A Report and Commentary
on Six Cases of Rheumatic Diseases

Submitted for the Wightman Prize in Clinical Medicine
June 1937

by

James Innes.
I should like to thank the undersigned Physicians to the Royal Infirmary of Edinburgh for their kindness in granting me permission to use these cases.

Professor W. T. Ritchie. - Cases I, III, & V.
Professor D. M. Dunlop. - Cases II & VI.
Dr. A. Fergus Hewat. - Case IV.
The subject of the rheumatic diseases is apt to be somewhat bewildering to the student commencing the study of clinical medicine. There are so many cases in the wards showing widely different clinical varieties, 
and from the point of view of systematic medicine the subject is beset with numerous theories and perplexing classifications. This while he comes to realise fully the great importance of this group of diseases in respect of their prevalence, savages and the need for early treatment and prevention, the student tends to dwell rather on these theoretical considerations and omits to become thoroughly acquainted with the more truly clinical aspects.

In this paper an attempt has been made to study from a clinical standpoint a short series of six cases seen in the wards of the Royal Infirmary as being rheumatic cases. The patients were studied in detail in respect of history, symptoms and signs, and a diagnosis was made on an anatomical and pathological basis rather than the mere application of a text-book "label". The methods of treatment have been noted and discussed.
Finally the cases as a whole have been reviewed to see how they accord with the present-day views as to the etiology and nature of the rheumatic diseases.

No attempt was made to select typical cases, it being felt rather that every case must at least show something of interest and that after all, from the patient's point of view, his or her case is by far the most important in the Infirmary.
Case I

Name: Georgina Aitken
Age: 22
Address: 24, Glenfield Bank, Dalkeith.
Occupation: Domestic servant.
Date of Admission: 3. 11. 36.
Date of Examination: 5. 11. 36.

Complaint: Severe pains & tender swelling in joints for 4 days.

History: Personal.

Present illness: Patient was at work in an Edinburgh hotel until 5 days before admission when she had a sore throat & a headache. She went to bed & shortly after felt pain in both hips, knees & ankles. The left knee & right ankle became red, swollen & extremely painful to touch or move. The sore throat subsided in about 2 days but she remained febrile & perspired very freely. The pain & swelling of her joints began to "flit about," subsiding in one joint as it involved another. On the day before admission the knees were less painful but her right shoulder, elbow &
wrist & her left wrist were all swollen & painful. She remained in bed in the hotel until 3/11/36 when she got up & went home to Dalkeith "feeling just one ache all over". She was seen by her Dr. who sent her straight to R.I.E. as her home conditions were unsuitable for efficient nursing.

Previous illnesses:

Patient had rheumatic fever at the age of 9 when she was in bed for 6 weeks. She remembers her joints being wrapped up in cotton wool. This attack cleared up completely & thereafter she had no joint aches, growing pains or sore throats until she was aged 16½. At this time she was working in Balashields & got soaked while walking 4 miles in the rain.

On the next day she had a severe sore throat & was feverish & perspiring. She was in bed for 1 week & then went home feeling alright. A fortnight later (3 weeks after the sore throat) she was working in Surrey when she had very severe pains & swelling in big toe, both wrists, knees & ankles & shoulders & was
feverish. She was treated in hospital at Walton-on-Thames for 3 months & returned home free from aches & pains in February 1931. Later in that month she again had a sore throat lasting 3-4 days & about 10 days after began to drop things, to have twitching of her arms & face, & to lose control of her emotions. After a period in bed she was admitted to Ward 25, R.I.E. as a case of chorea. She was in hospital from March to May & in the Ashley Ainslie Institution from June until she was discharged in August 1931.

She was quite free from symptoms until the autumn of 1933 when she was in London (cold, damp weather) & developed stiff & painful hips which have troubled her on & off in damp weather ever since. In summer 1935 she was treated in the Massage Dept. R.I.E. for stiffness in the joints of both feet. In November 1935 she was in bed for 14 days being febrile & having pain in the right hip. In August 1936 she was in bed for
a few days in Torgovay as her right knee was swollen & painful. She had no further symptoms till her present attack in October.

Has never had Scarlet Fever.

Family History

Father: aged 48 - alive & well.
Mother: aged 44 - ...
6 brothers - all younger - ...
3 sisters - ...

No family history of rheumatism except that father's mother was confined to bed for 18 yrs with rheumatism.

Home Conditions etc.

Father is a brushmaker.

The whole family (12 including patient) live in a Council house - 3 bedrooms, kitchen & bathroom.

State on Examination.

Patient is a fairly well-built & well-nourished girl of average intelligence. Her face is flushed & she is sweating profusely. She lies very stiffly in bed on account of her painful joints.

No obvious signs of anaemia, sedema,
Systemic Examination

Locomotor System

Upper extremities. Right shoulder is swollen + very painful if moved. Right elbow is similarly affected. Right wrist is red, hot, swollen + is intensely painful if any movement is attempted. Right interphalangeal joints are red + swollen + movement of fingers is very painful - especially the index finger.

Left shoulder is not swollen + movement is fairly free but rather painful. Left elbow seems normal. Left wrist, no swelling but slightly painful on movement. Left interphalangeal joints are tender + swollen + painful, though not so bad as on the right hand.

Lower extremities. Right hip appears normal; movements quite free. Right knee is rather swollen, stiff + painful. Right ankle - no swelling but movements painful. Toes of right foot appear normal.

