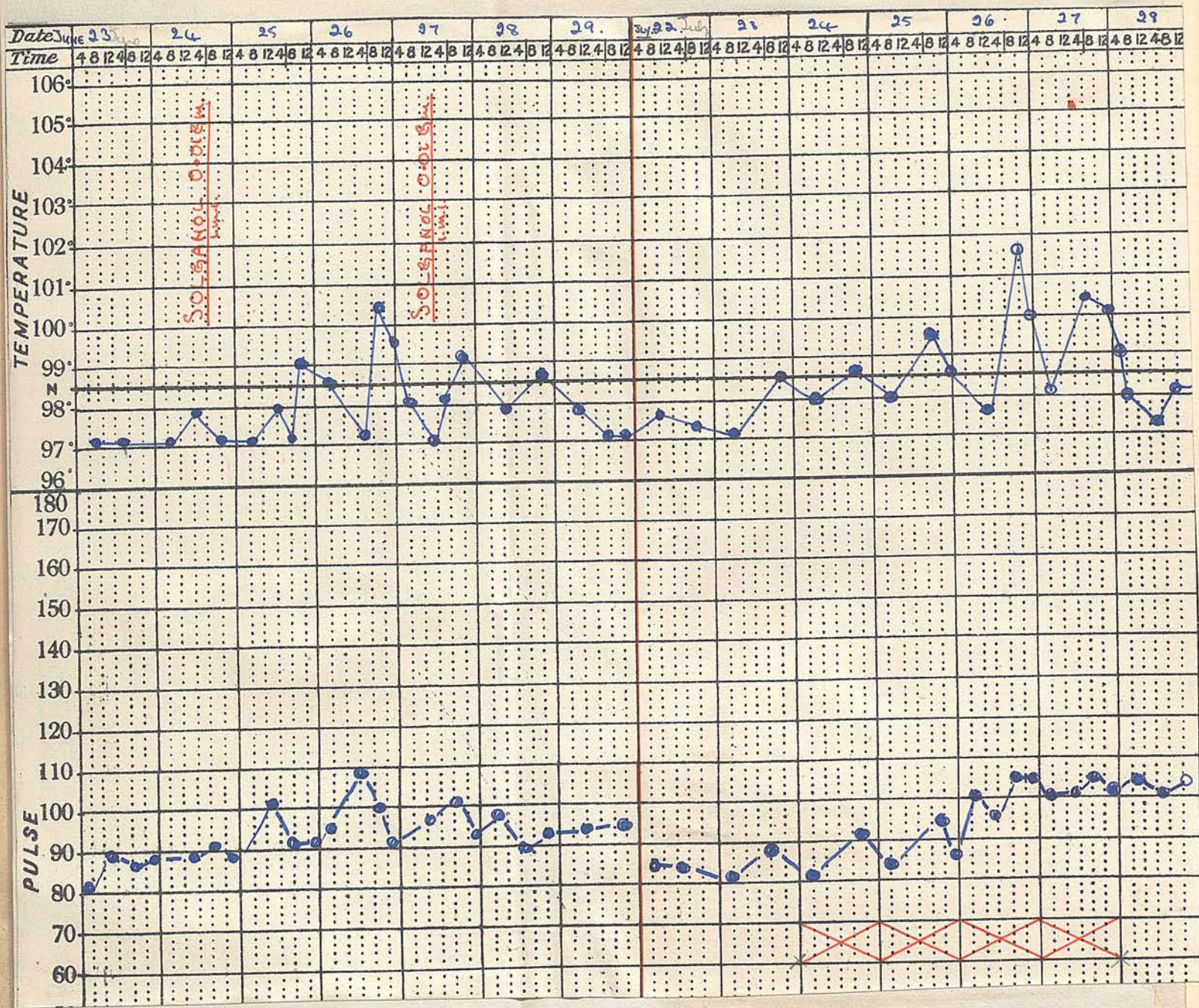
Analgesics were prescribed (codeine; phenacetin; aspirin) and in a day or two the joints became much less painful. The patient looked less toxic and the temperature varied between 98° and 99°.

In order to counteract the anaemia and to raise the general resistance a course of Ferrous Sulphate gr.iii t.i.d. was started on June 13th and on July 3rd the dose was increased to gr. vi t.i.d. In spite of this intensive therapy the haemoglobin level only rose very slowly to reach a maximum figure of 78%.

Physio-therapy in the form of gentle massage and radiant heat was begun on the 19th June and was continued for about 10 days. It seemed to be of help in relieving the joint stiffness and muscular spasm, but occasionally there was a rise of temperature after the treatment. Both temperature and pulse rate were very labile, being easily altered by any little excitement or exertion.

Towards the end of June the temperature which had been continually between 97° and 100° since the tonsillectomy began to remain in the region of 97° and so on the 25th June it was decided to institute gold therapy and an i.m.i. of Solganal B. Oleosum 0.01 gm. was given. The next day she complained of pain

AGNES HARLEY



Temperature chart showing the irregular pyrexia and tachycardia consequent upon:

(i) Small doses of Solganâl

(ii) Menstruation.

pain and stiffness in various joints, notably the fingers and knees. The temperature was 99° and the pulse rate 102/min.

The joint pains quickly settled down and on the 27th June a second injection of 0.01 Solganal was given. This produced quite a marked reaction. The joints became red, hot, swollen, painful and flexed and a slight irregular pyrexia and tachycardia developed. The patient felt ill and slightly nauseated. The urine showed no albumin and there were no other features of gold intolerance. Because of this marked reaction it was decided to stop the treatment.
(See temperature chart opposite).

All this time the patient had been having some difficulty with the bowels and so with the thought of auto-intoxication from the intestine in mind it was decided to test the efficiency of the emptying power of the colon by giving a dye orally and noting how long traces could be found in the stools. Carmine gr. v in a capsule was given and in four days time traces could still be seen in the stool.

Accordingly on the 6th July a course of high colonic lavage was started. The colon was washed out each day for 10 days. At the end of the course there was quite a marked difference in the patient's complexion; the sallow, muddy, tint had given place to a bright, clear, although still pale appearance and the eyes instead of being lustreless were bright and shining. She felt better and stronger at this time.

At the same time as the colonic lavage was being given it was decided to try the effects of salicylates because ever since the crysotherapy the temperature chart had been showing an irregular slight pyrexia (98°-100°) and the joints had been red and painful.

The therapy was begun on July 7th by giving 180 gr. of sodium salicylate and the same of sodium bicarbonate. (This dose was spread over the day). Marked toxic symptoms quickly followed consisting of vomiting, headache, tinnitus and deafness and the dose was reduced to 90 gr. a day. This dose was maintained without producing any toxic symptoms until the 23rd July (i.e. about two weeks).

During this time the pain in the joints gradually diminished and at the end of the course she was once again running a steady temperature of between 97° and 98°.

After the lavage was stopped the patient became extremely constipated and markedly so when a few days later on the 24th her menstrual period started. Her period lasted four days and during that time all the benefit gained in the past few weeks seemed to

to be lost. She felt ill and depressed, looked flushed and toxic and complained of considerable pain in the joints which were once again red and hot. The temperature and pulse again became irregular and above normal. On the second day the temperature reached 101.8° and the pulse rate 108/min. Fortunately at the end of the period her condition quickly settled down again. (See temperature chart).

On the 6th August she was allowed up for a short time and for each day thereafter for short periods. She was encouraged to try a little exercise at these times but felt very weak and could only walk a short distance all doubled up with the help of a nurse.

On sunny days her bed was put out of doors and in addition artificial sunlight treatment was given in order to raise the general resistance. Vitamin B (Bemax) was also given to raise the general tone of the musculature, especially that of the colon.

By the end of August the condition seemed in some ways improved. She looked brighter and healthier and was eating and sleeping well.

Little change however was to be seen in the joints which were still swollen, stiff and sometimes very painful. The knees especially were swollen and stiff and the muscular wasting of the thighs was still very marked.

A regular motion was by now obtained daily with liquid paraffin but again at her period she was markedly constipated and had a slight irregular temperature and tachycardia.

Several unfavourable points were present. Thus the weight had been gradually falling week by week in spite of a liberal diet. The temperature was still unstable and occasionally showed a rise to 99° or 100° for several days. The B.S.R. was still at a high rate, namely 60 mm./1 hr. The systolic murmur was still present in the mitral area.

As further convalescence was very necessary it was decided to transfer her to Liberton Hospital which was done on 6th September 1940.

SUMMARY OF TREATMENT

1. Rest in bed with analgesics when necessary.
2. Diet - nutritive, high calorie, high vitamin.
3. Tonsillectomy.
4. Physio-therapy - massage: radiant heat: sunlight.
5. Gold therapy - given up owing to excessive reaction.
6. High colonic lavage.
7. Salicylates.
8. Iron for anaemia.

SUMMARY OF PROGRESS

1. Acute exacerbation of pain and pyrexia after tonsillectomy.
2. Complexion and general health improved.
3. Joints themselves, little change except less painful.
4. Exacerbation of symptoms with pyrexia and tachycardia at menstruation.
5. Weight steadily decreased.
6. Temperature and pulse rate still unstable.
7. B.S.R. still high.

ORDER OF AFFECTION OF JOINTS

1. Left shoulder - transitory pain.
2. Small joints both hands.
3. Both shoulders.
4. Left knee.
5. Small joints feet.
6. Right knee.
7. Left wrist.

8. Cervical vertebrae: tempero-mandibular joints: sterno-clavicular joints.

9. Both elbows.

SUMMARY OF THE IMPORTANT ETIOLOGICAL POINTS IN THE CASE

A. POINTS FROM THE HISTORY

1. Influence of trauma - the finger joints were affected following a strenuous washing day and the knees and feet after walking.

2. The psychological aspect is interesting -

   i. Shy, nervous, conscientious type.

   ii. Her father died in March 1938; the disease started in March 1939; an acute exacerbation in March 1940.

3. Diet and social surroundings are quite satisfactory.

4. The patient gives no previous rheumatic history except an occasional sore throat.

5. The fact that certain foods are said to make condition worse suggests a metabolic upset.

6. The family history is interesting in that two definite predispositions are evident viz:

   i. An allergic predisposition - her father and his sister were asthmatics. Her grandfather died of Bright's disease.

   ii. A rheumatic predispositon - Her father's sister is "crippled with rheumatism". Her sister's daughter had rheumatism (? rheumatic fever). Her father had swollen hands and feet which may have been rheumatic in origin.

B. POINTS FROM THE CLINICAL FEATURES

1. Age and sex are both typical of the disease.

2. Constitution - patient is of the thin, nervous, visceroptopic type with a low haemoglobin level and a rheumatic and allergic family history.

3. Focus of infection - the tonsils were a definite focus of infection in this case. The bowel was also suspected of being the seat of auto-intoxication as judged by the delay in the passage of faeces and the improvement in complexion after colonic lavage.

4. The flabby tongue suggests that the rest of the alimentary tract was in a similar state.

5. The unstable pulse rate together with the flushing suggest an unstable vaso-motor system.

6. The pimples on the face suggest constipation or some degree of carbohydrate intolerance.

7. The exaggeration of the symptoms at menstruation with the raised B.M.R. and fine tremor suggest an endocrine upset.

8. Certain features suggest an infective process:

   i. Irregular pyrexia and tachycardia.

   ii. The raised B.S.R.

   iii. The low haemoglobin level.

   iv. The marked sweating and toxic appearance.

C. POINTS FROM THE PATHOLOGICAL FEATURES

1. The small peripheral joints involved first.

2. The joints are symmetrically involved.

3. Marked atrophy of skin, muscles, ligaments and bone.

4. Stiffness after rest suggesting adhesions.

5. Peri-articular swelling.

6. Systolic murmur, tachycardia and fibrous tissue nodules suggest some cardiac involvement.

PROGNOSIS

13 weeks in hospital with thorough treatment has made little improvement in this case. The joints remain almost as on admission, the weight has steadily declined, the temperature is still unstable and the general muscular tone is poor. The prognosis as regards the progress of the disease is therefore not bright. Prolonged treatment will be necessary and there is the possibility that this will be the type of case that will run a subacute course indefinitely, especially since menstruation has such an adverse effect. That the patient is quite bright and optimistic is I think a point of very good prognostic significance.

SUMMARY

A very resistant case of Rheumatoid Arthritis with multiple joint involvement occurring in a young unmarried woman of a nervous, asthenic type showing marked exacerbations at menstruation and showing very little reponse to treatment.

CASE IV

MRS. HELEN DOUGAL. AET 56

BERWICKSHIRE.

ADMITTED: 25th March 1940.

DISCHARGED: 17th May 1940. Ward 24.

DATE OF EXAMINATION: 2nd April 1940.

COMPLAINT: Swelling, pain and stiffness of various joints.

DURATION: One year

HISTORY:

One morning about a year ago the patient awakened to find both her ankle joints swollen, stiff and painful on movement. She thought she must have strained them but continued with her housework and gradually throughout the day the symptoms became less marked.

In a week or two she noticed that her hands were becoming affected in the same way so that she found great difficulty in dressing in the mornings and in the meanwhile her ankles had become so painful and stiff that she could hardly walk. The swelling of the ankles seemed to be worst at night but the stiffness and pain worst in the mornings.

After some months the right knee joint began to swell slowly and on movement it was sharply painful and stiff. The left knee was affected in the same way to a lesser extent.

All the affected joints felt hot and throbbing and the pain and stiffness always became worst after the joints had been kept immobile for some time as when she had been sitting at a meal and when she arose in the mornings. Sometimes the pain in the joints, especially the knees was so severe as to keep her awake at night and at these times the pain would radiate up and down the muscles of the legs.

Gradually as the months passed her condition became worse so that at times her hands were useless and walking was only accomplished with great difficulty by using a stick.

Occasionally there have been twinges of pain in both elbow and both shoulder joints but these joints have never been stiff and swollen.

The patient's appetite has been rather poor during the past year and she thinks she has been losing weight.

Her general health has been on the whole good although at times she has felt very tired and depressed.

The weather appears to have no effect on the condition of the joints.

Occasionally she has noticed that her finger nails were a blue colour even when the weather was not particularly cold. All her life she has complained of cold hands and feet.

During the past year she has had a good deal of sweating at night.

She suffers from nasal catarrh regularly and easily "takes a cold in the head". She has an occasional dry irritative cough.

PREVIOUS HISTORY

The patient has always regarded herself as a strong healthy women with few ailments.

She had scarlet fever as a child but since then has only rarely had a sore throat. There is no history of Rheumatic Fever, Chorea, Nephritis, Skin disease or Asthma.

Her teeth were very decayed for many years but they were all removed 3 years ago. She says the gums were healthy.

For many years she suffered from severe frontal headaches but has not been so troubled of recent years.

FAMILY AND SOCIAL HISTORY

She has no children and has had no pregnancies.

Husband, a ploughman, is alive and well and the home life is one of happiness and content.

The patient's parents are dead but she does not know the cause of death.

There is no history of any rheumatic disease, or of asthma, nephritis or skin disease in the family.

The patient lives in a ploughman's cottage which is old and damp. She regularly works on the farm when needed as for example at potato picking.

MENSTRUAL HISTORY

Menarché: 15 years.

Periods regular: 4/28.

Menopause: 3 years ago.

No history of leucorrhoea, dysmenorrhoea or menorrhagia.

DIETETIC HISTORY

The diet has been simple but not obviously deficient.

Breakfast: Porridge: occasional egg: bread: butter: tea.

Dinner: Soup: stew and potato: bread: tea.

Tea: Bread: butter: jam: cheese: tea.

Supper: Cheese: fish occasionally: bread: butter: tea

EXAMINATION

GENERAL IMPRESSION

The patient is a moderately well built, well clothed woman with a pale complexion. She has an anxious expression on her face, is slightly deaf on the left side and has a considerable amount of hair on the upper lip. She is sitting up in bed with the knees, elbows and fingers half flexed.

She does not like to be disturbed, statements have to be drawn from her with difficulty and she seems to be of the dour Scotch type.

LOCOMOTORY SYSTEM

HANDS The proximal interphalangeal joints and the metacarpo-phalangeal joints of both hands present a fusiform swelling especially marked on the radial sides of the hands. The most obvious swelling is at the base of each index finger. The joints are firm on palpation and painful on deep pressure. All the fingers are slightly flexed at all joints except the distal interphalangeal joints but they can be fully extended and fully flexed.

The hands are both slightly deviated towards the ulnar side.

The skin over the joints is stretched and glossy whilst over the rest of the hand it is loose, wrinkled and moist with scattered freckles here and there on the dorsum.

The muscles of the hand are markedly atrophied, quite definite hollows being seen between the metacarpal bones and absence of fullness over the thenar and hypothenar eminences.

WRISTS Both wrist joints are swollen especially on the dorsal aspect. On movement they are stiff but movement is complete. Some crepitus can be felt during movement and occasionally sharp twinges of pain are produced. The joints are tender on firm palpation.

The skin over them is not reddened nor feels hot.

The skin of the forearms is loose, dry, thin and inelastic and the muscles, especially the extensors are wasted and weak.

ELBOWS There is no visible swelling of the elbow joints but on movement they are slightly stiff and an occasional audible creak is present.

SHOULDERS

Except for some crepitus these joints are normal having a full and easy range of movement.

The surrounding muscles are thin and wasted.

The STERNO-CLAVICULAR, CERVICAL VERTEBRAE and TEMPERO-MANDIBULAR joints appear normal on examination.

KNEES

The patient lies with the right knee continually flexed although the left is occasionally straightened out. The right joint is swollen, very stiff and tender on movement and palpation. The swelling appears to be due mainly to peri-articular swelling: no fluid can be detected in the joint. Because of the pain and muscle spasm there is considerable limitation in movement, both flexion and extension.

The left knee is similarly affected to a lesser extent so that extension is complete.

There is considerable wasting of the thigh muscles.

ANKLES

Both ankle joints are swollen to a fairly marked extent; the swelling being mainly present at the sides below the malleoli. The joints are very painful on movement and on firm palpation.

The muscles of the leg and feet are slightly wasted.

The arches of the feet are fallen, resulting in a degree of flat foot.

The HIP JOINTS, METATARSAL JOINTS and PHALANGEAL JOINTS appear to be unaffected.

No subcutaneous nodules can be felt any where.

CARDIO VASCULAR SYSTEM

1. PULSE

(i) Rate 95/min.

(ii) Regular in time and force.

(iii) Normal wave.

(iv) Vessel wall palpable but not diseased.

(v) Blood pressure is 130 mm. systolic and 80 mm. diastolic.

2. HEART

Inspection: Apex beat just visible in 5th interspace in mid-clavicular line. External jugular veins visible but not pulsating.

Palpation: No thrill.

Percussion: No cardiac enlargement.

Auscultation: Sounds of normal intensity and closed.

There is no oedema, cyanosis or dyspnoea.

RESPIRATORY SYSTEM

Inspection: The chest is rather long and narrow with sloping ribs and a narrow subcostal angle.

Palpation: Both sides move well and equally on respiration. V.F. normal.

Percussion: Resonant note in all areas.

Auscultation: Vesicular breathing.
A few basal crepitations.

ALIMENTARY SYSTEM

The teeth have all been extracted and a set of well fitting dentures is in place.

The tonsils are submerged. The fauces and posterior pharyngeal wall appear healthy.

The tongue is rather flabby but clean and moist.

The abdomen moves well on respiration and there are no points of tenderness. The descending colon is just palpable.

Rectal examination - nothing to note.

URINARY SYSTEM

Out put is normal and nothing abnormal revealed on examination.

HAEMOPOIETIC SYSTEM

Spleen impalpable.

No enlarged lymph glands.

ENDOCRINE SYSTEM

Thyroid gland impalpable.

NERVOUS SYSTEM

The cranial nerves are normal.

The pupils are equal, regular and react well to light and accommodation. There is no nystagmus.

The tendon reflexes are rather more active than usual but equal.

The abdominal reflexes are present.

The plantar response is flexor.

There is no sensory impairment.

The motor power of all the limb muscles is reduced but equal on both sides.

LABORATORY AND SPECIAL INVESTIGATIONS

I. BLOOD

26/3/40. R.B.C. 4,800,000

HB. 75%

W.B.C. 7000

Film: Cells approximately equal in size and well filled.

28/3/40. B.S.R. 70 mm./1 hr.

W.R. - ve.

II. URINE

S.G. 1018

Reaction: acid with mucuous deposit.

No albumin, pus, blood or sugar.

Microscopic examination of centrifuged specimen showed a few pus cells and epithelial cells.

III. WEIGHT

26/3/40. 8 st. 8 lbs. HEIGHT 5' 1"

(Average weight for a woman aged 56 and height 5'1" is 7 st.12lbs).

IV. X RAY

Cranial sinuses showed generalised disease, especially left side.

Hands, wrists, knees, ankles showed early rheumatoid changes, as evidenced by a general osteoporosis in the neighbourhood of the joints and a slight dimunution in the joint spaces. Elbows are clear. A soft tissue nodule is present above the left medial epicondyle.

CHANGES IN LABORATORY FINDINGS DURING TREATMENT

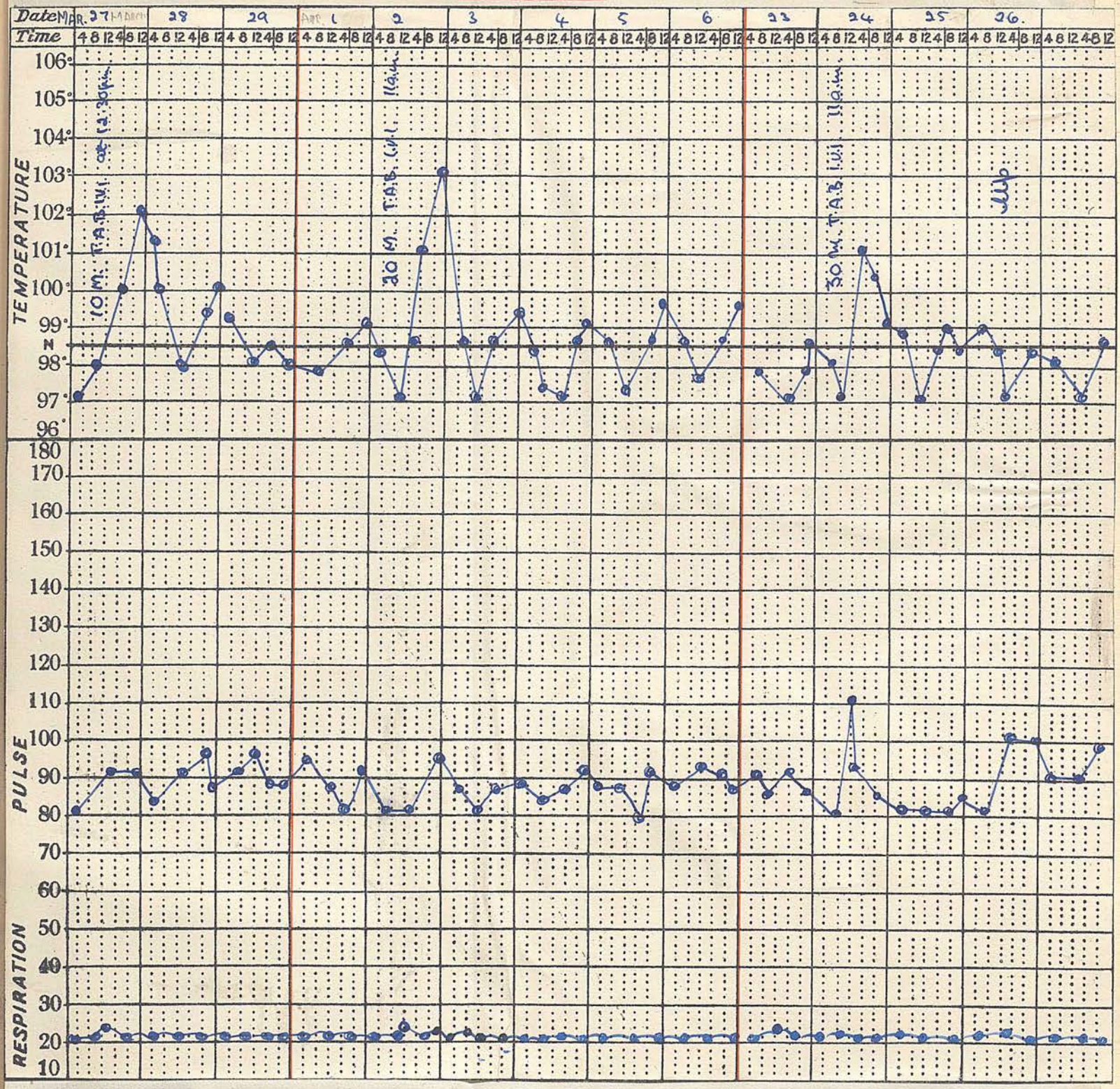
URINE

S.G. varied between 1012-1026 for the 24 hour specimen. At no time was albumin or blood present.

WEIGHT

26/3/40	8 st.	8 lbs.
3/4/40	8	8
10/4/40	8	11
17/4/40	8	11½
23/4/40	8	9
1/5/40	8	8½
8/5/40	8	9
15/5/40	8	3

MRS. DOUGAL



Temperature chart showing the reactions produced by the first two and the sixth injection of T.A.B. Vaccine.

TREATMENT AND PROGRESS NOTES

The patient did not appear acutely ill on admission and had no pain in the joints, although she was unable to walk without assistance. The temperature was 98° and the pulse rate 90/min. - a rate which remained constant except during protein shock therapy.

She was put to bed, given small doses of sedatives at night and put on a diet containing relatively large amounts of protein and vitamin.

The main treatment in this case was protein shock therapy. Six graded doses of T.A.B. vaccine were given intravenously over a period of about a month as follows:

1. March 27th. A dose of 10 million T.A.B. was given at mid-day. In the evening the patient felt shivery and the temperature reached 102° and then over a period of 3 days gradually subsided.

2. April 2nd. A dose of 20 million T.A.B. was given at mid-day and by 9 p.m. the temperature had reach 103° and then over a period of 5 days returned to normal.

3. Further doses of 20 million T.A.B. were given on April 9th, 14th and 21st and the temperature rose to 103°, 101.8° and 101° respectively, taking in each case about 4-5 days to return to normal.

4. The 6th dose of T.A.B. was given on April 24th, when 30 million organisms were injected. The temperature rose to 101.2° and returned to normal in about 3 days.

Examination at the end of this course showed a notable degree of loosening in the joints, probably most obvious in the knee joints which could now be almost fully extended without the production of much pain. The patient stated that she had less pain and stiffness in all the joints - fingers, wrists, elbows, knees and ankles and that she felt fitter and healthier generally.

On 26th April, a month after admission, the patient was allowed up for a short time but she had much difficulty in walking owing to severe pain in the ankles. Each day, however, she was allowed up and as she persevered with her walking the pain in the ankles became less severe.

After her course of T.A.B. the patient was sent across to the Ear, Nose and Throat department because of the X Ray report, which stated that the sinuses were diseased. The X Ray report was not confirmed by examination in the E.N.T. department where proof puncture of the antra was carried out to make sure there was no disease. The antra were washed out with saline and the result was clear.

A septic focus was discovered, however, in the submerged tonsils which were quite markedly septic. Accordingly on 10th May tonsillectomy was performed. The patient returned to the ward the day after the operation showing very little systemic upset. From this time onwards she thought she had less pain and stiffness in the joints.

Physio-therapy played a part in treatment and was started on April 29th, a few days after she was allowed up. It took the form of gentle massage, to the arms, shoulders and legs and radiant heat was given.

Whilst definite improvement had taken place the patient, after the tonsillectomy, appeared to have reached a phase at which her condition remained stationary. Movement in all the affected joints was considerably easier than on admission and the swelling, especially of the knees, had decreased. At the same time the improvement was not complete because some stiffness and pain was still present in all the joints. The finger joints showed the least improvement and the knees the most. The condition varied slightly from day to day; some days stiffness and pain would be fairly severe and at other times only slight. This variation did not seem to depend on the weather. The patient's walking had only slightly improved since admission and it was quite obvious that further hospitalisation would be necessary to continue the improvement which had been started and which must of necessity be a slow process. The patient was therefore sent to Corstorphine Convalescent Home on 17th May 1940.

FURTHER PROGRESS

On admission to the Convalescent Home the patient was unable to walk by herself but on her discharge on July 13th, 1940 she was able to walk quite easily with the aid of a stick. The fingers, wrists, knees and ankles were still stiff and swollen especially after rest, but practically all pain was absent.

SUMMARY OF TREATMENT.

1. Rest in bed with sedatives as necessary.
2. Protein shock therapy - 6 injections of T.A.B. vaccine in a month.
3. Tonsillectomy.
4. Physio-therapy.
5. Nutritive diet.

SUMMARY OF PROGRESS

1. Pain, swelling, stiffness lessened in all joints.
2. Weight not improved.
3. General condition better.

ORDER OF AFFECTION OF JOINTS

1. Ankles.
2. Finger joints and wrists.
3. Knee joints.
4. Elbows and shoulders - temporary pain.

SUMMARY OF THE IMPORTANT ETIOLOGICAL POINTS

A. POINTS FROM THE HISTORY.

1. Onset soon after the menopause - suggesting an endocrine upset.
2. Absence of pregnancies, suggesting some endocrinal deficiency.
3. Influence of damp and trauma - the patient regularly performing hard farm work in damp fields.
4. Diet is quite adequate.
5. Patient's life has always been one of domestic duties.
6. Neither the patient nor her family give any previous rheumatic or allergic history.

B. POINTS FROM THE CLINICAL FEATURES.

1. Sex is quite typical of the disease.
2. Constitution - patient is of average build with a pale complexion and a dour nature.
3. Focus of infection present viz. the tonsils.
4. Teeth have all been removed because of caries.
5. Certain features suggest an infective process viz.
   - (i) Slight pyrexia and tachycardia.
   - (ii) Raised B.S.R.
   - (iii) Sweating at night.
   - (iv) Sallow toxic appearance with anaemia.

C. POINTS FROM THE PATHOLOGICAL CHANGES.

1. Ankles affected first - note associated flat feet.
2. Small peripheral joints mainly involved.
3. Symmetrical involvement.
4. Atrophy of skin, muscles, ligaments and bone.
5. Peri-articular swelling.

6. Fibrous tissue nodules together with the tachycardia suggest some cardiac involvement.

PROGNOSIS

From the commencement this case has been of a mild subacute type and there is every possibility, now that the septic focus has been cleared up, of the disease becoming arrested, leaving some residual joint deformity in the form of swelling. The patient's future mode of living is important. If she goes back to her damp cottage and spends the autumn potato lifting there is every possibility of the disease flaring up again. The prognosis therefore depends to a large extent upon social problems which would probably be difficult to solve.

SUMMARY

A case of subacute rheumatoid arthritis, starting in a woman some years past the menopause with a definite focus of infection and showing a slow but steady response to treatment.

CASE V.

JOHN BOW. AET 33.

5 GEORGE STREET, STIRLING.

ADMITTED: 10th December 1940.

DISCHARGED: 15th February 1941. Ward 22.

OCCUPATION: Gas fitter.

RECOMMENDED BY: Dr. Angus, Stirling.

DATE OF EXAMINATION: 10th December 1940.

COMPLAINT: Pain in the right wrist and fingers of the right hand with weakness of the right arm.

HISTORY:

10 years ago whilst he was a plumber's apprentice engaged in much outdoor work the patient began to experience a gnawing pain in both feet which was mainly localised at the first metacarpo-phalangeal joint of the left foot and the second, third and fourth metacarpo-phalangeal joints of the right foot.

At first this pain was almost constantly present although worse in the mornings and gradually lessening as he moved his toes, but after being on his feet for some time the pain became severe again. His feet sweated a great deal and the affected joints became red, hot, swollen and tender to the touch and on movement whether active or passive. The result was that he had to go to bed for a week or two.

His general health seemed impaired - he felt tired and off colour.

A few weeks later the patient noticed that certain finger joints began to swell and were stiff and slightly red although there was no pain in them. The joints affected were the proximal inter-phalangeal joints of the index and little fingers of the left hand and the proximal inter-phalangeal joint of the right index finger.

The next five years showed little change in the condition of the joints although the fingers did not trouble him nearly so much as the feet. At times the pain and swelling would disappear and then a spell of damp weather or a wetting at his work would make the joints - especially the feet - flare up again with severe pain and swelling, sometimes resulting in his having to go to bed for several weeks.

At one such time his doctor put an Elastoplast dressing over his left foot and leg to ease the pain and then as this seemed to give no relief a walking plaster encasing the whole of the left leg from below the knee was put on. After 3 months the plaster was removed and the patient felt that the left foot was better and stronger.

Five years ago his doctor removed a sebaceous cyst from the back of his neck, thinking that this might influence the course of the disease.

Two years ago, although the patient had no symptoms referable to the appendix an appendicectomy was done in the hope of eliminating some hidden point of focal sepsis.

Occasionally during the past few years he has had twinges of pain in the muscles round his right shoulder joint and also twinges of pain in both knee joints. There has been no stiffness or swelling in these joints. At times he has felt the back of his neck stiff but it has never been painful. No other joints have ever been affected.

A year ago he began to have pain in the right wrist of a burning, gnawing type. The joint became swollen, red and hot and he could move it only with difficulty on account of the pain produced. The finger joints flared up again and those now affected were the proximal interphalangeal joints of the left index and little fingers and the right index, ring and little fingers. His feet were also very painful at this time. All the joints were very stiff in the mornings but gradually loosened out on moving them.

Since then the joints have been what he calls "on and off". Sometimes they are stiff, red, swollen and painful whilst at other times, except for a slight swelling and stiffness, they are almost normal.

He finds that damp weather always makes the joints worse.

Food, he says, has a definite effect. Thus if he eats tomatoes or vinegar his joints are always swollen and feel soft and painful the next day. (This fact was given spontaneously). Eating meat of all kinds has no effect on the joints.

For the past year he has suffered from a good deal of flatulence. His appetite, however, has been very good and he has not lost any weight.

He has been troubled with headaches and transient attacks of dizziness during the past year and now and then has seen "black floating shapes" in front of his eyes.

He has had no breathlessness, oedema, palpitations or cough.

He has had no frequency of micturition or dysuria.

PREVIOUS HISTORY

He is a twin. His twin sister died of pneumonia aged 18 months.

When a child the patient had measles, whooping cough, pneumonia and scarlet fever.

He had his tonsils removed when he was 11. He still has an occasional sore throat.

He has not had rheumatic fever, chorea, nephritis or asthma, but had "growing pains" as a boy.

He has an occasional outburst of "heat spots" (urticaria papulosa) and has an attack of "influenza" every year.

His upper teeth were removed at the age of 18 and the lower, aged 21. The teeth were badly decayed but the gums were healthy.

When aged about 17 he experienced twinges of pain in the feet but this quickly passed off.

FAMILY HISTORY

Patient's father died of pneumonia two months before he was born.

His mother has "rheumatics" in her fingers which are very swollen in the distal phalanges. These are the only parts involved and have been in that state for many years. His doctor says they are tophi due to gout. His mother married again when the patient was 10.

The step-father is alive and well.

There is one son from the second marriage alive and well.

His uncle (mother's brother) is an invalid due to "rheumatism in the hips and knees".

PERSONAL HISTORY

The patient left school aet 14 and started work as an apprentice plumber until the age of 20, when he worked with various firms as a plumber. The work entailed being out in all kinds of weather and often he came home from work cold and wet to the skin. He used to feel the cold badly at his work. His job was an anxious one owing to its uncertainty - he had periods of idleness alternating with busy periods. Accordingly, when 4 years ago he had the opportunity of becoming a gas-fitter which was indoor work with a fixed wage, he had no hesitation in giving up his former work.

His home life is perfectly happy. He gets on exceptionally well with his step-father and step-brother and has no worries.

He is conscientious about his work and is inclined to be sensitive and easily hurt.

He lives with his parents and brother in a comfortable warm dry house.

He is a non-smoker and does not touch alcohol.

He sleeps well at night, averaging 8 hours.

His hobby is pigeon-fancying.

DIETETIC HISTORY

Quite satisfactory.

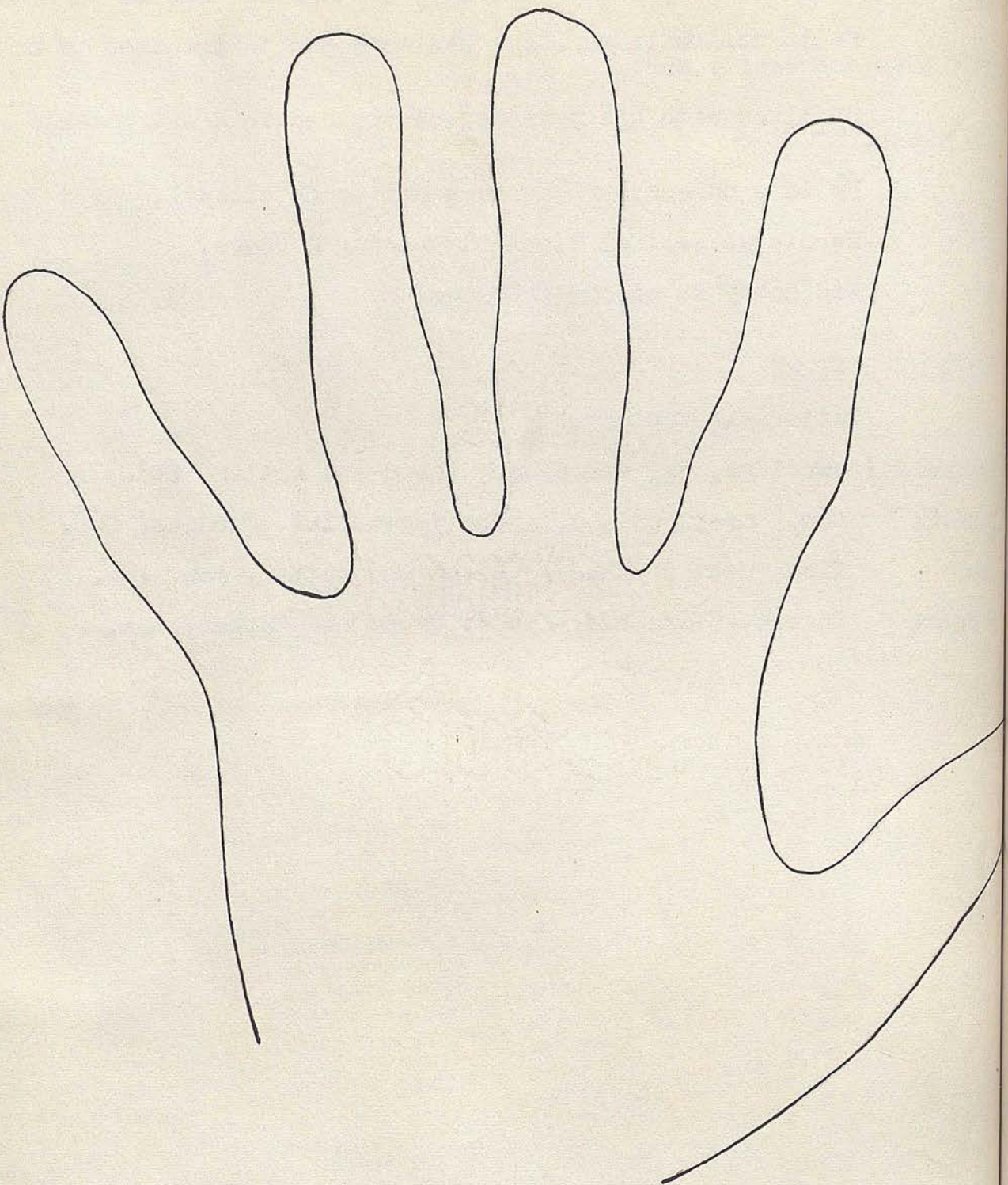
Breakfast: porridge, egg and bacon, bread and butter, tea.