Left hip appears normal; movements free. Left knee - similar to right knee though less painful. Left ankle painful but not swollen. Left foot joints appear normal.
Tonsils of neck: movements free & painless.

**Cardiovascular System.**

No oedema, dyspnoea or cyanosis.

**Radial pulse.** Regular in time & force.

Wave of good volume & well sustained.

Vessel wall just palpable. B. Rate = 104 per

min. B. P. = $105\frac{5}{8}$.

**Heart.**

**Inspection.** No epigastric pulsation

of no venous pulsation in neck.

**Palpation.** No thrill palpable. Apex

beat in 5th space in mid-clavicular line

is not forcible.

**Percussion.** Heart is not enlarged. Borders $\frac{11}{0\frac{3}{4}}$

** Auscultation.** Both sounds are pure

& of normal intensity in all areas.

**Respiratory System.**

No cough or sputum. No dyspnoea. No

coubling of fingers.

**Thorax.**

**Inspection.** Chest is well-
developed & covered & moves freely &
equally on both sides with respiration.

Rate of respiration = 22 per min.

**Palpation.** Movements equal both sides. V.F. normal.

**Percussion.** Note is resonant in all areas.

**Auscultation.** Breath sounds vesicular in
character & with no accompaniments in all areas. 
Vocal resonance normal & equal on both sides.

**Alimentary System.**

**Appetite & digestion good.** Bowels regular.
Tongue - moist & clean.
Teeth - in good condition.

**Throat & Tonsils.** Fauces not congested. Both
tonsils enlarged & irregular, especially the
right one. No pus seen in crypts, but
appearance is that of chronic septic tonsill.

**Abdomen.** Inspection. Moves freely with
respiration. Well covered.

**Palpation.** No rigidity, tenderness or abnormal
swelling. liver & spleen not enlarged.

**Urinary System.**
No frequency, or dysuria.

Kidneys not palpable. Urine normal.

**Nervous System.**

**Higher Cerebral & Mental Functions - appear normal.**
Cranial Nerves - appear to be functioning satisfac-
tory. Pupils are equal, regular, & react
 briskly to light & accommodation.

**Motor Functions - appear normal.** (These are
difficult to test owing to the very painful
joints.) **Sensory Functions also appear normal.**
Reflexes: Knee & ankle jerks are present & equal. Plantar — bilateral flexor response. Abdominal reflexes present & equal on both sides.

Haemopoietic System.
No obvious anaemia: liver, spleen & lymph glands of normal size.

Blood Count.  
\[
\begin{align*}
R.B.C. & \quad 3,700,000 \\
W.B.C. & \quad 15,000 \\
H.B. & \quad 67\% \\
Colour Index & \quad 0.9
\end{align*}
\]

Integumentary System.
Skin is warm & moist. Perspiring freely. No evidence of any erythema nodosum. No subcutaneous rheumatic nodules found.

Further Special Investigations.
Throat swab. 9.11.36. A growth of haemolytic & non-haemolytic streptococci was obtained.

11.11.36. Skin test to Streptococcus haemolyticus, Endotoxin & Exotoxin, gave entirely negative results.

Treatment & Progress while in Hospital.
Patient was at first given Sod. Salicylate gr. xx & Sod. Bicarb. gr. xi T.I.D. for 1 day. After 8 days the salicylate was again given 4 hourly for 4 days, then T.I.D for
3 days after which it was stopped.

Mist. Ammon. Carb. 3 S.S. T.I.D. was given for a few days as she had a rather troublesome cough. Throughout the remainder of her stay in hospital she was given Three Syrups 3 i T.I.D.

In 10 days the temperature & pulse rate had gradually come down to normal & remained so thereafter. 1. The pain & swelling in her joints, while severe at first, also subsided satisfactorily & 12 days after admission she had no pains & all movements were free & this condition also remained so throughout the rest of her stay in hospital.

Although no evidence of erythema nodosum was found on 5.11.36, on the next day she had a well-marked painful patch of erythema over the front of her right tibia. Within the next few days other patches of erythema nodosum appeared over her left tibia, upper third of her left forearm & left elbow, & over the upper part of her right arm. These patches were tender to touch for a few days, but gradually faded & became

1. See temperature chart opposite.
painless, & had completely disappeared 3 weeks after admission.

On 12.11.36 patient was confused & hysterical, but was very much more settled in 2 days.

Up till 14.11.36 the heart sounds had been pure & of normal intensity in all areas, but on this day it was noticed that the first & second sounds in the mitral area were muffled. On 15 & 16.11.36 there was a definite mitral systolic murmur, soft & blowing in character & propagated towards the left axilla. This murmur remained unaltered for a month when it gradually became more of a muffled first sound. On 18.12.36 it was noted that exertion e.g. sitting up in bed, tended to bring back the character of the murmur. The muffling itself slowly disappeared within the next 3 weeks, & when patient was discharged on 2.2.37, both sounds were pure & of normal intensity in all areas, both when resting & after slight exertion.

Two electrocardiographic examinations were made. The first was done on 24.11.36 when the mitral systolic murmur was definite.
Description of Electrocardiogram.