Dinner: soup, meat, potato, green vegetables, pudding, tea.

Tea: fish, meat or cheese, bread and butter, jam, tea.

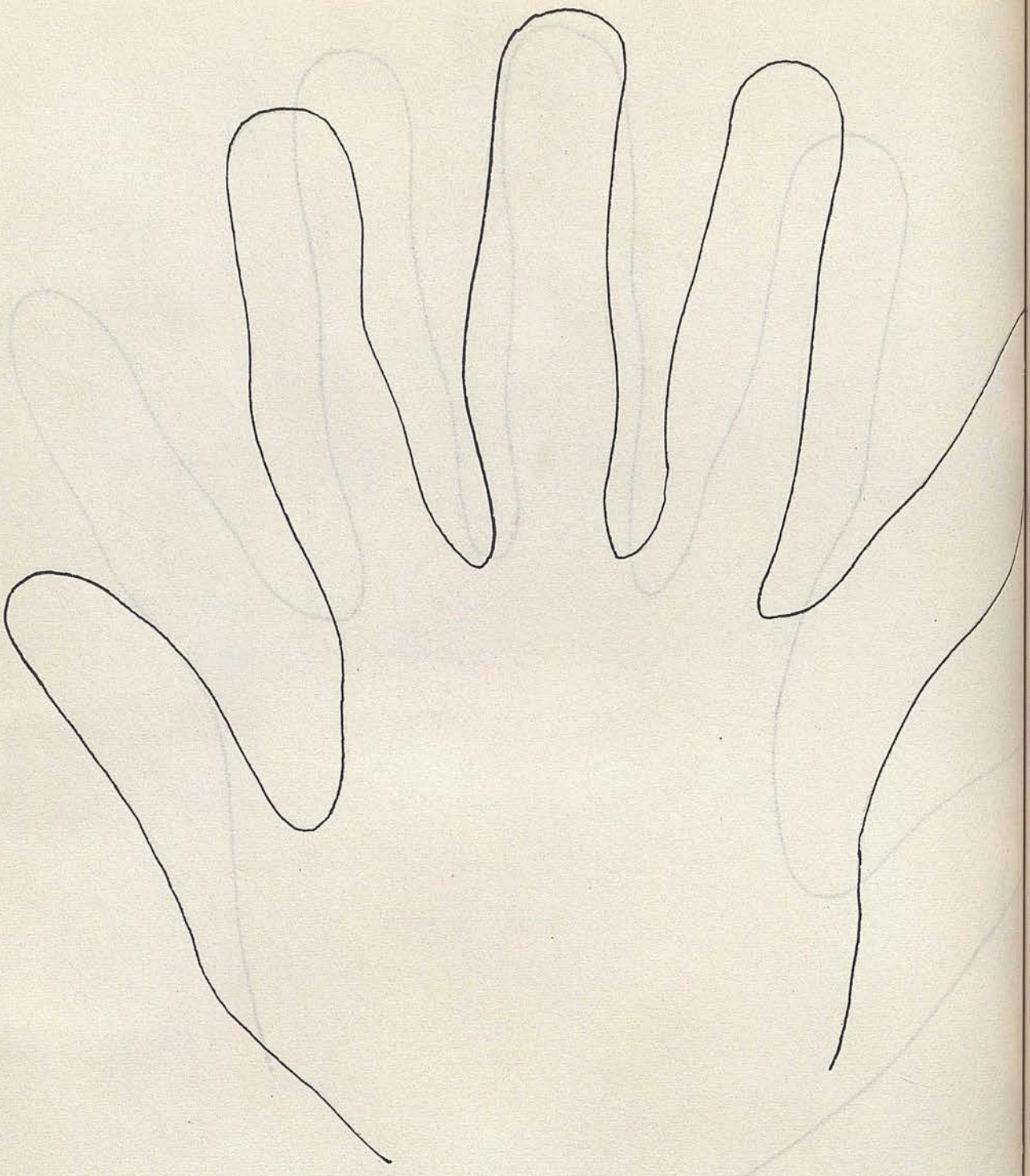
Supper: Cheese, "fish and chips", bread and butter, tea.

OUTLINE OF LEFT HAND OF JOHN BOW



Note the swelling of the proximal interphalangeal joints.

OUTLINE OF RIGHT HAND OF JOHN BOW



Note the swelling of the proximal interphalangeal joints.

EXAMINATION.

GENERAL IMPRESSION.

The patient is a sturdy, well built, well covered man of average intelligence. He is not unduly pale, in fact he has a slightly ruddy complexion and appears cheery and contented. He enters readily into conversation and likes to talk and ask questions about himself.

LOCOMOTORY SYSTEM

HANDS.

Both hands are cold and very clammy. The fingers are inclined to be short and broad and the hands are broad and look strong. There is a slight amount of ulnar deviation. There is no evidence of any muscular wasting and there is no pigmentation of the skin.

Several joints appear abnormal. On the left hand the proximal interphalangeal joints of the middle, ring and little fingers are slightly swollen. The swelling round each joint feels soft and appears to be due to thickened peri-articular tissue. No pain is produced on firm pressure and full flexion and extension is possible. The index finger of the same hand shows a considerably larger swelling than the other fingers around the corresponding joint. The swelling is roughly fusiform in shape but is more pronounced on the ulnar side of the joint. It has a soft spongy feel and is painful on firm pressure and on full flexion.

Certain joints on the right hand show similar changes. There is a slight fusiform swelling of the proximal interphalangeal joints of the index, middle, ring and little fingers. In each case on palpation the swelling feels spongy. On firm pressure and on full flexion there is pain of a sharp stabbing nature in the joints of the fore-finger and middle finger but no pain is produced in the joints of the ring and little fingers.

The distal interphalangeal joints and the metacarpo-phalangeal joints and the thumb joints of both hands appear to be unaffected since no abnormality is detectable on examination.

Both hands can be fully closed although there is a slowness of movement due to the thickened peri-articular tissue and when closed the grip in each case is found to be strong and about equal in both hands.

WRISTS.

The right wrist is swollen. The swelling is especially marked on the ventral aspect of the radial side where an area about an inch square looks red and feels warm. On palpation over this area a spongy sensation is obtained and on firm pressure there is marked tenderness.

Rough grating can be felt when the wrist is moved and movement, especially flexion, is considerably limited owing to the pain produced.

The left wrist is free of pain, swelling and stiffness. No crepitus can be felt on movement.

No obvious muscular wasting can be seen in either arm but the circumference of the right arm is slightly less than that of the left and the strength of each is about equal. Since patient is a right handed man this may indicate a small degree of muscular atrophy in the right arm.

ELBOW JOINTS, SHOULDER JOINTS, TEMPERO-MANDIBULAR JOINTS, CERVICAL VERTEBRAE JOINTS and STERNO-CLAVICULAR JOINTS show no abnormality.

FEET.

Both feet are cold and covered with a profuse clammy sweat with a strong smell.

The longitudinal and anterior arches of both feet are fallen giving rise to marked flat feet.

No swelling or redness can be seen at any of the toe or tarsal joints. On firm pressure over the metatarso-phalangeal joints of the 2nd, 3rd and 4th toes of each foot sharp pain is produced. On palpation over these joints whilst the toes are moved a rough grating is distinctly felt.

All movements of the ANKLE, KNEE and HIP JOINTS are full and painless. An occasional creak is produced in the KNEE JOINTS on rapid movement but otherwise no abnormality is present.

The legs are covered with strong well developed muscles. Varicose veins which have been present as long as the patient can remember are present on both legs.

CARDIO-VASCULAR SYSTEM

Pulse 62/min.
Regular in time and force.
Normal wave.
The Blood Pressure is 140 systolic
and 80 diastolic.

HEART. Apex beat in the 5th space in the mid-clavicular line.
No enlargement on percussion.
On auscultation the sounds are well heard and closed in all areas.

RESPIRATORY SYSTEM

Rate 18/min.
The chest is broad, well-developed and muscular. Both sides move well and equally on respiration.
The percussion note is normal.
The breath sounds are vesicular in all areas. No accompaniments are present.

ALIMENTARY SYSTEM

The tongue is clean, moist and firm.
The teeth are all removed and well-fitting dentures are present.
The tonsils are submerged. The pillars of the fauces and the pharyngeal wall appear healthy.
The abdomen is well covered and muscular moving well on respiration. An old appendix scar is present. There are no points of tenderness and nothing abnormal detectable on palpation.
The descending colon cannot be palpated.

HAEMOPOIETIC SYSTEM

There are no enlarged lymph glands. The spleen is impalpable.

URINARY SYSTEM

The kidneys are impalpable. No tenderness on palpation in the kidney angles or over the bladder.

NERVOUS SYSTEM

Pupils react to light and accommodation equally and well. No nystagmus.
The tendon jerks of arms and legs are equal and active.
The abdominal reflexes are present and equal.
The plantar response is flexor.
No sensory impairment is detectable.

LABORATORY INVESTIGATIONS

I. BLOOD.

11/12/40. HB. 105% (Sahli).
W.B.C. 6000.
B.S.R. 3 mm./1 hr.
W.R. - ve.
G.C.F.T. - ve.

II. URINE.

12/12/40. S.G. 1016.
Colour lemon.
Sediment - mucous.
Albumin, sugar and blood absent.
Microscopic examination - cell debris.

III. X RAY (Hands and Feet)

The only abnormal feature detectable is a small localised area of rarefaction in the proximal phalanx of the right great toe and a similar area in one of the bones of the right wrist. No general decalcification is present and no diminution in joint spaces.

IV. HEIGHT. 5' 8½".

V. WEIGHT. 11 st. 11 lbs. (10/12/40).

(Average weight for a man aged 33 and height 5'8½" is 11 st.8 lbs).

CHANGES IN LABORATORY FINDINGS DURING TREATMENT

I. BLOOD.

10/12/40.	B.S.R.	5 mm./1 hr.	HG. 105%.
24/12/40		3 mm./1 hr.	
8/ 1/41		2 mm./1 hr.	

II. URINE.

10/12/40 - 15/2/41.

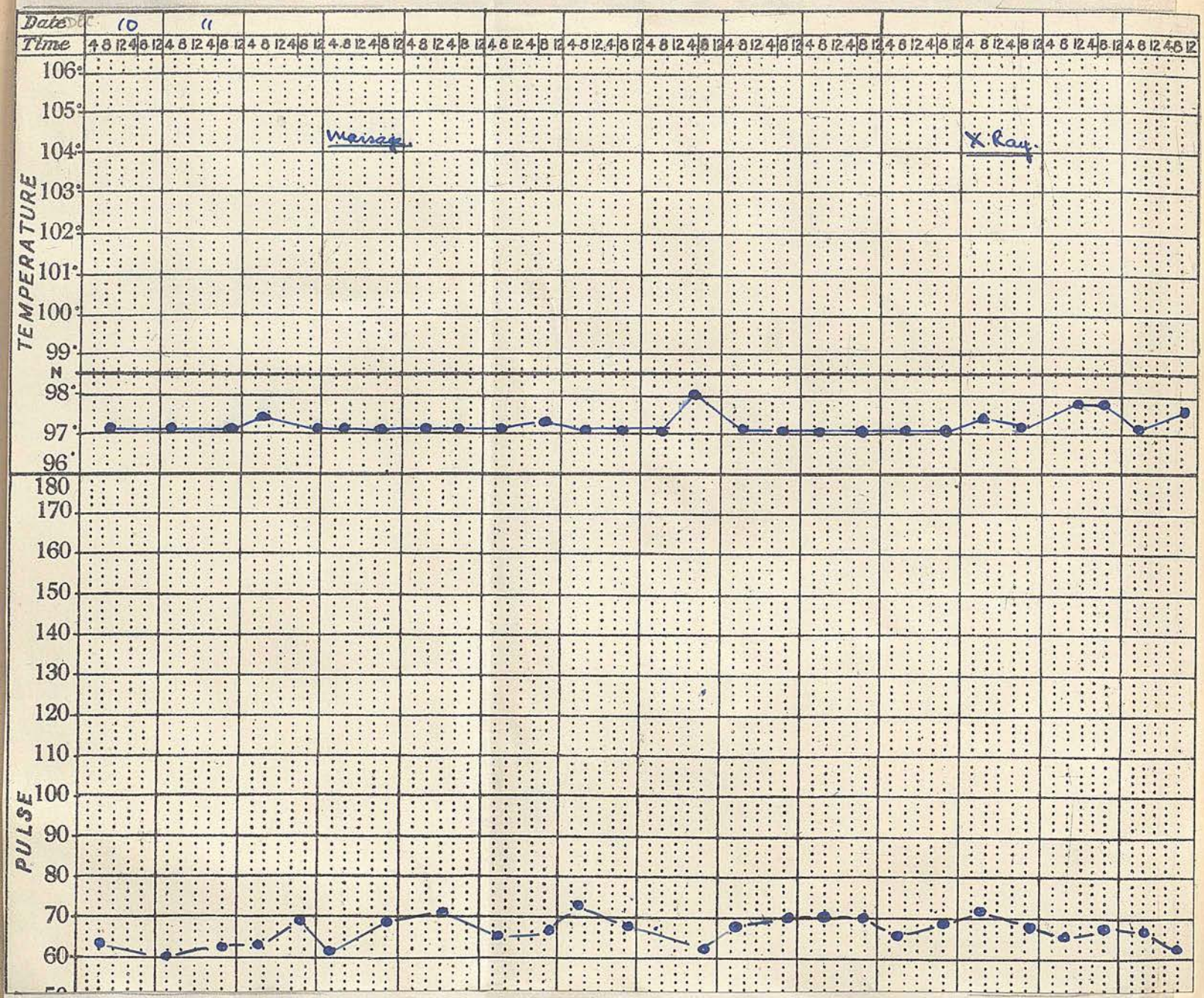
S.G. varied between 1016 and 1030 for 24 hour specimen.
No albumin present.

III. WEIGHT.

HEIGHT 5' 8½".

10/12/40	11 st.	11 lbs.
13/12/40	11	12½
17/12/40	11	11
24/12/40	11	13
27/12/40	12	0
10/ 1/41	12	0
17/ 1/41	12	0
30/ 1/41	12	2

JOHN BOW



Temperature chart showing the steady normal temperature and pulse rate during the first two weeks in hospital.

(Compare with the charts of Mrs. Rennie and Wm. Spiers).

TREATMENT AND PROGRESS NOTES.

The patient appeared perfectly well on admission, having a normal temperature (see chart opposite) and a slow full pulse. There was some redness, swelling and tenderness of the right wrist and certain fingers as described in the examination, but otherwise the patient had no complaints.

The appetite was good, the bowels regular and the patient slept well without the help of sedatives.

Each day he was allowed up and did odd jobs about the ward and after a week or two was allowed to go for a walk in the afternoons.

On the day after admission physio-therapy was begun and was continued each day until the patient's discharge. This consisted of:-

1. Massage.
2. Radiant heat.
3. Feet exercises.
4. Breathing exercises.

The massage was given to the right wrist and forearm for 10 minutes each day.

The feet exercises were directed towards correcting the flat foot which, as stated in the examination, was very marked. These exercises consisted of:-

(i) Raising himself on tip toes several times and walking in that position.

(ii) Walking on the outer sides of the feet.

(iii) Picking a pencil and later on a piece of paper up with the toes.

(iv) Standing still and trying to lift the arches up.

The breathing exercises were directed towards improving the peripheral circulation which, as evidenced by the cold clammy extremities, was of a sluggish type. These exercises consisted of:-

(i) Breathing through the nose using the abdominal muscles.

(ii) "Cycling" with the legs whilst lying on the back.

(iii) Touching the toes with the hands and stretching the arms above the head.

(iv) Knees bending exercises whilst standing on the toes.

JOHN BOW

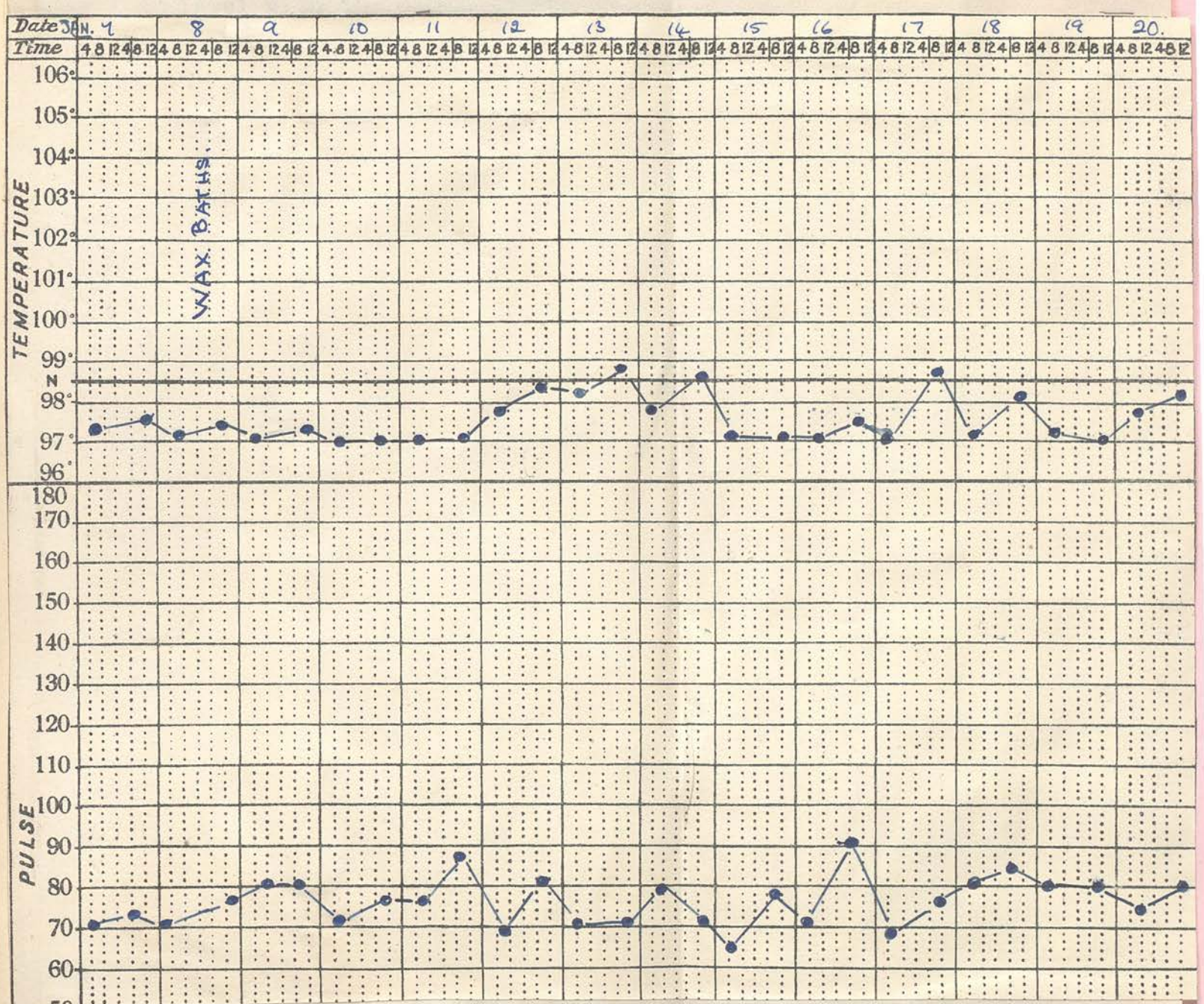


Chart showing how the wax baths caused a slight evening rise in temperature and in increase in the pulse rate.