1. Rate. Average ventricular rate = 62 per min.


3. Axis. Deviation = -12°, i.e. left ventricular preponderance.

4. P. Waves. Upright in leads I & II, small & indefinite in lead III.

5. P-R Intervals. Average = 0.16 sec.

6. QRS Complexes. Upright in leads I & II, downward in lead III. Of normal contour.

7. T Waves. Upright in leads I & II, small & diphasic in lead III.

Summary

Normal sinus mechanism, respiratory arrhythmia & mild left ventricular preponderance.

The second E.C.C. was done on 1.2.87, the day before patient's discharge from hospital.
Description of Electrocardiogram:

1. Rate. Average ventricular rate = 92 per min.


3. Axis. Deviation = $-25^\circ$ i.e. left ventricular preponderance.

4. P Waves. Upright in leads I & II, small & indefinite in lead III.

5. P-R. Intervals. Average = 0.16 sec.

6. QRS Complexes. Upright in leads I & II, downward in lead III. Of normal contour.

7. T Waves. Upright in leads I & II, small, flattened & obscured in lead III.

Summary. Normal sinus mechanism, respiratory arrhythmia & left ventricular preponderance.

Note that the degree of left ventricular preponderance here is more than twice as great as in the previous E.C.C. This is not apparent on mere
looking at the tracings but is well brought out when calculated by the accurate method of determining the axis deviation.

On 21.12.36 it was noted that patient had a fine tremor of both hands. On 27.12.36 she was very fidgety, hysterical & easily upset, weeping easily & shouting at the top of her voice. There was a fair amount of involuntary twitching of her hands & fingers. She was given Nervonal 30 T per day & Luminal 1/3 B.I.D. until 6.1.37. The twitchings & loss of emotional control were very soon improved. Thereafter she remained settled until discharged on 2.2.37.

During her first week in hospital she had a milk diet & thereafter a light diet. She was in bed for 11 weeks & was up for the last 2 weeks.

Patient was discharged to the Convalescent Home on 2.2.37. She reported at the Ward on 2.3.37 on being allowed to go home. She had had occasional rheumatic pains in her joints but no sore throats. Her heart sounds were pure & of normal intensity. She was feeling very well.
Commentary on Case I.

This is a case of acute rheumatism, or rather a "flare up" of a smouldering rheumatic condition which she has had since her first attack at the age of 9. The disease has always affected her joints giving the characteristic flitting polyarthritic; it has also involved the brain as evidenced by the attack of chorea in 1931. The tendency to choreiform movements observed during the present illness.

The great danger in acute rheumatism lies in the involvement of the heart. Such involvement, while apparently only of a minor and temporary nature, is shown in this case. The development of a mitral systolic murmur and its subsequent disappearance could be followed clinically day by day.

The most probable explanation of this was a relative mitral incompetence due to a dilatation or weakness of the left ventricle, i.e. a muscular incompetence. An E.C.G. at this time showed a left ventricular preponderance, but as there was no clinical evidence to suggest that the left ventricle
was hypertrophied, it can be assumed that there was also weakness of the right ventricle.

The second E.C.C. taken when the heart was clinically normal, showed a greater degree of left ventricular preponderance. This would be in keeping with the left ventricle having recovered its tone to a relatively greater extent than the right ventricle. There was never any evidence of right sided failure. In both E.C.C.'s, the P-R interval was of normal duration (0.16 sec) & the QRS complexes were of normal contour.

This shows that the rheumatic process however it may have affected the myocardium, did not interfere with the conducting powers of the AV bundle. Such an interference is frequent in rheumatic myocarditis; & its absence here may be taken as a good sign.

We must be guarded however in assessing the ultimate prognosis with regard to the heart. A mitral systolic murmur is the most frequent & significant of the focal signs of acute rheumatic carditis; & even in cases where the heart sounds remain pure throughout the two, three or four months
while the patient is under observation, a latent endocarditis may be developing & the proof be only afforded some months or years later by the detection of the ultimate valvular lesion. (Prof. W. T. Ritchie).

The appearance of patches of erythema nodosum in this case is interesting. It is not uncommon in acute rheumatism, in streptococcal infections & in tuberculous cases. After much discussion as to its cause, it is now believed that it is an allergic deme-hypodermic reaction to emboli of circulating organisms of which streptococci & tubercle bacilli would appear to be the most frequently responsible. Thus many authorities would say that in this case the appearance of the erythema was a clear manifestation of a streptococcal infection.

The patient was treated with salicylates & the temperatures fell & the joint pains subsided in 10 days. Salicylates have now been used in the treatment of acute rheumatism for about 60 years, & while all are

agreed that they are specific in reducing temperature & in alleviating joint pains, it is equally acknowledged that they are inadequate & unsatisfactory in many respects. Salicylates fail to stamp out the disease & are unable to prevent the ravages of rheumatic carditis. (Bezanson & Weil). In the present case the patient had been adequately treated with salicylate during previous attacks. & even in this attack that it was after the temperature & pains had been settled by the drug that the least involvement became apparent.

The usual way of giving salicylate is to give Sodium salicylate with double the quantity of Sodium bicarbonate. Dr. R.M. Murray 

2 Murray, J.G. in a study of 100 cases found that 77.4% of the relapses under salicylate occur within 4 weeks of the onset, & that relapses are rare when the patient is taking at least 120 grains per day. He recommends therefore that all cases but the most trivial should be kept on at least 120 grs.

few days for one month after admission. It will be noted that the present case did well on a much smaller dosage & the joint pains did not recur. The tendency to chorea cannot be considered as a relapse in this sense, as it has been shown repeatedly that salicylates have no or little influence on the onset or control of chorea.