(v) Swinging the arms alternately to each side on a level with the front of the chest.

The feet and the breathing exercises were done on alternate days.

WAX BATHS

On January 8th treatment of the hands was started by means of wax baths, the aim being to reduce peri-articular swelling. In the first instance the patient immersed the hands five times in the molten wax giving the fingers, hands and wrists five coats of wax which were kept on, wrapped in cotton wool for 15 minutes. A marked erythema of the hands and arms followed and the patient felt hot and sweated profusely. Gradually as the patient became accustomed to the treatment thicker layers of wax were put on for longer intervals. Thus on 14/1/41 he had 7 coats for 30 minutes and on 20/1/41 10 coats for 30 minutes; 4/2/41 12 coats for 60 minutes. Each evening after removing the wax the patient felt very warm and perspired profusely. This treatment appeared to cause a slight upset in the temperature for as the temperature chart opposite illustrates, soon after starting the wax baths the evening temperature began to show occasional small rises up to 99°.

During this time the patient's right wrist was giving him some pain of a gnawing type and the wrist felt easily tired and so during the day an aluminium cock up splint was worn and this seemed to ease the pain.

Occasionally the patient complained of having "giddy turns" whilst walking about the ward but these did not appear to inconvenience him at all and no cause could be found.

It was not until the end of January that the patient really felt the condition of his hands improving, stating that the gnawing pain was now much less marked and the fists could be closed and the fingers moved more easily.

On the 15th February the patient was discharged with instructions to continue the wax baths and the exercises at home.

Examination on discharge did not show a marked change in the joints. The right wrist was still slightly swollen but all the redness had disappeared and movement was only slightly affected. The finger joints too were less swollen as compared with the condition on admission. On palpation over the metatarso-phalangeal joints a considerably degree of rough grating was palpable and the feet were still cold and clammy and flat.

During his stay in hospital the patient's general condition had remained good and he had put on several pounds in weight.

SUMMARY OF TREATMENT.

1. Good diet.
2. Physio-therapy.
   (i) Massage.
   (ii) Radiant heat.
   (iii) Feet exercises.
   (iv) Breathing exercises.
3. Wax baths.
4. Splinting of right wrist.

SUMMARY OF PROGRESS

1. Pain, swelling, stiffness of right wrist and finger joints reduced.
2. Condition of the flat feet not yet altered.
3. Little change as yet in the condition of the peripheral circulation - difficult to assess.
4. Weight increased.

ORDER OF AFFECTION OF JOINTS

1. Metatarso-phalangeal joints both feet.
2. Finger joints.
3. Knee joints - transitory pain.
4. Right wrist.

SUMMARY OF THE IMPORTANT ETIOLOGICAL POINTS IN THE CASE

A. POINTS FROM THE HISTORY

1. Occupation - outdoor work exposed to damp and cold.

2. Influence of weather - damp making the condition worse.

3. General health upset at first onset - suggesting a systemic upset.

4. Adverse effect of certain foods (tomatoes: vinegar) - suggesting a metabolic upset.

5. Atonic alimentary tract and liver - suggested by flatulence, headaches, and "black floating specks".

6. The patient's previous history gives some evidence of an allergic diathesis (urticaria papulosa) and a rheumatic one (growing pains and sore throats).

7. Psychological aspect - patient sensitive and introspective but appears to have no special worries.

8. Family history is interesting in that two predispositions are evidenced (although somewhat vaguely).

   (1) A rheumatic predisposition - uncle has rheumatism in hips and knees.

   (2) A metabolic upset - mother suffers from gout.

B. POINTS FROM THE CLINICAL FEATURES

1. Sex.

2. Constitution - patient is well built and sturdy, unlike the other cases, but like them he is sensitive and has a rheumatic family history.

3. Focus of infection - not found.

4. The teeth were very various before removal.

5. Cold, clammy extremities suggest a sluggish peripheral circulation.

6. An unstable vaso-motor system is suggested by the temperature and pulse rate being easily upset.

7. The normal temperature, pulse rate, B.S.R. and W.B.C. suggest that there is no infective process at work.

C. POINTS FROM THE PATHOLOGICAL CHANGES

1. Toe joints affected first - note associated flat feet.
2. Only small joints involved.
3. No obvious muscular wasting, or bony atrophy.
4. Marked peri-articular swelling.

PROGNOSIS

The fact that the case is a long standing one and has shown only a slight improvement whilst in hospital suggests that in all probability the disease will continue in this low grade form, having periods of remission and exacerbation for many years. The main line of attack must be directed towards the correction of the only two obvious etiological factors which could be found, namely the poor peripheral circulation and the flat feet. This will be a long and tedious process but if it is accomplished marked improvement may result.

SUMMARY

A long standing subacute case of rheumatoid arthritis affecting only a few of the smaller joints in a well built young man of sensitive nature and showing much resistance to treatment.

CASE VI

ALEXANDER McVIE. AET 32

EDINBURGH.

OCCUPATION: Night watchman and cleaner in Insurance Offices.

ADMITTED: 28th September 1940. Ward 22.

DISCHARGED: 20th December 1940.

DATE OF EXAMINATION: 2nd October 1940.

COMPLAINT: The patient complains of pains in his joints of six weeks duration.

HISTORY

About 6 weeks before admission the patient received a severe wetting whilst on an unaccustomed 40 mile cycle run. The next morning he felt stiff in the upper part of his back and thought it was just slight muscular strain. The following day certain finger joints and his elbow joints felt stiff and at times there were slight twinges of pain in them. The finger joints affected were the proximal interphalangeal joints of the digits of both hands and the metacarpo-phalangeal joints of both thumbs. He did not notice any swelling of the joints at this time but thought that gradually during the next few weeks they began to swell slightly, but at no time was the swelling marked. At first he only noticed the swelling by the fact that he could not remove the ring from his finger. The left hand was more affected than the right.

On the third day since receiving the wetting the left knee joint and both ankle joints were affected in a similar way to the finger joints, i.e. they felt stiff and on movement slight twinges of pain were produced in them. There was no swelling or redness present at this time.

He considered that his condition was not serious enough to warrant his staying off work and so for the next 5 weeks he continued working.

All this time the joints remained in approximately the same state although they varied a bit from time to time, depending mainly on the weather. For example, four weeks before admission the patient felt almost normal and thought the rheumatism had left him when three days of rain came and the joints immediately became stiff and slightly painful again.

His work started at 6 p.m. and each night during this period when he started his work he always felt very weak "in his muscles" until he had been working for some time, when his strength seemed to return. At 10 p.m. he had half an hour's break for a meal and on resuming work he always found himself stiff all over especially in the legs and back. After working for an hour or so the stiffness went away. This happened every night since his wetting.

At the beginning of the week before admission his left ankle became suddenly swollen, very painful, red and tender. The next day the pain and swelling had gone and except for slight stiffness the ankle appeared quite normal.

The following day the right ankle became swollen, hot, red and very painful and to a lesser extent the right knee also. He was determined not to go to bed and struggled to work with the aid of a stick.

During the next two days the pain and swelling in these joints subsided a little but his left wrist became swollen, stiff and throbbing. Now he struggled to work with the aid of his stick plus a friend.

At the end of the week he was obliged to stay in bed as his right ankle and knee and left wrist were extremely painful, swollen, red and hot. He was unable to stand and felt ill and miserable. He sweated and shivered a great deal.

Finally his wife sent for the doctor who sent him in to the Infirmary.

He has had no pain, swelling or stiffness in the TEMPERO-MANDIBULAR, STERNO-CLAVICULAR, CERVICAL VERTEBRAE, TOE or HIP JOINTS.

His appetite was always good until two weeks before admission when he lost all inclination to eat.

His bowels have always been regular.

He has never complained of breathlessness, swelling of the ankles or praecordial pain. He complains of hoarseness occasionally especially when he gets excited.

PREVIOUS ILLNESSES

When aet 2 years he had diphtheria and had a tracheotomy done at that time which has remained patent ever since.

When aged 18 he had an attack of rheumatic fever and in a few weeks this was followed by an attack of chorea. At this time the doctor told him to take things easily as his heart was affected.

At the age of 28 he had a second attack of rheumatic fever and was in bed for several weeks.

All his life he has been subject to an occasional sore throat.

Hehas never had scarlet fever, nephritis, erysipelas, skin rashes or growing pains.

FAMILY HISTORY

Mother and step-father are both alive and well. His own father is divorced from his mother. As far as he knows he is alive and well.

He has two brothers alive and well. Both have had scarlet fever.

He has been married 11 years and has one girl aged 10, alive and well.

None of his relations have suffered from rheumatism, kidney disease, skin disease or asthma.

SOCIAL AND PERSONAL

He lives in a comfortable, warm, dry house and lives a happy married life.

He has been 15 months in his present occupation. Because of the black-out his work is stuffy and the atmosphere is warm and humid. His habit has been to work stripped to the waist.

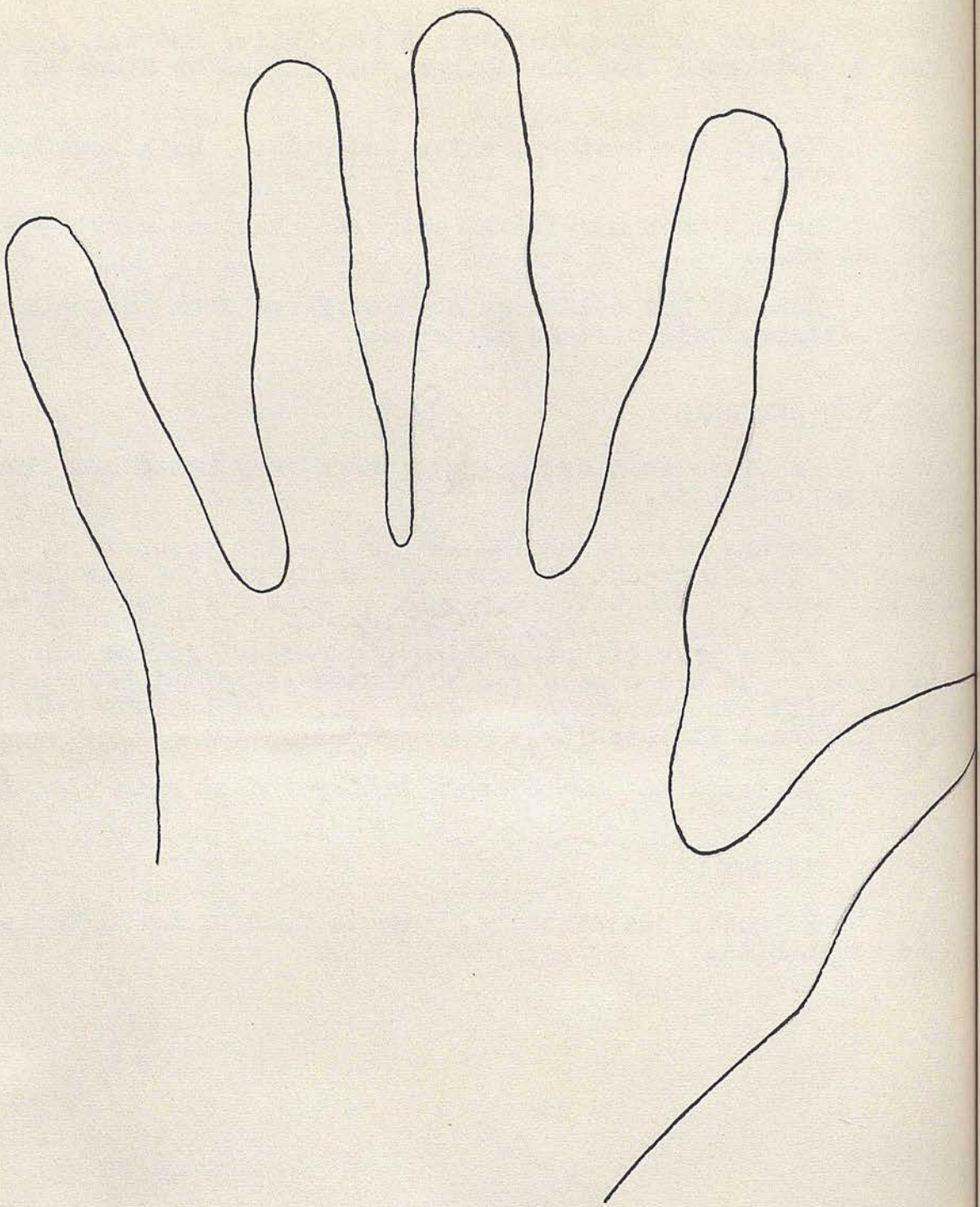
For a year before getting his present job he was unemployed. He had a good job as a shop assistant before that but had a row with his manager and walked out. He has found the past two years difficult financially.

He tends to take offence easily and is rather sensitive.

DIETETIC HISTORY

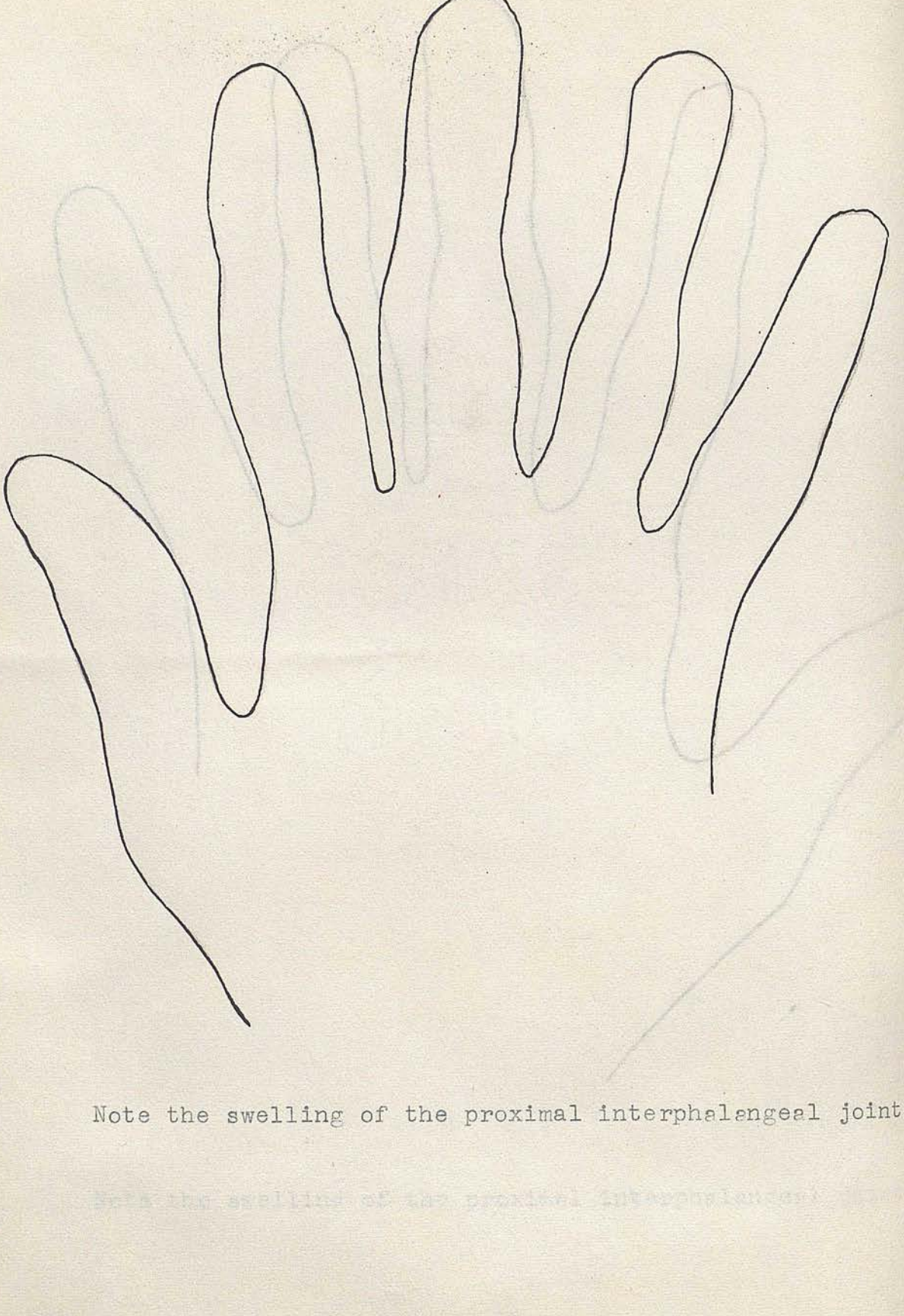
Is quite satisfactory. He is fond of meat, fruit and green vegetables.

OUTLINE OF LEFT HAND OF ALEX. McVIE



Note the swelling of the proximal interphalangeal joints.

OUTLINE OF RIGHT HAND OF ALEX. McVIE



Note the swelling of the proximal interphalangeal joints.

EXAMINATION.

GENERAL IMPRESSION

The patient is a pale looking young man of average build and musculature. Fair hair.

He is quite cheery and optimistic, entering readily and very intelligently into conversation.

LOCOMOTORY SYSTEM

HANDS

The skin of the hands is smooth, warm and moist.

There is a slight swelling of all the proximal interphalangeal joints of both hands. The swelling which is not very obvious is more square shaped than the typical spindle-shape shown by the other cases. This is probably partly due to the almost complete absence of muscular wasting. The swelling is most marked in the middle and ring fingers of each hand. The joints themselves are slightly painful on firm pressure and on fully clenching the fist which the patient can do quite easily, although there is a slight amount of stiffness present. (See diagram opposite).

The distal interphalangeal joints and the metacarpophalangeal joints appear normal.

The thenar and hypothenar eminences and the interosseous spaces are well filled and show no signs of muscular wasting.

No ulnar deviation is present and there is no pigmentation of the skin.

WRISTS

The left wrist is slightly swollen especially on the ventral aspect. It looks red and feels hot. It is painful on palpation and on movement and because of this pain flexion and extension are considerably limited. Fine crepitus can be felt on palpation.

The right wrist appears perfectly normal.

ELBOWS

No swelling or redness can be seen in either joint. There is no limitation of supination, pronation, flexion or extension. The only abnormality is an occasional creak and twinge of pain on extension.

SHOULDERS

Both shoulder joints are slightly stiff but a full range of movement is possible, although abduction produces twinges of pain in the deltoid muscle. There is no swelling, redness or pain in either joint.

The surrounding muscles are well developed and show no evidence of atrophy.

KNEES

The right knee joint is moderately swollen. It looks red and feels hot. On flexion and on firm palpation exquisite pain is produced and because of the pain movement is markedly diminished.

The left knee is slightly swollen and red. It is not painful on palpation but slight twinges of pain and creaks are produced on flexion. The joint is stiff on movement and full flexion is not quite possible due mainly to the pain produced. Crepitus can be felt on movement.