The etiological factors to be noted in this case are briefly as follows. Their significance will be discussed later in dealing with the series of cases as a whole.

1. The social & economic position of the patient: father a brushmaker, large family living in a small house - 12 in 3 rooms.

2. The occurrence of sore throats before his attacks of rheumatic fever & the shortening of the intervals between the sore throat & the onset of joint pains or chorea, viz. in subsequent attacks viz. 3 weeks, 10 days & 2 days (present attack).

3. The relation of cold & damp to his attacks: "got soaked in the rain", "cold damp weather in London" etc.

4. Patient has never had scarlet fever.

5. The negative skin test to strep. haemolyticus endotoxin.

6. The appearance of erythema nodosum.
Case II

Name: John Wallace.

Age: 39.

Address: 45, Bangor Rd., Leith.

Occupation: Street scavenger.

Date of Admission: 22.12.36.

Date of Examination: 23.12.36.

Complaint: Swollen & tender joints for 6 weeks.

History: Personal.

Present illness: About 6 weeks ago patient caught a "chill" & went to bed for 3 days with headache & a sore throat. He then got up feeling alright & returned to his work. A few days later the joints of his feet became stiff, painful & swollen & he had to stop work for 3 days until the condition cleared up. After a further 4 days at work the joints of his right hand became similarly affected & he has not returned to work since. During this time, about 2 weeks, the pain & swelling have flitted about from joint to joint involving the following joints consecutively: feet, ankles, right hand, right shoulder, left shoulder,
right hand, lips, knees & thigh muscles, right hand, elbow & shoulder.

Patient was treated at home by his Dr. & has not remained in bed. Some of the joints, especially in the right hand, have been so painful that they have had to be wrapped up in many layers of cotton wool. He has been sweating considerably though he has had this tendency for many years especially during his attacks of rheumatism.

Previous Illnesses. Patient first had rheumatic fever at the age of 12 yrs & was in Bethel Hospital for 6 weeks & off school for about 2 months. He remembers particularly the painful joints "working upwards" i.e. feet, ankles, knees & lips, in that order.

At the age of 18 1/2, in 1916, when he was employed in a flour mill, he had a mild attack of rheumatic fever with joint involvement & was off work for 4 weeks.

His next attack was in 1921 when he was serving in the Army at Rawalpindi in India. This was a severe attack & he was in hospital for 6 weeks & during which
tirle all his joints were affected starting in his feet & working up to his fingers.
In 1928 when he had been working as a street scavenger for 1 yr., he had a slight attack of rheumatism with pains in his ankles & knees, but he managed to continue at his work. He does not know of any predisposing factors—such as wet getting wet—which bring on his rheumatism. Between the attacks he has been free of all symptoms. He has had no sore throats before the present attacks. He has never had scarlet fever.

**Family history.**

Fathers, died of kidney disease at 63.
Mothers, alive & well at 58.
Brothers & sisters alive & well.
Wife, died of quiescent fever at 30.
3 children, alive & well.
No family history of rheumatism.

**Habits.**

Smokes about 10 cigarettes per day.
Drinks about 3 pints beer per week.

**State on Examination.**

General. Patient is an intelligent well
built man & lies comfortably in bed. There is profuse sweating, but no obvious morbid appearances such as anaemia or oedema. Temperature: 99.0°F.

**Locomotor System.**

The joints of the right upper limb are all affected & any movement is resisted. The right hand & wrist are bandaged, but patient says that the joints of the fingers - metacarpophalangeal joints & the wrist joint are very swollen & painful & are “burning hot”. There is some swelling of the elbow, though movement is fairly free & not very painful. The right shoulder is swollen & tender & painful to move. The joints of the other limbs appear to be normal & all movements are free & painless.

**Cardiovascular System.**

No subjective symptoms.

Radial Pulse: Regular in time & force.

Pulse Rate: 96. Wave is of good volume & is well maintained. B.P. 146/78.

Vessel wall quite palpable.
Heart.

Inspection: no precordial pulsation visible.

Palpation: No thrill palpable.

Aorta: beat in 5 Vth space in mid-clavicular line.

Percussion: Heart does not appear to be enlarged. Borders: \[ \frac{11}{2} \div \frac{13}{2} \]

Auscultation: Mitral area - a faint blowing systolic murmur can be heard near the left border of the sternum. The second sound is pure. Aortic area - a doubtful very faint systolic murmur is heard. (This was not heard on one or two occasions). Second sound pure.

Other sounds pure.

Respiratory System.

No cough, dyspnnea or clubbing of fingers.

Respiratory rate: 20 per min.

Thorax is well-formed & symmetrical & moves equally on both sides with respiration. Vocal fremitus normal.

Percussion: Resonant in all areas.

Auscultation: Breath sounds are vesicular in character with no accompaniments in any area. Vocal resonance normal.

Digestive System.

Appetite good. Bowels regular. No indigestion.
Tongue - slightly furrowed. Moist.
Teeth - upper are artificial. lower show some cavities & mild pyorrhoea alveolaris.
Abdomen - moves freely with respiration. No tenderness on palpation. liver & spleen not enlarged.

Nervous System:
Higher cerebral & mental functions appear normal. Cranial nerves - N.A.D.
Motor functions, satisfactory.
Reflexes. - superficial & deep all present & normal. Sensory functions satisfactory.

Urinary System:
No dysuria, frequency etc.
Urine, no albumin or sugar.

Haemopoietic System:
No obvious anaemia. liver, spleen & lymphatic glands not enlarged.

Integumentary System: N.A.D. - no subcutaneous rheumatic nodules found.

Further Special Investigations:
Blood Wassermann reaction - negative.
Blood Consoeal fixation test - negative.
Blood - Sedimentation Rate 24.12.36 = 93 mm.

Treatment & Progress while in Hospital.


24.12.36. Soak repeated. 30 cc. Strep. antitoxin given I.M.


26.12.36. " " " & also applied to R. shoulder rubbed with oil of methyl salicylate.

30 cc. Strep. antitoxin I.M.

28.12.36. Sedimentation rate 105 mm.

29.12.36. Serum rash appearing on R. arm.

31.12.36. Sedimentation rate 59 mm.

1.1.37. Widespread vesicular rash which is very itchy. Calcium lactate given I.D. x 2.

2.1.37. Rash entirely disappeared.

4.1.37. Sedimentation rate 52 mm.

Systolic murmur heard in mitral area, though not propagated to axilla.

9.1.37. Pains in both elbow joints.

Sedimentation rate 89 mm.

Sod. salicyl. 2 x 2 & Sod bicarb 2 x 2 given 2 daily.

11.1.37. Reduced above to 4 daily.

Pains gone & patient very comfortable.

See temperature chart opposite.
Patient was discharged to the Ashley Downe Institution for a prolonged convalescence on 12.1.37. He remained there until 23.2.37, after spending one month in bed with massage after which he had graduated exercise. During this time he complained of pain and stiffness in his left knee on 2 occasions but this settled down & he left feeling very fit, having gained in weight.

Commentary on Case II.

This case is a good example of an attack of acute rheumatism occurring in an adult. The predominating feature in this & in previous attacks has been the polyarthritis. On the whole it is found that arthritis is often the only manifestation of acute rheumatism in adults, & it is a much more painful condition than in children. The suddenness with which the joints are affected & clear up is notable, & it is interesting that in this patient's several attacks, the joint affection has always been 'from the feet upwards'.
Rheumatic nodules are, I have been, absent in this case. They are far less common in adults than in children, or when they occur often signify a severe attack. It

It would appear that the heart has suffered little or no severe damage in this patient in spite of four previous bouts of acute rheumatism. The faint blowing mitral systolic murmur heard during his present attack probably indicates some myocardial weakness with relative mitral incompetence. The chances are that it will disappear completely, (as did the similar murmur in Case I), when the heart muscle recovers its tone. Here again however we must bear in mind the possibility of some developing endocarditis when assessing the ultimate prognosis.

Another feature of acute rheumatism well seen here, is the occurrence of profuse sweating. The sweat may often be seen in clear vesicles at the surfaces of the sweat pores -- a condition called sudamina -- & there is often a characteristic sour odour (absent here) which almost enables a "spot diagnosis" to be made without further examination. This
sweating & flushing is due presumably to dilatation of the peripheral circulation.

Note that the present attack of acute rheumatism was preceded by a sore throat & that there was a symptomless period of about 12 days before the joints became affected. This association of an acute streptococcal tonsillitis followed by a "silent" period of about a fortnight before the development of acute rheumatism is a very frequent clinical observation: in approximately 40-50% of cases.

It affords important evidence in support of the theory that acute rheumatism is a manifestation of an allergic state to haemolytic streptococci. This will be discussed later.

Another point in this case is that the patient had his worst attack whilst in the tropics. The occurrence of acute rheumatism in hot, dry climates while rare as compared with the incidence in colder & damper countries, is another interesting etiological observation.

The treatment of acute rheumatism by injections of streptococcus antitoxin serum is based on the above-mentioned belief that the disease is an allergic state to the haemolytic
streptococcus. The intramuscular injection of 30 cc. antitoxin at intervals of 36 hrs is soon to correspond with a fall in temperature from 102.4°F. to normal temperature on the day following the second injection. (See chart opposite.) This fall in temperature was accompanied by improvement in the joint symptoms, by a diminution in the amount of sweating & by a fall in the blood sedimentation rate. Although the temperature rose to 100°F. two days later, thereafter it remained subnormal until the time of discharge from hospital. It cannot be said that the serum therapy was totally successful in controlling the condition, as there was a mild recurrence with joint pains & rise in blood sedimentation rate twelve days later, & this "flare-up" was quickly & satisfactorily dealt with by administration of sodium salicylate. Here then is an example of a case which received both methods of treatment, serum & salicylate. It would be ridiculous however to try to compare the relative merits of these methods as judged by only one case, & furthermore the salicylate was
working on a patient previously under the influence of the serum.

The antitoxin treatment of acute rheumatism is at present under extensive trial in some of the medical wards of the Royal Infirmary. It is discussed in a statement in quin of the results of treatment in a series of cases in an article by Dr. John Eason who considers the results of this therapy very encouraging.

The blood sedimentation rate is an indication of the suspension stability of the red blood corpuscles, and may be taken as a non-specific index of the presence and severity of organic disease, being comparable in this respect to fever and leucocytes. In rheumatism, both acute and chronic, it is a valuable additional help to the clinical indications as to whether the disease is still active. Using Westergren's method, if the cells fall more than 10 mm in the first hour or more than 20 mm in 2 hours, the disease is still active.