The thigh muscles are well developed and show no atrophy.

ANKLES

The right ankle is slightly swollen and the swelling is especially noticeable in front. The surrounding skin is slightly reddened and moist. The joint is tender on palpation and on movement and because of the pain there is considerable limitation of movement in all directions, inversion, eversion, dorsi-flexion and plantar flexion.

The left ankle joint appears perfectly normal.

The leg muscles are strong and well developed. There is no atrophy.

FEET

The arches of the feet are slightly fallen.

The tarsal, metatarso-phalangeal and interphalangeal joints appear normal.

CARDIO-VASCULAR SYSTEM

PULSE. Rate is 88/min.
Regular in time and force.
The wave has a fairly sharp upstroke, is poorly sustained and has a rapid downstroke.
The vessel wall is impalpable.

The Blood Pressure is 136/62.

HEART.

INSPECTION: A diffuse and rather forcible apex beat is visible in the 6th left interspace $3\frac{1}{2}$ inches from the mid-line.

The carotid vessels at the base of the neck can be seen pulsating.

No other pulsation is visible over the praecordium.

PALPATION: Confirms the position of the apex beat. No thrills can be detected over the praecordium.

PERCUSSION: No right sided enlargement is detectable on percussion.

AUSCULTATION: In the mitral area a soft blowing systolic murmur propagated into the axilla is heard. The second sound is closed.

In the aortic area a blowing diastolic murmur is heard propagated down towards the left side of the sternum. This murmur is best heard at the junction of the 4th left rib with the sternum.

In the other areas the sounds are closed.

RESPIRATORY SYSTEM

Rate 21/min.

The chest is well developed and both sides move well and equally on respiration

The percussion note is normal.

The breathing is of a very faint vesicular type.

An unclosed vertical tracheotomy wound is present through which the patient breathes and this accounts for his hoarse voice and the very faint breath sounds.

ALIMENTARY SYSTEM

The tongue is slightly furred.

The teeth are good except for two decayed lower molars and a decayed upper left molar.

The tonsils are moderately enlarged but are not inflamed. There is slight injection of the anterior pillars of the fauces.

The abdomen is well covered and muscular, moving freely on respiration. There are no points of tenderness and nothing abnormal detectable on palpation. The liver is not enlarged. The pelvic colon is impalpable.

URINARY SYSTEM

The kidneys are impalpable.

NERVOUS SYSTEM

The pupils react to light and accommodation. There is no nystagmus.

The tendon reflexes are present, equal and active.

The abdominal reflexes are present and equal. The plantar response is flexor.

There is no sensory impairment.

HAEMOPOIETIC SYSTEM

The spleen is impalpable. There are no enlarged lymph glands.

LABORATORY INVESTIGATIONS

I. BLOOD.

29/9/40. HB. 89%.
W.B.C. 12200.
B.S.R. 47 mm./1 hr.
Blood Pressure 136/62.

II. URINE.

29/9/40. Output 2000 cc. in 24 hours.
S.G. 1020.
Reaction - acid.
Mucous sediment.
No albumin, sugar or blood.
Microscopic examination - a few epithelial cells and urates.

III. THROAT SWAB.

30/ 9/40. Strong growth haemolytic streptococci.

IV. WEIGHT.

28/9/40. 9 st.

CHANGES IN LABORATORY FINDINGS DURING TREATMENT

I. BLOOD.

Date	B.S.R.	W.B.C.	HB.	B.P.
28. 9.40	47			136/62
29. 9.40	47	12200	89%	
2.10.40	55			
6.10.40	16			138/64
9.10.40	15			
14.10.40	15			134/58
19.10.40	7		86%	
24.10.40	16			140/60
29.10.40	20	8000	86%	
5.11.40	5		84%	140/66
7.11.40	8			
9.11.40	20			
12.11.40	11		82%	146/68
18.11.40	10		85%	
22.11.40	7			15I/64
4.12.40	3			140/70
12.12.40	3	6200	92%	132/68
18.12.40	3			

II. URINE.

Daily total averaged between 1500-2500 ccs.

S.G. averaged between 1006-1030.

At no time was there any albumin, sugar or blood.

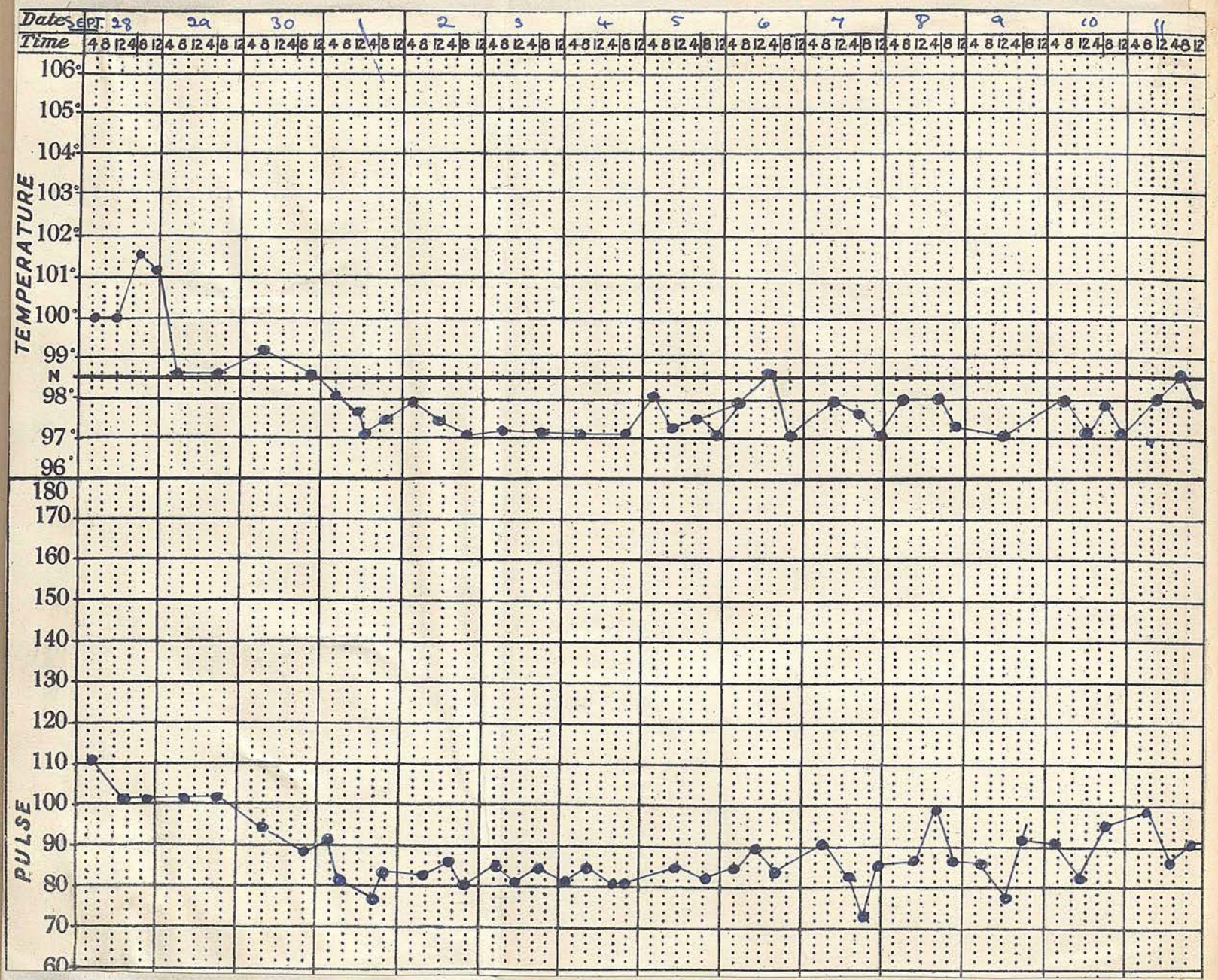
III. THROAT SWAB.

30/9/40.	Strong growth haemolytic streptococcus.
31/10/40.	Growth of haemolytic streptococcus.
13/11/40.	No growth obtained.

IV. WEIGHT.

28/ 9/40.	9 st.
22/11/40	9 st. 1½ lbs.
6/12/40	9 3
13/12/40	9 5

ALEX. McVIE



Temperature chart during the first two weeks in hospital.

Note

(i) The rapid fall with salicylate therapy.

(ii) The continued slight irregular pyrexia.

(iii) The tachycardia.

TREATMENT AND PROGRESS NOTES.

On admission the patient was acutely ill, looking flushed and toxic with a temperature of 101° and a pulse rate of 110/minute. The left wrist was swollen, red and fixed in flexion and he was complaining of throbbing pain in the right knee and ankle joints which were both swollen, red and hot.

The usual treatment for acute rheumatism was at once instituted i.e. he was given

sodium salicylate
sodium bicarbonate aa gr.30 two hourly

and at night to ensure sleep he was given nepenthe and chloral hydrate.

For the next two days the patient still complained of pain in the right wrist, knee and ankle joints but it was gradually lessening in intensity, the swelling was disappearing and the wrist became movable. Meanwhile the temperature had fallen to 98.4° and the pulse rate to 90/minute.

On the 3rd day since admission the pain disappeared entirely, the only complaint being stiffness in the joints mentioned above and also in the shoulder joints. Therefore two days later the dose of sodium salicylate was reduced to 30 gr. four times a day for five days. Then as pain was still absent the dose was given t.i.d.

During all this salicylate therapy the patient never complained of headache, tinnitus, deafness or undue sweating, his only complaint being stiffness in the joints already mentioned. This was always marked in the mornings and gradually disappeared during the day.

Coincident with the fall in temperature and pulse rate and the disappearance of the joint pains the B.S.R. after an initial rise began to fall steadily and as can be seen from the graph continued to do so until discharge, although the steady fall was punctuated by occasional sudden small rises.

After 3½ weeks the salicylate therapy was stopped (October 20th). During the next three days the only complaint was stiffness in various joints particularly the shoulders, elbows and small joints of the hands and fingers. This was the first time the patient had complained of his finger joints since admission. On examination it was seen that the proximal interphalangeal joints of all the fingers of both hands were swollen slightly more than when they were first seen.

On the 4th day since the cessation of salicylate therapy the patient complained of throbbing pain in the metacarpo-phalangeal joints of both thumbs and the stiffness in the finger joints was increased. The thumb joints were red, swollen and

ALEX. McVIE

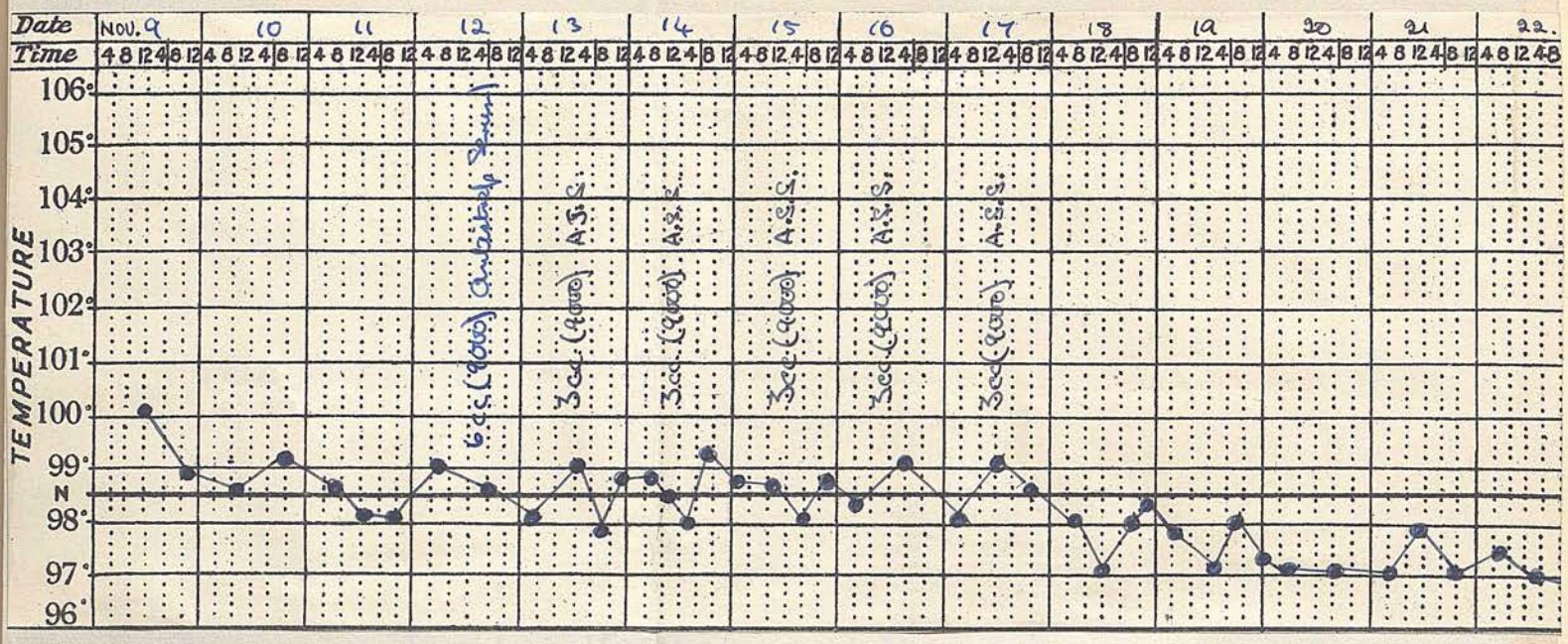


Chart illustrating the dramatic effect of anti-streptococcal serum in bringing the slight irregular pyrexia to a normal level.

The temperature continued normal until discharge.

was started on 12th November and the temperature chart opposite shows the dramatic effect on the temperature. Stock concentrated anti-scarlatinal serum was used and a dose of 6 ccs. (9000 units) was given on the first day. No ill effects resulted and so on each of the five succeeding days a further 9000 units was administered. The result was a quite dramatic fall in temperature which never again dared raise its head above the level of normality. Coincidentally the B.S.R. as the graph clearly indicates came steadily down. Whether the effect was due to a direct action of the serum on the streptococcus or due to a non-specific type of action is doubtful. Since at this time the throat swab was negative the latter is the more probably explanation.

By the end of November the B.S.R. was almost normal and so on December 2nd the patient was allowed up for ¼ hour and for a lengthening period of time each day. Salicylates were still being given gr. 30 t.i.d.

On the 12th December the rheumatic process gave a final little flare up in the form of swelling, pain and redness in the proximal interphalangeal joint of the left little finger. The B.S.R. and temperature did not rise and the patient felt quite well. The next day the only complaint was swelling and slight stiffness in the joint.

Sodium salicylate was finally stopped on the 13th December.

From now until his discharge on the 20th December the patient still complained of stiffness in the finger joints but as the B.S.R. and temperature remained consistently normal he was allowed home.

EXAMINATION ON DISCHARGE

The right hand shows a moderate swelling of the proximal interphalangeal joints of the middle and ring fingers and to a lesser extent of the fore and little fingers.

The left hand shows a moderate swelling of the proximal interphalangeal joints of the fore, middle and ring fingers.

All these joints are rather stiff on movement although painless. If they had been seen for the first time they would immediately suggest a case of early rheumatoid arthritis.

There is no muscular wasting present

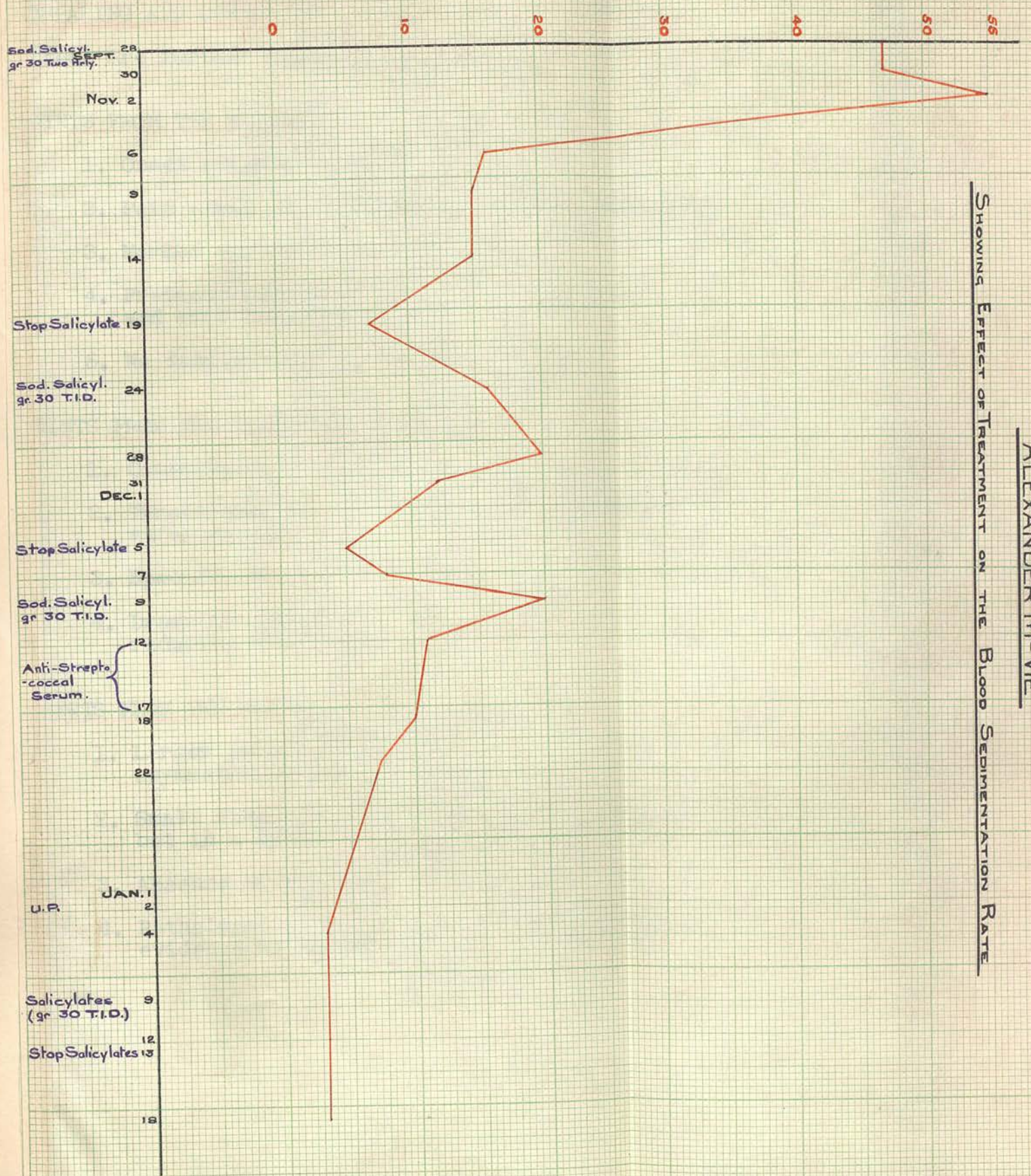
SUMMARY OF TREATMENT

1. Rest in bed.
2. Full diet.
3. Sodium salicylate.
4. Prontosil.
5. Anti-streptococcal serum.

SUMMARY OF PROGRESS

1. All larger joints free of pain and stiffness.
2. Swelling and stiffness unaffected in finger joints.
3. B.S.R. and temperature returned to normal.
4. Haemoglobin level raised.
5. Weight improved.

Blood Sedimentation Rate



Showing Effect of Treatment on the Blood Sedimentation Rate.

Alexander McVie

SUMMARY OF THE IMPORTANT POINTS IN THE CASE IN COMPARING AND CONTRASTING WITH RHEUMATOID ARTHRITIS

(These are further discussed on page 148).