In this case it is noted that the clinical improvement as judged by fall in temperature corresponded with a marked drop in the sedimentation rate from 105 mm on 28 Dec. 36.

to 59 mm on 31.12.36. & 52 mm on 4.1.37, but that it again rose to 89 mm. during a mild recrudescence on 9.1.37.
Case 111

Name: Margaret Matheson
Age: 12 yrs.
Address: 15. Academy St., Bathgate.
Occupation: Schoolgirl.

Date of Admission: 15.12.36.
Date of Examination: 21.12.36.

Complaint: Ticking of hands & head
& rolling of eyes for 4 wks.

History: Personal.

Present illness: Patient was feeling
alright until about 4 weeks ago when
her mother noticed that she was becoming
"fidgety" & was inclined to drop things
- eg a cup. The "fidgety" gradually
developed into well marked twitchings
& involuntary jerks of her hands & head,
& latterly she has been very unsteady
on her feet. She has been "making
faces" & rolling her eyes. & is easily
upset. She has been sleeping well &
her appetite is good though because of
the jerks of her arms she finds it very
difficult to get food into her mouth.
She continued to go to school until 11.12.36.
& says that in spite of the jilts she has felt 'well enough'. She has had no rheumatic pains apart from a slight twinge behind her right ear. Her throat has not been sore.

Previous illnesses. Patient has had 2 previous attacks of chorea. On both occasions has been treated in Ward 24. For the first attack, when she was aged 9 yrs, she was in R.W.T. from 26.9.33 to 31.10.33 & was then booked in the Belvedere Convalescent Home. She made a good recovery from what was a moderately severe attack & there was no sign of cardiac involvement. Thereafter she was well until she was re-admitted on 12.2.35 suffering from a mild degree of chorea from which she recovered with no complications & was discharged on 30.3.35 though she was kept off school for a further 2 months.

She had a very slight attack of twitchings in November 1935, but was not sent to hospital as they soon cleared up.

She has had measles & chicken-pox, & has at times felt rheumatic pains in her legs. Occasionally she has had no a sore
Family History.

Father & Mother, alive & well.

4 Brothers - ages, 11, 10, 7, 6 yrs. - all healthy.
No family history of rheumatism.

Home Conditions etc.

Father is a miner. The family of Y live in a house comprising 1 room & a kitchen.
The house is small, damp, & uncomfortable & is ? condemned.

State on Examination.

General examination. Patient is a well-nourished & well-developed, healthy-looking girl. She is rather dull mentally & it is difficult to get a coherent history. (many points in above history were obtained from her mother). She is rather restless as she lies in bed & there are occasional involuntary jerks of her hands, arms, shoulders, head & legs. These movements are more marked when she is being looked at or spoken to, & she frequently laughs for no apparent reason. Temp. 97.4°F.
There are no obvious morbid appearances such as anaemia, cyanosis or oedema.
Nervous System.

Higher Cerebral & Mental Functions.
As mentioned, the patient appears to be mentally backward & shows some emotional instability. Her speech is somewhat jerky at times.

Cranial Nerves are functioning satisfactorily.
1. Eye movements are full & steadily maintained. Pupils are regular, equal, & react normally to light & accommodation.
3. Facial sensation & musculature normal. There are occasional slight, twitches affecting the facial muscles on both sides, i.e. slight grinning.
4. Speech & swallowing seem normal though speech is noticed to be jerky sometimes.

Sensory Nerves.

Motor Functions. There are occasional involuntary inco-ordinate movements affecting the arms, shoulders, head, & legs. The inco-ordination is increased by voluntary
movement (e.g. buttoning up her jacket).
There is a generalized muscular hypotonia,
& slight loss of tonus of the muscle tone.
There is no atrophy of muscles apparent.

Reflexes:
Right:
- Plantar: flexor
- Knee jerk: present
- Ankle:
- Biceps:
- Wrist:

Left:
- Plantar: flexor
- Knee jerk: present
- Ankle:...
- Biceps:...
- Wrist:...

Sensory Function:
Sensation (light touch, pain, vibration &
stereognostic) is unimpaired.

Cardiovascular System:
Radial pulse: regular in time & force,
of good volume & well sustained. Rate 100.
Heart:
Inspection: no impulse seen.
Palpation: No thrill palpable. Apses
latched in V th space in mid-axillary line.
Perussion: No increase in dullness. Borders
Thorac.
Auscultation: Sounds are clear & of normal
intensity in all areas.

Respiratory System:
No cough or sputum. No dyspnoea.
Thorax: on inspection & palpation is well
covered & developed & moves freely & equally on both sides with respiration.
Respiratory rate 20 per min.
Percussion note is resonant in all areas.
Auscultation: Breath sounds vesicular in character with no accompaniments.

**Alimentary System:**
- Appetite good. Bowels regular.
- Tongue - clean & moist. Teeth - healthy.
- Throat - normal. Tonsils not enlarged or septic.
- Abdomen - well covered. Moves freely with respiration. No tenderness on palpation & no palpable mass. Spleen & liver not enlarged.

**Urinary System:**
- No frequency or dysuria. Urine N.A.D.

**Haemopoietic System:**
- No obvious anaemia. Spleen & glands not enlarged.

**Locomotory System:**
- Generalised muscular hypotonia & some weakness of motor power. No abnormalities in joints.
- No Heberden's nodes found.

**Tegumentary System:**
- No subcutaneous rheumatic nodules found.

**Treatment & Progress while in Hospital:**
Patient was treated by rest in bed &
a nourishing diet supplemented by Cod liver oil & Malt 3 i T.I.D. legions
Americanis min iii T.I.D. was also given & her bowels were kept open with Rhei 3 T.I.D. She improved slowly. The involuntary movements gradually diminishing & emotional instability gradually diminishing & when she was allowed up on 5.1.37, she was very much steadier on her feet. A careful watch was kept for signs of cardiac involvement, but at no time was there any evidence of such.
She was discharged from hospital on 9.1.37 with her general condition very greatly improved.

Commentary on Case iii
This case presents a typical clinical picture which leaves no doubt as to the diagnosis of Sydenham's Chorea. We have seen that it is a chronic relapsing condition characterised by jerky & disorderly involuntary movements, muscular hypotonia & weakness, & instability of emotional control, but in
a condition which clears up after a course of a few weeks & leaves no apparent cerebral damage. It is a disorder of childhood, rarely seen after the age of twenty & it is much commoner in girls than in boys.

While in this case there was no difficulty in diagnosis, we must remember the distinguishing features of other conditions in which the movements may resemble those of chorea.

1. Hysteria. — movements are generally more rhythmic & purposeful than in chorea. They tend to be more localised & may recover quickly.

2. Tics & Habit Spasms. — movements are localised & repeated, & are more under control than in chorea.

3. Post-encephalitic movements are finer & less disorderly than those of chorea & are accompanied by muscular hypertonia instead of hypotonia.

4. Athetosis e.g. resulting from birth injury. — movements are slow, involuntary, more or less rhythmical movements of extremities, usually of the fingers.

5. Friedrich's Ataxia — movements are jerky but the gait is swaying & there are also absent
...knee-jerks, deformities of the feet, etc. & the history & course are long & progressive.

6. Progressive Lenticular Degeneration (Kinnier Wilson's disease). In this there are tremors associated with muscular spasticity & contractures, masked mental changes & dysarthria. (no clinical indications of the cirrhosis of the liver which is also present.)

Having thus made a clinical diagnosis, it is interesting from the point of view of clinical neurology to endeavour to work out the whereabouts in the nervous system of the lesion or lesions in chorea. Three main symptoms have to be accounted for:


While there are several slightly different views on this subject set forth in the text books, indicating that doubt exists as to the exact nature or site of the lesion in chorea, the following account based largely on anatomy & physiology seems feasible as providing an explanation.

The diagram facing the next page shows the various fibres connecting the basal ganglia.
N.B. This is diagrammatic: the pyramidal fibres really terminate in close proximity to the posterior horn cells and there appear to be short connecting fibres passing forwards.
The red nucleus & the cerebellum, & also show two of the tracts acting on the anterior horn cell which finally controls muscular movement. The cerebellum, acting indirectly through the rubro-spiral tract, is said to control coordination & to maintain muscle tone. This it does by damping down the constant stream of impulses normally playing on the anterior horn cell from the higher centres (through the pyramidal tract), & does so to such an extent as to permit only voluntary movements. If therefore this action of the rubro-spiral tract is inhibited, incoordinated & involuntary movements will occur, & there will also be a diminution in muscle tone. The red nucleus is said to be largely controlled by fibres arising in the globus pallidus of the lentiform nucleus, so that stimulation of these fibres can inhibit the cerebellar function of the rubro-spiral tract i.e. producing the effects described above.

The lesion in chorea would thus appear to be an irritation of the globus pallidus region or of the striato-rubral tract, resulting in the inhibition of the rubro-spiral impulses. One must postulate only a temporary irritation & not a
destruction, as the whole clinical condition returns to normal after, or between, the attacks, and no permanent clinical findings are observed.

[It is interesting to note in passing that according to the above view, a destructive lesion of the globus pallidus region or the fibres from it to the red nucleus, would permit uninhibited cerebellar—rubro-spiiral action and would give the increased muscle tone or spasticity observed in paralysis agitans.]

The emotional instability in chorea can only be explained by postulating some temporary minor affection of the higher centres.

The tachycardia, so frequently seen in chorea (in this case pulse rate = 100), could possibly be explained on a neurological basis by an irritation of the sympathetic centre which lies near the red nucleus.

Actually, from the point of view of marked anatomy, the lesions in a fatal case of chorea are remarkably insignificant. They consist of marked hyperaemia, a moderate perivascular infiltration of lymphocytes, thrombosis and endothelial proliferation in small vessels, some degeneration of nerve cells. The condition is a
meningo-encephalitis. Greenfield & others' find that
the lesions are most pronounced in the cerebral
cortex & the basal ganglia, particularly in the
latter. No true Archoff bodies have ever been
found, but this may well be because of the
very small amount of connective tissue in the
brain (Boyd.) 2. As recovery is so complete &
often rapid, it seems probable that many of
the lesions are of the nature of a toxic irritation
or degeneration which may not be recognised
under the microscope.

There is little in this case to suggest
that the condition is a manifestation of
rheumatism; yet it is recognised widely that
chorea is one type of acute rheumatism & has
the same etiology. The very close relationship
between chorea & acute rheumatism is shown by:

1. The frequent occurrence of endocarditis,
myocarditis & pericarditis, & its almost
universal presence in the fatal cases.