A. POINTS FROM THE HISTORY.

1. Onset after a "wetting".
2. Pain - was of a sudden, severe, flitting type.
3. Marked systemic upset present.
4. Previous history of rheumatic fever, chorea and sore throats.
5. No family history of rheumatism.

B. POINTS FROM THE CLINICAL FEATURES.

1. Constitution - patient is fair, pale, anxious.
2. Throat swab showed the presence of haemolytic streptococci.
3. Specific action of sodium salicylate in removing pain.
4. Dramatic action of anti-streptococcal serum in reducing temperature.

C. POINTS FROM THE PATHOLOGICAL CHANGES.

1. Larger joints involved mainly, and in an asymmetrical and temporary manner.
2. Small finger joints involved to a lesser extent but in a symmetrical and more permanent manner.
3. Absence of atrophy of skin and muscles.
4. Pathological changes in the heart present - evidence of myocarditis and endocarditis.

PROGNOSIS

The general prognosis in this case is influenced by the aortic incompetence. At the moment cardiac compensation is good but in time left sided failure is bound to occur.

As regards the joints, the small finger joints have shown very little reponse to treatment although the disease as judged by the B.S.R. is quiescent. It is in a case such as this that the possible relationship with rheumatoid arthritis is brought forcibly to the front. If the finger joint swellings are in the nature of a rheumatoid change they will probably remain swollen whilst if they are just evidence of a low grade rheumatic fever process the swelling will probably disappear.

SUMMARY

A subacute case of rheumatic fever occurring in a young man giving a history of previous attacks and showing well marked cardiac involvement. There is some evidence of changes of a rheumatoid arthritic type occurring in the small joints of the fingers. The general activity of the disease together with all signs of large joint affection has cleared up under treatment, but the finger joints have remained resistant to treatment.

GENERAL DISCUSSION

A. PATHOLOGY

I. CLASSIFICATION OF RHEUMATOID ARTHRITIS

Before considering the actual changes which take place in the body tissues it is as well to have some idea as to where in the general classification of the Rheumatic diseases this particular entity has been placed and as to how the disease itself has been divided up into different groups.

The literature on the subject abounds with many different classifications and the position allotted to Rheumatoid Arthritis depends mainly upon the writer's idea as to the etiology and especially upon the relationship which he considers the disease has to Rheumatic Fever and Osteo-arthritis.

Probably the simplest classification and certainly the most non-committal as regards etiology is that suggested by the British Medical Association Committee in the B.M.J. of June 17th 1933. In this classification the juvenile and specific types of Arthritis and the metabolic, haemopoietic and nervous groups were excluded so that five distinct entities were left:

1. Rheumatoid arthritis.
2. Villous arthritis.
3. Osteo-arthritis.
4. Spondylitis.
5. Fibrositis.

Unfortunately there are many cases like McVie and also I think, Mrs. Rennie, which cannot be placed into one rigid compartment as they show features of two types of arthritis e.g. McVie began as a case of acute articular rheumatism (rheumatic fever) but showed changes of a rheumatoid type whilst the condition of Mrs. Rennie's knees was suggestive of a chronic villous (menopausal) arthritis in addition to the rheumatoid arthritis. Similarly, cases are often found exhibiting both rheumatoid and osteo-arthritis features.

TYPES OF RHEUMATOID ARTHRITIS

Francis Bach divides the disease into 3 groups:

1. Caused by specific infective agents e.g. gonococcal arthritis.
2. Non-specific causation and unknown etiology with known associated factors i.e. with a focus of infection.
3. Non-specific causation and unknown etiology with no known associated factors.

necrotic so that the surface is covered with a thin layer of necrotic material containing leucocytes. The synovial membrane is infiltrated by various types of mononuclear cells - mainly small lymphocytes and plasma cells, arranged round small blood vessels. This results in perivascular fibrosis and endarteritis obliterans. Certain workers (Allison and Ghormley) lay much stress on these focal collections of lymphocytes in pathological diagnosis.

Not all cases show these synovial proliferative changes to the same degree; some are of a more adhesive type. In this latter type the great danger is for the opposing surfaces of synovial membrane to adhere with subsequent organisation and division of the joint space into irregular cavities. Of the cases discussed I think Agnes Harley is the best example of this adhesive type whilst John Bow with his spongy crepitating joints is more suggestive of the synovial villous proliferating type.

2. At about the same time as these early synovial changes are taking place the joint capsule is affected in a similar way accounting for the fusiform enlargement which the patients all noticed early in the disease. The capsule is thickened and proliferated by a connective tissue reaction and infiltrated with blood vessels and small round cells. Later this is replaced by dense fibrous tissue. John Bow illustrates this first proliferative phase remarkably well. The swelling round his joints has a spongy feel, suggestive of vascular connective tissue thickening, whilst in Spier's case the peri-articular tissues feel hard and fibrotic, more suggestive of the later stage.

3. Shortly after these early changes the most characteristic reaction of the disease occurs. From the junction of the synovial membrane with the articular cartilage a vascular granulation tissue known as a pannus grows inwards towards the centre of the joint. It covers the cartilage, destroys it and leaves fibrous tissue in its place.

4. At the same time the connective tissue elements in the cancellous spaces just below the cartilage begin to proliferate forming vascular granulation tissue with many osteoblasts which destroy the articular cartilage from below.

This layer approaches the pannus until fusion occurs with destruction of the cartilage. The joint cavity may now become obliterated by union of the fibrous tissue with that on the opposite articular cartilage. Later the union may become cartilaginous and bony due to the development of osteoid tissue in the marginal areas.

None of the cases I have discussed has as yet reached this stage but the ones most likely to do so are Agnes Harley and Mrs. Rennie.

5. If proliferation is the key-word to the early changes then atrophy is the key-word to the later stages. All the surrounding tissues are affected:

(i) Skin is smooth, glossy, pigmented - especially seen in Mrs. Rennie's and Agnes Harley's cases.

(ii) The muscles are wasted and hypotonic - present in all the cases except Bow and McVie.

(iii) The ligaments atrophy becoming lax so that subluxations may occur.

(iv) The bones especially near the joints are rarefied, due to the absorption of calcium. Some say that this change is entirely due to disuse, conditioned by muscle spasm around the joints. X Rays showed this condition very markedly in William Spiers and Agnes Harley, but John Bow shows only two small localised areas of rarefaction.

6. The synovial fluid varies in amount from case to case but it is usually slightly increased and occasionally as in Mrs. Rennie's case, markedly so.

Knaggs and others have divided the disease up into different pathological types e.g.

1) A dry type, probably illustrated best by Spiers.

2) A capsular type, probably illustrated best by Bow.

3) An adhesive type, probably illustrated best by Agnes Harley.

4) A villous type, probably illustrated best by Mrs. Rennie.

These are really just different phases in the same pathological process.

III. EXTRA-ARTICULAR PATHOLOGY

Whilst the main changes in rheumatoid arthritis are found in the joints it is important to remember, especially from the etiological point of view that there are widespread changes throughout the body. Some of these will be mentioned here, others in the Clinical Features.

1. SKIN.

Atrophic changes are almost uniformly found, as illustrated by the pigmented skin of Mrs. Rennie and Agnes Harley. The skin is often moist, the sweat having a strong smell as in Bow's case.

Psoriasis is occasionally associated with rheumatoid arthritis especially in the more severe cases.

2. MUSCLES

Marked atrophy is a constant feature , shown well by all the cases except Bow and McVie. This may appear before the actual joint changes e.g. Mrs. Rennie's wedding ring began to fall off her

her finger some time before the proximal interphalangeal joint became swollen and so prevented it falling off.

3. FIBROSITIS AND NEURITIS are very common and often usher in the joint changes as in the case of Spiers and Mrs. Rennie. In advanced cases there is a definite histological picture of dilatation of the smaller blood vessels in the muscle bundles, followed by leucocytic infiltration and connective tissue proliferation between the muscle bundles. This connective tissue later contracts, causing pressure atrophy of the muscle fibres.

4. SUBCUTANEOUS NODULES

These are very like those found in rheumatic fever, consisting of a central area of necrosis surrounded by mononuclear cells and when present are said to indicate a poor prognosis. Two of the cases, Agnes Harley and Mrs. Dougal, showed these nodules and in both cases there was some evidence of cardiac involvement; a systolic murmur in Agnes Harley's case and a persistent tachycardia in Mrs. Dougal's case. (It is said that in acute rheumatism nodules only appear when there is cardiac involvement.

5. SPLENOMEGALY AND ENLARGED LYMPH GLANDS

These are occasionally found, especially in Still's disease, but none of the cases show these features.

6. VASO-MOTOR UPSET

Is very common and is discussed under Etiology. It may be a factor by causing a defective blood supply to the muscles, in producing atrophy.

7. LESIONS OF THE NERVOUS SYSTEM have been described - see under Etiology.

8. Changes in the ENDOCRINE GLANDS - see under Etiology.

9. Changes in the GASTRO INTESTINAL TRACT - see under Etiology.

B. ETIOLOGY

A great number of theories have been propounded regarding the etiology of rheumatoid arthritis, but as yet none of them has proved entirely satisfactory although most of them seem to play a part in the causation of the disease. Further, this part seems to vary in some degree in different cases, a point which I think shows that there must be some basic etiological factor common to all the cases which as yet has not been definitely defined, whilst the many other varying factors are merely predisposing.

The various theories are discussed under two headings - A. Possible Predisposing Causes and B. Possible Actual Causes.

(A) POSSIBLE PREDISPOSING CAUSES

1. HEREDITARY: CONSTITUTION

There seems to be no doubt that heredity plays a definite predisposing part in the production of rheumatoid arthritis i.e. it appears likely that there are in certain families constitutional peculiarities which favour the onset of the disease. It is difficult to define these "constitutional peculiarities" which may not evidence themselves as rheumatoid arthritis in every generation. I have tried to show in the case summaries that this constitutional weakness may be found in two forms:

1) A rheumatic form which may be of the acute articular, chronic articular or non-articular type and in one case (Bow) it appears to be in the nature of gout.

2) An allergic form as evidenced by family histories of asthma and skin lesions. This is less constant than the definite rheumatic history, but two out of my six cases (Mrs. Rennie, Agnes Harley) show this feature.

In many cases this constitutional weakness may only assume importance when other predisposing causes are brought into play such as fatigue, damp and sepsis.

Sufferers from the disease are often of a delicate, asthenic, highly-strung type with a low energy reserve. This is well illustrated in Spiers, Mrs. Rennie, Agnes Harley and to a lesser extent in Mrs. Dougall. John Bow on the other hand is a sturdy and well built man although sensitive in nature. These are merely the broad constitutional points, whilst the final constitutional points such as sympathetic tone, bowel tone, emotional tone, although really coming under this heading are dicussed elsewhere.

2. AGE

The commonest age period for rheumatoid arthritis is between 20 and 40 years. The reason for this is probably that that is the age period when people are exposed to the majority of the etiological factors such as mental worry, occupational effects, endocrinal strain (marriage, pregnancy, menopause) and infection. It appears that the primary type is especially common in this period. All my cases began their illnesses in this period (approximately)

(approximately), except Mrs. Dougal who was relatively old. In her case focal sepsis seemed to play a definite causative part.

3. SEX

Females predominate in all the rheumatic diseases except osteo-arthritis, rheumatoid arthritis being no exception. As already stated in the primary type the ratio is 8:1 and in the secondary type about equal. This sex incidence seems to suggest that there is some abnormal factor present which is more commonly found in women than in men. Might not endocrine dysfunction be that factor?

Of my five cases two are males which is a high proportion particularly as they are of the primary type as far as the demonstration of a septic focus is concerned.

4. THE PSYCHOLOGICAL FACTOR

Emotional upset appears to be of the greatest importance as a predisposing cause and yet how it produces its effects except by lowering general resistance is difficult to explain. The close connection between the emotions and the hypothalamus and through it with the endocrines and autonomic nervous system suggests that the emotional disturbance may be the cause of the vaso-motor and endocrine upset which is so commonly present and which may in turn lead to the joint changes (cf. peptic ulcer).

The patients are often of a definite emotional type. The type that never fully relaxes but is always rushing about "shouldering other people's responsibilities": the type that is sensitive and introspective: the type that craves for sympathy and attention. In a word, intense.

Often the onset of the disease is preceded by a period of severe emotional strain. It has struck me in studying these cases that the patients strive very hard to hide their feelings but behind the smile is a restless state of anxiety and disappointment.

Mrs. Rennie is very typical of this anxious, introspective type, longing for sympathy and peace of mind which her childhood and drunken husband denied her. Agnes Harley's disease has its onset and its acute exacerbation on the first and second anniversary of her father's death respectively. William Spiers' relationship with his step-mother provoked great emotional upset which he bravely tried to suppress, to be followed after his marriage by the mental strain of a new job for which he felt inadequate. John Bow says he is sensitive and easily hurt and McVie is of the same type. Only Mrs. Dougal with her dour Scotch temperament appears to be unaffected by her emotions.

5. OCCUPATION

It is probable that occupation by increasing fatigue, emotional upset, and dampness may be a precipitating factor e.g. the occupation of Spiers, Bow and Mrs. Dougal exposed them to dampness.

In a series of female cases the occupations were found to be:

918 Domestic occupation.
86 Domestic servants.
83 Shop assistants.
73 Cooks.
27 Childrens nurses.
12 Factory workers.

This shows a very marked preponderance of domestic work and in a similar series it was noticed that other forms of rheumatism such as fibrositis showed a similar preponderance. Of my 3 female cases two are of domestic occupation and one is an office worker. Probably the main effect of occupation is an emotional upset produced by tedious routine of housework, fatigue, lack of outdoor exercise and absence of relaxation. Contentment of occupation is also of importance. To illustrate these points I quote from Prof. Lelean's notes on Public Health headed "The Woman's Sphere". "The live-long day of unbroken drudgery and stress extends from early rising to make breakfasts until the final spell of darning by bad light and worse fire. Each interval after the rush of getting children ready for school is fully occupied in clearing away the last meal and preparing the next. The only recreation meanwhile available is an interchange of personalities with the neighbours. Towards evening the husband having had a change of scene and personnel at his work arrives home in search of his supper with the day's work all done. That done he joins his friends in the club or pub - leaving the wife to finish off the day's work after putting the children to bed. Saturdays bring extra stress as the weekly house cleaning has to be done with the children about all day owing to schools being closed".

6. CLIMATE

There is little doubt that cold and damp play a part in precipitating the disease in susceptible individuals. For example take the case of Spiers whose illness started whilst he was exposed to extreme cold and damp; or Bow whose work entailed long hours in the damp and cold; or Mrs. Dougal working in damp fields. This is further borne out by the fact that several of the cases were quite definite that cold and damp weather made the joints worse.

This effect of climate is of course especially noticeable when associated with other factors such as fatigue and worry as in Spiers' case and focal sepsis as in Mrs. Dougal's case.

It has been said that the disease "is an inborn error of temperature regulation" and because of that, sudden marked alterations in temperature are more important than mere exposure.

7. HOUSING

Acute rheumatic fever is quite definitely commoner amongst those living in the poorer types of houses and this is seen to a lesser degree in rheumatoid arthritis. Bad housing does act as a predisposing cause by interfering with the general health and mental

mental happiness of the dwellers by such factors as damp, cold, draughts, dust, darkness, bad ventilation, bad sanitation and overcrowding.

Only one case, Mrs. Dougal, gave evidene of bad housing stating that her house was small, damp and unhealthy and this, especially the damp, may have been a predisposing factor in her case.

This, of course, like several of the predisposing causes is a social problem.

8. TRAUMA

Whilst trauma does not appear to be such a very constant predisposing factor as it is in certain other forms of arthritis, there is some evidence to suggest that it may be a predisposing cause provided the disease is as it were "just waiting for a suitable opportunity to appear". Minor strainappears to be just as important as sudden trauma.

Agnes Harley stated that her disease began after a heavy washing and later the knees were affected after a long walk.

Spiers sat on his bent finger, causing it to become considerably more enlarged and painful than the others.

In all cases complaining of the feet it is advisable to examine for flat foot as this may, by virtue of the undue strain produced, precipitate joint changes in that region. This is illustrated by Mrs. Dougal and John Bow, both of whom complained first of their feet and both had flat feet.

9. DIET

Much has been written about the effects of food in the production of rheumatoid arthritis and most of this will be mentioned under metabolic upset.

Vitamin deficiency of course has been blamed, especially B_1 and C. Lack of vitamin B_1 leading to atrophy of the mucous membrane lining the gastro-intestinal tract and this allowing penetration of B. coli whose toxins cause the disease (McCarrison and Rowlands). Lack of vitamin C favouring local oedema and stagnation round the joints (Sherwood).

Only Mrs. Rennie gave a clear history of dietetic deficiency and I think it doubtful if that played much part in the causation of her condition.

10. GASTRO INTESTINAL FACTORS

A history of gastro-intestinal upset is common in rheumatoid arthritis, often being present before the joint changes but whether this is "cause or effect" is difficult to say. The change seems to be an atonic condition of the small intestine

intestine associated with a spastic and often elongated colon. The result is intestinal stasis with the resulting possibility of toxic absorption.

Achlorhydria is another common feature leading to such symptoms as flatulent dyspepsia which troubled Spiers so much. The result of this would be to allow organisms such as streptococci from septic teeth to reach the small intestine; it would also render the upper part of the ileum more alkaline, which is said to favour the growth of harmful organisms.

Agnes Harley is the best example of intestinal stasis and it was quite remarkable to observe the improvement in complexion following the colonic lavage. The joint condition, however, did not improve. The other cases did not show evidence of intestinal stasis.

11. ANTECEDENT DISEASE

Certain diseases such as acute rheumatism, pregnancy complications, influenza, psoriasis, nephritis, are said to sometimes preceed the onset of rheumatoid arthritis. My cases are all very disappointing in their previous histories which are all practically negative. Only McVie gives a clear antecedent history of rheumatic fever.

POSSIBLE ACTUAL CAUSES

1. FOCAL INFECTION

A great deal of attention has been paid to the question of focal infection in rheumatoid arthritis but much doubt still exists as to its actual etiological effect. The doubt arises because:

(1) Many people have focal sepsis without rheumatoid arthritis.

(2) Many people have rheumatoid arthritis without focal sepsis.

(3) Many people with rheumatoid arthritis show no change when septic foci are removed.

The last fact may be because:

(1) The septic focus is not the cause of the disease.

(2) Other foci are present.

(3) The disease is too far advanced when removal was done.

In spite of these doubts it does seem that in certain cases e.g. Mrs. Dougal, focal sepsis plays a major causative role but that this role can only be played when some of the predisposing causes are present. On the other hand if focal sepsis was the cause one would expect to find it in all cases whether designated primary or secondary, since the pathological changes are so constant in all cases. It may be that in the primary cases there is a low grade blood stream infection producing the same effects as a focus of infection. This is further discussed below.

The sites to look for focal infection are as follows:

1. Teeth

Sepsis here may be of the "open" type (pyorrhoea) or "closed" (apical abscess) and the organism usually involved is the streptococcus viridans. This, together with the tonsils, is usually regarded as the most important area for focal sepsis. If in any case dental infection is believed to be the cause it is highly important to treat as early as possible before the rheumatic process is well established, because absence of improvement in long standing cases is not proof that the focus was not the original cause. The results of removal are variable, some workers even going so far as to say that recoveries are commoner when foci are not removed.

Most of my cases have lost a considerable number of teeth because of caries, but all state that the gums have always been healthy. Mrs. Rennie and John Bow had all their teeth removed early

early in the course of the disease because they were carious but the little improvement that has resulted from this suggests that the teeth did not play a very large part in producing the disease.

2. Tonsils

Chronic tonsillar sepsis is usually regarded as a potent cause of rheumatoid arthritis. The infected tonsils may be large and inflamed or they may be small and hidden and it is this latter type which is particularly dangerous as they are not so likely to be detected and not so liable to discharge their contents. Mrs. Dougal affords an excellent example of this type, the infected submerged tonsils only being discovered by a specialist. The removal of these tonsils appeared to cause a considerable improvement in the patient's condition, although the disease was not completely arrested.

The removal of Agnes Harley's tonsils affords a good example of what sometimes happens after the removal of septic foci i.e. there was an acute exacerbation of the condition which did not settle down for at least two months and no improvement could be detected. This certainly suggests that the streptococcus has something to do with rheumatoid arthritis since it is a well known fact that a temporary bacteraemia (of streptococci) exists after tonsillectomy and this sudden entrance of organisms into the blood stream affects the joints.

3. Sinuses

The importance of sinus infection is that it may give rise to no symptoms; pain, inflammation and discharge may all be absent. Mrs. Dougal gave a history of headaches and nasal discharge and her X Ray picture suggested an infection of the maxillary antra but proof-puncture did not confirm this.

4. Respiratory system

Infection here is not usually regarded as of much importance in chronic arthritis , but it is significant that Mrs. Rennie suffered from bronchitis for many years until her arthritis started when the bronchitis disappeared. What the significance, if any, of this is I do not know.

5. Intestinal infection

(i) Auto-intoxication resulting from intestinal stasis, unhealthy mucous membrane and achlorhydria has already been mentioned and in at least one of the cases, Agnes Harley, appeared to be a factor of some significance; clearing up the stasis by colonic lavage whilst improving the patient's complexion did not affect the joint condition.

(ii) Chronic appendicitis.

This is more in the nature of focal infection than general intestinal stasis and in some cases benefit has resulted in removal of such an appendix. None of the cases had any symptoms of appendicitis and yet one of them, Bow, had an appendicectomy done.

This I think is an example of carrying the search for sepsis too far.

(iii) Cholecystitis.

(iv) Diverticulitis.

These conditions have also to be remembered as possible foci of infection.

6. Genito-urinary system

This system is probably almost as important as the upper respiratory tract as a source of septic foci, the two main conditions being chronic prostatitis and chronic cervicitis. Chronic cystitis may also be mentioned.

(i) Chronic prostatitis.

This when present is usually gonococcal or due to a low grade infection of different organisms such as streptococci following gonorrhoea. This was excluded in the cases by the G.C.F.T.

(ii) Chronic cervicitis.

Perhaps after dental sepsis and tonsillitis, chronic cervicitis should be placed as the most important septic focus. This may exist by itself or be associated with chronic parametritis, chronic endometritis and chronic salpingitis. Mrs. Rennie gave a history of leucorrhoea which cleared up, as far as she can remember before the onset of the disease and therefore if that did signify cervical infection it appears to have had little connection with the arthritis.

At this point the question of "elective affinity", a phrase coined by Rosenow, may be mentioned. When organisms obtained from a focus of infection in a person suffering from arthritis are injected into an animal, they produce a comparable lesion in joints e.g. Laura Moench has produced arthritis in rabbits by inoculation of anaerobic streptococci cultured from the cervix of rheumatoid arthritic women.

(iii) Chronic cystitis - none of the cases gave any evidence of this.

Summary as regards focal infection

Focal infection plays an important part in the causation of many cases of rheumatoid arthritis but since it is not present in every case (i.e. so called primary cases) it may not be the fundamental cause. Further it can only be of importance when other predisposing factors are present.

Only two of the cases showed definite evidence of focal sepsis and only one of these showed improvement after removal.

2. BACTERIOLOGICAL INFECTION

normally pathogenic. One of the characteristics of allergy is that the type of reaction varies according to the nature of the tissue and that is why I have laid much stress on the Patient's and his family's history of such conditions as asthma, scarlet fever, nephritis and skin lesions.

The possibility also arises that the allergy may not be only a bacterial type but a reponse to different substances e.g. Agnes Harley who has a very strong skin reaction to extract of tomatoes and who is quite convinced that eating tomatoes makes her condition worse.

Another point in favour of allergy is the achlorhydria which is commonly found in allergic conditions.

4. NERVOUS DISEASE

Certain features have caused the question to be asked as to whether rheumatoid arthritis is primarily a disease of the central nervous system; such features as the symmetrical involvement of the joints, the peripheral ones first and later the proximal ones; the atrophy of skin, muscle and bone; the pain and paraesthesia which sometimes mark the onset. There has been some evidence that sclerosis in the corpus striatum may mark the onset and cases have been recorded with evidence of Parkinsonism on one side of the body and rheumatoid arthritis on the other side.

These changes are not constant enough to be of much significance.

More important is the suggestion that the disease is primarily an autonomic nervous system upset - in particular a disease of the peripheral sympathetic system. This theory does without doubt afford an explanation of many of the clinical features. For example, it explains the blushing of Agnes Harley, the unstable pulse rate of several of the cases, the sensitiveness to cold and damp and the atrophy of the skin evidenced by most of the cases. It would also account for the sluggish peripheral circulation shown so well by Bow.

Further, there is some evidence to show that an upset in the splanchnic vaso-motor system may increase the permeability of the alimentary tract to organisms or their toxins and that this vaso-motor mechanism acts in an opposite way to the superficial vaso-mtor mechanism i.e. when the superficial one constricts the splanchnic dilates; so that an upset of the superficial system produces an upset in the deep. It has been suggested that in rheumatoid patients sudden changes of temperature cause this upset so that bacterial toxins are absorbed from the intestinal tract and these cause the rheumatic changes.

5. ENDOCRINE DYSFUNCTION

Many of the clinical findings in cases of rheumatoid arthritis suggest a general endocrine imbalance, the glands especially incriminated being the thyroid, parathyroid and ovaries. Whether this general endocrine upset is cause or effect is difficult to say. It must also be remembered that if one endocrine gland is showing dysfunction it always affects the others.

1. The thyroid

This is the gland which has received most attention in the study of rheumatism because so often cases such as Agnes Harley show clinical features which might be attributed to either hyperthyroidism or dysthyroidism. Unfortunately however for the protagonists of this theory cases of rheumatoid arthritis have been often recorded showing evidence of hypothyroidism or merely normal thyroidism so that the affection of the thyroid does not appear to be a constant feature and cannot therefore be of fundamental etiological importance.

Of the cases I have discussed only one, Agnes Harley, shows features which might be attributed to hyperthyroidism. These features are the fine tremor, loss of weight, sweating, tachycardia, flushing, pigmentation of the skin and raised B.S.R. (+ 23%). She does not show exophthalmos, high pulse pressure or an enlarged thyroid.

Probably the real reason for the association of hyperthyroidism with rheumatoid arthritis is that the same diathesis favours both and the same precipitating cause, namely nervous shock is common to both.

2. The ovary

Next to the thyroid the ovary has received the most attention with regard to the etiology of rheumatoid arthritis and in my opinion there is more substantial evidence for its association.

An examination of my 3 female cases reveals the following facts:

1. The two married women had no pregnancies (Mrs. Rennie; Mrs. Dougal).
2. Mrs. Rennie always had scanty menstruation.
3. The onset of the disease occurred at the menopause in Mrs. Rennie's case and a few years later in Mrs. Dougal's case.
4. Agnes Harley's symptoms were much worse at her periods.

To these may be added other features not illustrated by the cases.

5. The disease is often greatly improved during pregnancy.

6. The disease often starts after abortion, pregnancy and lactation and when for some reason an artificial menopause has been produced.

7. The improvement which occurs after cauterisation of the cervix in certain cases may be due to reflex stimulation of the ovary.

8. Amenorrhoea frequently occurs in young women at the commencement of the disease.

When these facts are correlated with the concentration of oestrin in the blood the following points are noted:-

1. One of the causes of sterility is a low oestrin level. (Mrs. Rennie: Mrs. Dougal).

2. One of the causes of scanty menstruation is a low oestrin level (Mrs. Rennie).

3. At the menopause and after, the oestrin concentration is low (Mrs. Rennie): (Mrs. Dougal).

4. There is a sudden, temporary fall in the oestrin level with the onset of menstruation (Agnes Harley).

5. There is a great increase in oestrin concentration during pregnancy.

6. There is a fall in oestrin concentration after abortion, pregnancy, lactation and artificial menopause.

7. Stimulation of the ovary by cauterisation of the cervix will cause an increase in the oestrin and progestin level.

8. Amenorrhoea may be caused by lack of oestrin. It may also be caused by the general debility occurring with rheumatoid arthritis.

These facts seem to indicate that a low blood concentration of oestrin may be a basic cause of rheumatoid arthritis. Probably the best proof of this would be a therapeutic test by administering oestrin. The few references I have found on this aspect do not suggest that in the true cases of rheumatoid arthritis much benefit is derived from the administration of oestrin preparations.

Further, it would be difficult to explain the occurrence of the disease in males on the assumption of a low blood oestrin.

3. The parathyroid

The marked rarefaction of bone which is illustrated so well by several of the cases has led the etiological search to the parathyroid glands and occasionally relief of symptoms has been claimed after parathyroidectomy. Changes in the blood and urine calcium are however usually not found. None of these cases gives any evidence of parathyroid upset except for the rarefaction of bone.

4. The pituitary gland

It must be remembered that there is a reciprocal action between the ovary and the anterior pituitary so that as the concentration of one increases that of the other decreases. It is therefore possible that when the influence of the sex hormones is diminished as at the menopause over activity of the anterior pituitary may be a factor in producing the joint changes. Actually in acromegaly joint changes do occur but these are usually osteo-arthritic in type.

6. METABOLIC AND BIO-CHEMICAL UPSET

The theory that rheumatoid arthritis is primarily a metabolic disease has frequently been suggested, but no very definite changes are constantly found analgous say to the blood uric acid level in gout. On the other hand a number of interesting metabolic facts may be mentioned.

1. Carbo-hydrate metabolism

The work of Pemberton has shown that a common finding is a delayed blood sugar curve but that actual glycouria is rarely found. At first this was regarded as indicating a diminished carbo-hydrate tolerance with the result that severe carbo-hydrate restriction was deemed necessary, but it is now considered as due to the tissues absorbing and storing glucose at a reduced rate consequent upon vaso-constriction so that it is the result and not the cause of the disease.

2. Protein metabolism

Wyatt states that the blood protein level is usually 1-1.5% higher in rheumatoid arthritis than in normal cases whilst other authors state that the total protein is diminished although the globulin and fibrinogen are increased. These changes are said to occur in many infective conditions and to be the cause of the increased blood sedimentation rate.

Mrs. Rennie had been told that meat would make her condition worse and consequently it did so, but actually there is no proof now that gout has been separated off, that rheumatic subjects cannot deal with meat. All the other cases enjoyed it.

3. Fat metabolism

No abnormal changes are usually found although Agnes Harley had a blood cholesterol of 111 mgm. % which is actually on the low side.

It has been noticed that an attack of jaundice may cause disappearance of the symptoms of rheumatoid arthritis. That pregnancy has the same effect has already been mentioned. There may therefore in rheumatoid arthritis be some metabolic upset in connection with cholesterol (increases in pregnancy) the sex hormones and the bile acids all of which contain the phenanthrene nucleus.

4. Sulphur metabolism

A relative increase in the amount of sulphur excreted has been noted in cases of rheumatoid arthritis, together with a decrease in the amount of cystine in the finger nails. This disordered sulphur metabolism may be connected with the thyroid dysfunction and therefore only a result of the disease.

5. Calcium metabolism

The cause for the osteoporosis has been looked for in an upset in calcium metabolism but this usually appears to be normal.

6. Acid-base balance

The modern trend is to pour scorn on the old idea that rheumatic sufferers have an "acid diathesis" but in this respect several points may be mentioned.

a) The Dental Profession still stresses its belief in an acid and an alkaline diathesis, going so far as to say that as far as dental disease is concerned the former type suffers from caries and the latter from pyorrhoea. In my etiological summaries I laid emphasis on the fact that all the cases showed evidence of more or less widespread caries e.g. 3 cases had no teeth, the rest had a relatively large number of extractions and fillings. If the dentists' assumptions are correct these facts suggest that the cases have an acid diathesis.

b) The effect of so called "acid foods, namely fruits, is illustrated in the case of Agnes Harley who said that tomatoes, oranges and rhubarb made her condition worse and John Bow who said that tomatoes and vinegar made the condition worse. Since fruits leave an alkaline ash it is difficult to draw conclusions from this.

c) The CO_2 Combining Power is sometimes raised by 6-7 vols.% in cases of rheumatoid arthritis, suggesting a tendency towards acidosis.

CONCLUSIONS AS TO ETIOLOGY

(see page 150.)

C. CLINICAL FEATURES

The clinical features will be discussed under the following headings:-

1. PRODROMAL FEATURES.
2. EARLY FEATURES.
3. LATE FEATURES.

1. PRODROMAL FEATURES

The actual onset of the disease as judged by the time it first affects the joints is usually preceded by a period during which a considerable number of vague symptoms appear. Unfortunately these symptoms are often so slight and so vague that the individual ignores them, especially if he is of the delicate asthenic type who is very accustomed to having period of "being run down"; and if he does consult his doctor the general nature of the symptoms makes it difficult to come to any conclusion as to the cause and practically impossible to say that the symptoms are a warning that the onset of rheumatoid arthritis is not far distant. Perhaps some day some astute observer will notice some feature in these prodromal findings which will enable him to diagnose rheumatoid arthritis before the joint changes have occurred! If that were possible adequate treatment could then probably prevent the onset of the joint changes.

These features usually include some of the following:-

1. General debility, tiredness and lassitude.
2. Mental weariness and nervous instability and irritability.
3. Loss of weight.
4. Night sweating and rapid pulse.
5. Vague muscular pains and numbness in the fingers.
6. Vaso-motor upset - flushings, blueness of the nails and fingers.
7. Gastro-intestinal upset- flatulence, loss of appetite, constipation.
8. Weakness, wasting and twitching of muscles. Fine tremor.
9. Definite neuritis and fibrositis may occur just before the onset.

It is quite obvious that these symptoms present. no localising features

features but merely suggest some chronic infective process comparable to say tuberculosis. All that can be said therefore is that in patients with complaints such as these especially if they have the diathesis and family history mentioned in the Etiology, the utmost must be done to improve the general health by such methods as plenty of sleep, fresh air, exercise, nutritious diet, tonics and particular attention must be paid to the elimination of psychological upset, postural deformities such as flat feet and particularly septic foci. By this means it may be possible to prevent the onset of the arthritic changes, the only snag being that there is no way of telling whether these changes would have occurred without treatment or not.

Some of these features are illustrated by the cases. Mrs. Rennie suffered severe muscular pain for some months before the joint changes.

William Spiers was fatigued, irritable, complaining severely of the cold for some time before the onset. He also sweated a good deal.

Agnes Harley was nervous, delicate and had a fine tremor.

John Bow complained of vague aches in his legs a year or two before the onset.

1. EARLY FEATURES

1. Onset

The mode of onset is not uniform; it may be so acute as to make diagnosis from rheumatic fever difficult, it may be subacute or it may be chronic. The first of these is said to occur most commonly when there is an active focus of infection. The usual mode of onset seems to be insidious with slight joint changes and some systemic upset. Several of the cases I have discussed began in this way, particularly Agnes Harley, Mrs. Dougal and John Bow, so that for a time they did not consult their doctors with the result that valuable therapeutic time was lost. Some cases begin like Mrs. Rennie and William Spiers, with marked fibrositis making the attendance of a doctor imperative from the start. It was whilst he was in bed because of the fibrositis that Spiers' joints began to swell.

2. Joint changes

Typically the disease begins as a fusiform swelling accompanied by slight pain and stiffness of the small joints of the hands, commencing on the radial side, working across to the ulnar side but always avoiding the distal interphalangeal joints. The metacarpo-phalangeal joints become flexed, the distal interphalangeal extended and the whole hand is deviated to the ulnar side. Occasionally if some factor such as flat foot or obesity is present the disease may begin in other joints such as the feet or knees and sometimes it begins by transitory pain in the large joints but always in true cases the finger joint changes soon develop.

Other joints commonly affected early are the temperomandibular and cervical vertebrae and it has been said that in early cases as an aid to diagnosis auscultation over the cervical vertebrae whilst the patient moves the head reveals crepitus.

The involvement of joints gradually spreads centripetally passing from the hands to the wrists, elbows and shoulders and from the feet to the ankles, and knees and always in a bilateral way.

Of the cases William Spiers and Agnes Harley are the most typical in the order of affection of joints. In Miss Harley's case there was temporary pain in the right shoulder and then in both cases the disease worked proximally from the small peripheral joints.

In Mrs. Dougal's case the disease began in the small joints of the feet but very quickly the hands were involved and then the disease spread proximally. John Bow also complained first of his feet and it was not for some years that the hands were affected. Note that in both these cases there was flat foot which as already mentioned may have been a factor causing the disease to begin in the feet.

Mrs. Rennie's knees were the first joints to be involved, after which the disease progressed in a more or less typical manner. It may be that the age of onset influenced this order since climacteric arthritis frequently begins in the knees.

3. Other changes

a) During the active stage of the arthritis there is usually some rise of temperature and pulse rate shown to some extent in all the cases except Bow, in whom the disease was quiescent as judged by the B.S.R.

When the temperature and pulse rate begin to return to normal after some weeks of rest it is noticed that they still remain very unstable, a point which I have emphasised already e.g. having an X Ray taken caused a small rise of temperature in Spiers' case and wax baths did the same in Bow's case.

b) Accompanying this low grade fever there is usually a general systemic upset with headaches, lethargy and anorexia, the individual feeling "off colour". The blood pressure may be low as in Spiers' case.

c) Blood examination reveals a low haemoglobin level often difficult to treat and often a slight leucocytosis, lymphocytic in type. These readings when first taken were as follows:-

Name	HB.	W.B.C.
Mrs. Rennie	68%	8400
Wm. Spiers	80%	11800
Agnes Harley	75%	4200
Mrs. Dougal	75%	7000
John Bow	105%	6000

One of the most important readings in the disease is the Blood Sedimentation Rate since this gives a more accurate idea of the activity of the disease than mere clinical observation. It does in fact lag behind the joint improvements, indicating that although the joints are better the disease is still in an active state. It is therefore a good guide to the effects of treatment, the type of treatment required and the prognosis. The rate is higher in rheumatoid arthritis than in all other types of arthritis. In these cases the highest figure in each case was:-

Mrs. Rennie	105	mm./1 hr.
Wm. Spiers	60	" "
Agnes Harley	90	" "
Mrs. Dougal	70	" "
John Bow	5	" "
Alex. McVie	55	" "

These figures show a very high rate in all except one case and the rate is higher than that found in the case of rheumatic fever. The highest figure was recorded by Mrs. Rennie who was in a state of acute exacerbation and the next highest were Agnes Harley and Mrs. Dougal who both had a toxic focus.

d) X Ray findings

These may be divided into 3 stages.

1. General osteoporosis most marked in the region of the affected joints.

2. Diminution in the joint space due to loss of cartilage.

3. The third and late stage may show erosion of articular bone, subluxation or ankylosis of the joints.

The first two of these stages were shown by the X Rays of Spiers, Agnes Harley and Mrs. Dougal, whilst Bow's X Ray did not show the typical features. Fortunately so far none of the cases has reached the 3rd stage.

It is obvious from this that X Rays afford a valuable means of differential diagnosis in doubtful cases and also as a guide to treatment.

It would be interesting to know whether the general osteoporosis is present with the prodromal symptoms before the actual joint changes have occurred, because if so it may prove to be of the highest diagnostic importance from the point of view of early treatment.

e) Muscle atrophy

As soon as a joint is involved the surrounding muscles atrophy, this being especially marked in the thenar and hypothenar eminences and the extensor muscles of the forearms. All cases except John Bow and McVie display great muscular atrophy. As already mentioned, there is some evidence to suggest that the muscular wasting may occur before the actual joint changes e.g. Mrs. Rennie and her wedding ring.

3. LATE FEATURES

In the later stages of the disease the picture is a sad one. The rheumatic process has extended until almost every joint is affected, the patient lying bedridden owing to ankylosis and contracture of many joints. Speech is difficult owing to involvement of the tempero-mandibular joints and the patient can do nothing for himself. Death due to some intercurrent infection soon supervenes.

Fortunately none of the cases has reached this stage.

D. TREATMENT

As in all diseases of doubtful etiology the suggested methods of treatment of rheumatoid arthritis are legion, but from a study of the cases certain broad principles and certain methods of treatment emerge which appear to be of definite value.

These Broad Principles are

I. Treatment must be EARLY.

II. Treatment must be PROLONGED AND THOROUGH.

III. The Full CO-OPERATION OF THE PATIENT is essential.

I. As illustrative of the necessity for early treatment compare the effects of treatment on Wm. Spiers and Mrs. Rennie; in the former case where treatment was started early considerable improvement resulted but in the latter case where the disease had been present for years very little improvement resulted.

II. Chronic, slowly progressive diseases usually require prolonged and thorough treatment, rheumatoid arthritis being no exception. All the cases illustrate this principle of prolonged treatment to a marked degree - they were all in hospital for many weeks before being discharged to a Convalescent Home or their own homes where the treatment was continued. It is important therefore, I think, to impress upon the patients at the beginning of treatment that a prolonged hospitalisation and convalescence will be necessary and so avoid periods of depression such as I noticed in Spiers and Bow when marked improvement did not occur after several gold injections and wax baths respectively.

As regards thorough treatment, this entails a general study of the patient's life and general condition in addition to the joint condition so that such factors as psychological difficulties, mental strain, focal sepsis, faulty posture, can be put right whilst treatment is being applied to the joints e.g. whilst Bow's joints were being treated with wax baths he was having exercises to eradicate his flat-foot and sluggish peripheral circulation.

III. The co-operation of the patient is usually easy to obtain because of the psychological make-up, the patient being introspective and desperately anxious to be cured. This was so in these cases; John Bow took meticulous care in applying his wax baths; William Spiers' face beamed when he saw the syringe of Solganol approaching; Agnes Harley bore the high colonic lavage without a murmur; Mrs. Dougal enjoyed each of the six T.A.B. injections better than the preceeding one, and Mrs. Rennie bravely tried to move her arms and fingers each day "as sister told herto".

The methods of treatment which appeared to be of benefit are:

I. REST - GENERAL AND LOCAL in the acute stage.

II. PHYSIO-THERAPY carefully graduated after a period of rest.

III. IMPROVEMENT OF GENERAL HEALTH by diet, fresh air, exercises, control of the bowel.

IV. CRYSOTHERAPY.

V. PROTEIN SHOCK THERAPY.

VI. REMOVAL OF SEPTIC FOCI.

As to which of these forms of treatment has to be applied and the manner in which they are applied depends upon the condition of the joints, whether they are acutely tender and swollen or stiff and painless; upon the presence or absence of fever; upon the nutrition of the patient, whether under or over weight; upon the physical state, whether grossly debilitated or in good general health.

I. REST

In the active stage of the disease rest is of the utmost importance and is to be regarded from a three-fold aspect - rest of the body, mind and joints.

1. Body

This means rest in bed. It is useless for patients to try as Agnes Harley, Mrs. Rennie, Mrs. Dougal, and William Spiers did, to continue their work whilst the disease is active. The result is only a steady advance in the number of joints involved and a deterioration in the general condition. The only case in which rest in bed was not indicated was John Bow where the disease was not in an active state.

To be of any use this general physical rest must be accompanied by a control of pain and hence the importance of giving analgesics. All the cases except Bow required these and their importance was that they allowed sleep and helped to get rid of muscle spasm.

2. Mind

Rest of the mind is almost as important as rest of the body but considerably harder to obtain. This means that in many cases removal to hospital away from the worries of family life is essential e.g. whilst Mrs. Rennie did not obtain a great deal of mental rest she would have obtained far less if she had remained at home with her blind husband.

As I have already mentioned, it is important in this respect to take the patient into one's confidence and explain that prolonged and thorough treatment with full co-operation of the patient is essential.

3. Joints

The muscular spasm which is always present in the acute stage is the body's method of resting the joints but unfortunately as was mentioned in the examination of several of the cases, the joints tend to rest in flexion and so prepare the way for permanent deformities. Rest to the joints is therefore obtained as was done in the case of Mrs. Rennie, William Spiers and John Bow by giving analgesics to reduce the spasm and by immobilising the affected joint in a Plaster of Paris splint in a good position. All three patients after some initial discomfort found the splinting gave them considerable relief. During this time it is important to remove the splint once or twice a day and move the joint to prevent ankylosis; this point was illustrated by Mrs. Rennie who found that after the splints had been in position for a day or two she was unable t o flex her knees.

II. PHYSIO-THERAPY

Under this heading is included local application of heat, massage, X Ray treatment and exercises.

1. Local application of heat

This can be done im a variety of ways, being very useful in the acute and subacute stages of the disease. The cases illustrate a number of these ways.

(i) Warm water - several of the cases found that the immersion of the hand in warm water quickly lessened the stiffness.

(ii) Wax baths - this was the method used by Bow and was of considerable benefit in diminishing peri-articular swelling and stiffness. Each hand was immersed repeatedly in molten paraffin wax until up to 12 coats had been applied; the part then being wrapped in cotton wool for an hour.

(iii) Mud pack - this was used in Spiers' case, a pack of Fuller's earth being applied to the shoulder regions.

(iv) Electric blanket - this very effective means of applying heat proved of considerable benefit in reducing spasm of Spiers' deltoid muscles.

(v) Radiant heat was used in several of the cases and was found to be of considerable benefit.

2. Massage

In the active stage of the disease unless massage is done very carefully, the result may be an aggravation of the joint condition. This is well illustrated by Spiers who received quite energetic massage of the muscles and shoulder joints soon after admission, with the result that his B.S.R. shot up and his joints became more painful. Later on, when the disease had become less active, light massage of the muscles with avoidance to some extent of the painful joints, gave considerable relief of muscle spasm and helped to improve the general condition. Fatigue, of which Spiers always complained after the early massage treatment must be avoided.

Agnes Harley and Mrs. Dougal were benefitted by light massage carefully applied, whilst Bow whose condition was quiescent was given vigorous massage from the start.

3. Exercises

Carefully graded exercises carried out regularly over a prolonged period can do much to correct etiological factors and so improve the condition. The exercises are used for two purposes:

(1) To improve general muscle tone and eradicate postural defects.

(2) To improve the peripheral circulation.

Both these types were illustrated by Bow who was given feet exercises to cure the flat foot and breathing exercises to improve the peripheral circulation. These latter exercises had as their aim to teach Bow to use his diaphragm and abdominal muscles more efficiently and so empty the splanchnic circulation and increase the oxygenation of the general circulation.

At all stages from the early acute to the chronic some form of movement of the joint is essential to prevent ankylosis, this being readily obtained by such occupations as knitting and writing which can be done with the patient in bed.

4. X Ray treatment

A course of deep X Ray therapy was given to Spiers' knees during his last few weeks in hospital. It was difficult to decide what improvement resulted from this as he was already beginning to walk fairly well before it was begun.

III. IMPROVEMENT OF GENERAL HEALTH

1. Rest - already considered.

2. Diet.

All the cases with the exception of Bow were considerably under weight and therefore dietetic treatment assumed considerable importance as a therapeutic aid.

The aim of the diet in all the cases was to build up the nutrition and increase the resistance.

(a) Calorie intake

A high calorie diet is of the first importance although at first this was hard to obtain for Mrs. Rennie, Agnes Harley and William Spiers because their appetites were poor. Gradually however, by means of frequent appetising feeds a high calorie intake was obtained.

(b) Carbo-hydrate intake.

Some workers restrict the carbo-hydrate intake on account of the blood sugar curve but as already mentioned, this is more likely to be effect than cause and therefore the restriction is not of great value. All these cases were given a liberal carbo-hydrate intake.

(c) Fats

These are important both as regards calorie intake and as a supply of vitamins.

(d) Protein

The idea that meat is bad for rheumatism is unfounded and all the cases were given a liberal protein intake to replace broken down tissues. All of them, including Mrs. Rennie who thought that meat made her condition worse, enjoyed the large amount of animal protein that they were given.

(e) Vitamins

A high vitamin diet was given in every case.

Vitamin A. This is especially useful as the anti-infective vitamin.

Vitamin D. This is useful because it aids in the absorption of calcium.

These vitamins were ensured by giving a plentiful supply of milk and butter.

Vitamin B. This is especially useful in cases such as Agnes Harley where the alimentary tract is atonic and where there is increased metabolism.

Vitamin C. A plentiful supply is obtained from fruit and green vegetables.

(f) Salts

Calcium is important because of the rarefaction of bone and is supplied by giving 1-2 pints of milk a day.

Iron is necessary for the anaemia and was given as ferrous sulphate.

3. Fresh air

As a means of toning up the skin fresh air is invaluable and was used regularly in Agnes Harley's case.

4. Control of the bowel

The general hypotonia of the alimentary tract so well illustrated by Agnes Harley and to a lesser extent William Spiers calls for definite treatment.

A good motion each day was aimed at by using mild laxatives such as cascara or liquid paraffin.

Colonic lavage, as given to Agnes Harley, is not a method to be continued long, but was useful in clearing out the colon before obtaining control of the bowel by liquid paraffin.

Vitamin B_1 was given to several of the cases in the form of Bemax and Marmite with the object of toning up the alimentary tract.

IV. CRYSOTHERAPY

1. Indications

The type of case deriving most benefit is that which is slightly active i.e. with a slight pyrexia, leucocytosis, raised B.S.R. and swollen, painful joints. The treatment was therefore indicated for Mrs. Rennie, William Spiers, Agnes Harley, but not for John Bow in whom the disease was quiescent.

3. Drug

The drug used in all these cases was Solganol B. Oleosum - an organic compound of gold combined with sulphur and containing glucose which is said to lessen toxic effects by causing a slower disintegration after injection.

3. Route

The drug was given by deep i.m. injection into the buttocks.

4. Dosage

In each case a very small dose of 0.01 gm. was given first, being in the nature of a test dose, and then at weekly intervals it was intended to gradually increase the dose, depending upon the patient's reaction until 0.2 gm. was being given. The only case in which this was actually done was William Spiers. The doses used were:

	WM. SPIERS	AGNES HARLEY	MRS. DOUGAL
	0.01 gm	0.01	0.01
	0.01	0.01	0.01
	0.02		0.02
	0.02		0.02
	0.05		0.05
	0.05		
	0.1		
	0.1		
	0.2		
	0.2		
	0.2		
	0.2		
	0.2		
	0.2		
Total	1.56 gm	0.02	0.11

To be really effective it is necessary to give a total of between 1.5 - 3 gm. in about 12-14 weeks and if necessary repeat at intervals of two months.

There seemed to be little doubt that this played a large part in arresting the disease process in Spiers' case.

5. Reactions

Mrs. Rennie and William Spiers complained of a transient increase in joint symptoms and had a slight temperature after most of the injections, but these were not taken as an indication to stop treatment although they were to be regarded as a warning against too rapid an increase in doses.

Agnes Harley on the other hand had a severe reaction indicating an idiosyncrasy to the drug, this being taken as an indication to stop treatment.

6. Complications

A large number of complications may occur during treatment each of which is an indication for immediate cessation.

These are:

a) Skin lesions - general erythema and exfoliative dermatitis.

b) Albumin, casts and red cells in the urine.

c) Gastro-enteritis.

d) Jaundice and vomiting.

e) Leucopenia.

f) Glossitis, gingivitis, stomatitis.

The nearest approach to one of these was the metallic taste which Mrs. Rennie complained of after the first injection. No effects were produced by subsequent injections.

It has been stated that toxic symptoms are commonest when the B.S.R. is normal; if this be true then they were not to be expected in these cases.

V. PROTEIN SHOCK THERAPY

1. Aim

The aim of this treatment is to stimulate the non-specific defensive mechanism of the body by injection of foreign protein.

2. Indications

The treatment is used in subacute or chronic cases where the patient is in fairly good general health and so it was indicated in Mrs. Dougal and William Spiers.

3. Method

In each case the treatment was started with an i.v. injection of 10 million T.A.B. Vaccine. Although this was a small dose a marked reaction was produced in each case especially in Spiers' case. Because of his marked reactions Spiers was only given 3 injections, the highest dose being 30 million organisms whilst Mrs. Dougal, who did not react quite so markedly, was given 6 doses with a maximum dose of 30 million organisms.

4. Results

Considerable improvement in the range of movement of the joints resulted, especially in those of Spiers. After a week or two, however, the joints stiffened up again although some lasting improvement did occur.

VI. REMOVAL OF SEPTIC FOCI

It is important to investigate every case of rheumatoid arthritis for a septic focus in a thorough manner - short of opening the abdomen! (Bow). To be effective the removal of such a focus must be early in the disease, but it must not be done whilst the patient is showing acute signs of the disease or a severe exacerbation may result. This was so with Agnes Harley - an acute exacerbation occurring after tonsillectomy which two months of hospitalisation did not clear up.

Two of the cases, Agnes Harley and Mrs. Dougal, had demonstrable septic foci which were removed. In the former case the result was a worsening of the condition and in the latter an improvement.

OTHER TREATMENT USED

Sodium salicylate

This was administered to two of the cases as well as to McVie (the rheumatic fever). The result in both cases was only a slight diminution in pain, in no way comparable to the result produced in McVie's case.

OTHER TREATMENT SUGGESTED BUT NOT USED IN THESE CASES

1. Iodides - to dissolve fibrous tissue.
2. Thyroid - seldom indicated.
3. Arsenic.
4. Ortho-idioxy benzoic acid - probably of little use.
5. Histamine - of some value in chronic stages.
6. Bee-venom - Do.
7. Sulphur.
8. Sulphanilamide.
9. Vaccines - usually streptococcal.

RELATION BETWEEN RHEUMATOID ARTHRITIS AND RHEUMATIC FEVER

Cases such as McVie which appear to be mid-way between acute rheumatism and rheumatoid arthritis are not uncommon and from the etiological point of view assume considerable importance.

Equally important is the fact that the two conditions frequently occur in the same families as illustrated by Agnes Harley whose niece had juvenile rheumatism.

The presence of subcutaneous nodules such as were found in Mrs. Dougal and Agnes Harley is probably the most convincing suggestion of a direct relationship between the two conditions.

A throat swab from McVie showed the presence of haemolytic streptococci which bear a known relationship to rheumatic fever and there is little doubt that swabs taken from the infected tonsils of Agnes Harley and Mrs. Dougal would have shown a similar growth, but what their relationship and the organisms in McVie's throat is to the rheumatoid changes is difficult to say. As already mentioned, the fact that Agnes Harley had an acute exacerbation after tonsillectomy when there would almost certainly be a streptococcal bacteraemia suggests that the streptococcus may be the cause.

It is a well known fact that many factors such as age, constitution, immunity, type and virulence of organisms cause great variations in the response to infection so that it is possible that rheumatoid arthritis and rheumatic fever are different clinical manifestations produced by the same or closely related causes.

E. PROGNOSIS

In forming the prognosis of these cases a number of factors have been taken into consideration which when taken together give a good idea as to what the future of the case is likely to be. It is important to remember that the disease is one of remissions and exacerbations which may continue indefinitely or be arrested at some point and therefore knowing that remissions will occur in almost all cases, an optimistic outlook when talking with the patient is justified.

The factors on which I based the prognoses were

A. The length of time the disease had been present

e.g. An old standing case like Mrs. Rennie has a poor prognosis compared with a fairly recent case such as Mrs. Dougal.

B. The recognition and eradication of etiological factors

e.g. The removal of the septic focus of Mrs. Dougal and the improvement of the peripheral circulation of Bow gave a better prognosis to these cases than to Mrs. Rennie and Spiers in whom no definite etiological factor could be found.

C. The reponse to treatment as judged by

1. General condition e.g. Spiers' improved. Mrs. Rennie's unaffected.

2. Joint condition e.g. Agnes Harley's practically unaltered.

3. Weight e.g. Spiers' increased. Agnes Harley's decreased.

4. Blood Pressure e.g. Spiers' gradually rose to an average level.

5. B.S.R. e.g. Spiers' reduced. Mrs. Rennie's unaffected.

D. The presence of subcutaneous nodules

These indicate a poor prognosis e.g. Agnes Harley.

E. The environment, social position and occupation.

e.g. Mrs. Dougal's returning to a damp cottage would worsen the prognosis as would Spiers' return to commercial travelling.

ETIOLOGICAL CONCLUSIONS

Five fairly typical cases of rheumatoid arthritis and one case of rheumatic fever with changes of a rheumatoid type have been studied.

The following facts of etiological importance were noted:

1. A PECULIAR CONSTITUTION was present to a marked degree in 4 cases (Rennie, Spiers, Harley, McVie) and to a lesser extent in one case (Bow); the patients being of an asthenic, hypotonic, anxious type with some evidence of a rheumatic and allergic family history.

2. EMOTIONAL STRAIN preceded the onset in 4 cases (Rennie, Spiers, Harley, McVie).

3. A POOR PERIPHERAL CIRCULATION was present in at least 3 cases (Rennie, Spiers, Bow).

4. EXPOSURE TO DAMP AND COLD was present in 3 cases (Spiers, Bow, Dougal).

5. TONSILLAR SEPSIS was present in 2 cases (Harley, Dougal) and HAEMOLYTIC STREPTOCOCCI were present in the throat of 1 case (McVie).

6. ENDOCRINE IMBALANCE was suggested in 3 cases

    1. Hyperthyroidism (Harley).

    2. Ovarian dysfunction (Rennie, Dougal, Harley).

7. INTESTINAL STASIS was demonstrated in one case (Harley).

From these facts it is impossible to arrive at a definite conclusion regarding etiology, but probably the most likely conclusion would be that the cases by virtue of their peculiar emotional, endocrinal and metabolic make up, together with a lowered general and local resistance produced by environmental factors such as damp and strain responded in this way to a low grade streptococcal infection.

REFERENCES.

1. PRICE. Text Book of the Practice of Medicine.

2. DUNLOP and DAVIDSON. Text Book of medical Treatment (Livingstone 1939).

3. BOYD. Pathology (Kimpton 1938).

4. DAVIDSON and ANDERSON. Text Book of dietetics.

5. POYNTON and SCHLESINGER. Recent Advances in the study of Rheumatism (Churchill 1937).

6. BACH. The Rheumatic Diseases, Recognition and Treatment (Cassell & Co. 1935).

7. WYATT. Chronic Arthritis and Fibrositis, Diagnosis and Treatment (Bailliere, Tindall & Cox 1933).

8. KERSLEY. The Rheumatic Diseases (Heinemann 1934).

9. YOUNG. Gynaecology.

10. B.M.J. June 17th 1933 (Report of B.M.A. Committee).

11. B.M.J. September 7th 1940.

12. The Prescriber. March 1940.

13. American Journal of Medical Sciences. October 1940.