2. Symptoms occurring in or before both e.g.
preceding attack of tonsillitis, subcutaneous
nodules, growing pains, & occasionally acute
rheumatic arthritis previous to the chorea.

school, may be an aggravating cause of the disease.

The great danger in chorea is the liability to endocarditis or subsequent valvular disease of the heart. This liability to cardiac involvement is said to be greatest in the first attack of chorea, & heart disease is less likely to develop in the second or third attack if the heart has escaped in the first attack. The presence of many subcutaneous nodules on the elbows, knees & scalp, is said to indicate that the heart is affected.

In this case we have noted that this is the third attack, that there is no sign of cardiac involvement & that there have been no subcutaneous nodules. These three facts taken together in the light of the above general findings, enable us to offer a definitely favourable prognosis in this case.

As regards the treatment of chorea, it is now recognised that the essentials of treatment are prolonged rest & quiet in bed, with a nourishing diet. No safe drug has been found to cut short the course of chorea. Mild sedatives such as chloral or antipyrin may be used.
but nothing is gained by giving them in heroic dosage. Arsenic in the form of liquid arsenicals in small doses, such as given in this case, seems to be of value and has been the orthodox drug treatment for many years, although the rationale is somewhat difficult to understand.

Nervonal, a barbiturate preparation was widely tried a few years ago but has now been abandoned by many authorities (e.g., in the Royal Hospital for Sick Children, Edinburgh), even as being useless and dangerous in the doses required to produce any effect.

In America, Barnacle, Ewalt & Braugh claim to have achieved very satisfactory treatment, with recovery & no recurrences in all cases treated by artificial fever produced by a Kettering hypertherm.

Another form of therapy based on the view that cholera is closely allied to tetany & is due to a lowered content of ionic calcium in the body & especially in the cerebro-spinal fluid, is advocated in Taylor’s Practice of Medicine, (1936 edition). Favorable results are claimed with parathormone injections which raise the calcium in the C.S.F.

Case IV

Name: Catherine Dryburgh
Age: 14 yrs.
Address: New Houses, lower Bathville, Armadale
Occupation: Messing factory worker

Date of Admission: 18.12.36.
Date of Examination: 22.12.36.

Complaint: Shortness of breath, "dizzy turns" & giddiness, a "choky cough.

Duration of Illness: Since Friday 11.12.36.

History

Personal

Present illness. Patient felt rather "out of sorts" at her work on Friday 11.12.36. The next morning she woke up feeling sick & dizzy as that she took no breakfast & did not go to work but sat by the fire. In the evening she was still unsteady on her feet & felt like very little food though she did not vomit. On Sunday she remained in bed till 6 P.M. when she got up feeling much better. She went to work on Monday & was alright until after tea at 7 P.M. when she felt dizzy & went to bed. Her sleep was disturbed by a
persistent dry, hacky cough. She stayed in bed until 7 P.M. on Tuesday and felt better that evening and slept well at night. When up, she was rather breathless, and the cough was troublesome at times.

On Wednesday 16.12.36, she felt sick and dizzy and remained in bed and sent for the Dr. in the evening. She was given a tablet which relieved her cough and she was able to sleep. On Thursday, she was again sick and dizzy and short of breath. She felt her heart thumping and the Dr. gave her some pills which relieved this somewhat. As she did not improve, the Dr. suggested removal to the R.I.E. and she was admitted to Ward 33 on Friday 18.12.36.

On the day of admission, she felt her "old rheumatic pains up and down her legs", but these were gone on Saturday and did not return.

Previous History: At the age of 7 yrs in 1929, patient was 9 weeks in the Royal Hospital for Sick Children with rheumatic fever. She was in bed for
1 month after leaving hospital & then returned to school. Since then she has had several attacks of "rheumatic", often accompanied by fevers & necessitating about 1 month in bed. These attacks always occurred in the autumn, October to November, & she was free in the summer months. She experienced shooting pains from the thighs down to the toes in both legs, & during the feverish attacks both knees & ankles became swollen, red & tender & had to be wrapped up in hot blankets & rubbed with turpentine. She sweated considerably at night. She has had a cough every winter for the past few years. She has never had any sore throats. The rheumatic pains were unaffected by cold or damp & occurred "just on & off" throughout the winter. She has had mild "dizzy turns" lasting about 4 hrs. about every 3 weeks for about 1 yr., though she has never felt sick & has never had to miss a day's work since leaving school in July 1936.
Family History.
Father, Mother, 3 brothers (ages 15, 12 & 7 yrs).
3 sisters (ages 9, 5 & 3 yrs). All are well, though the boy of 5 has whooping cough. All the children except the patient have had scarlet fever at one time or another. Patient has never heard any other member of the family complain of rheumatic fever.

Home Conditions etc. Patient's father is a munies. The whole family of 9 live in a 4 roomed tenement-ground floor (3 bedrooms, sitting-room & kitchenette). The house is dry. Patient sleeps with her mother while her father is on night-shift.

State on Examination:
Intelligence - below normal.
Patient is a poorly developed, rather undernourished child. She is pale & listless, & has a slight malar flush.
No obvious anaemia, cyanosis, oedema.
Temperature. 97.4°F.
Cardiovascular System.
Radial pulse. 96. Regular in time & force & wave well maintained. B.P. 115/70.
Heart. Inspection. No pulsation observed in precordial region.

Palpation. Apex beat in Vth space in mid-clavicular line. No definite thrill felt.

Perussion. Heart does not appear to be enlarged. Borders: 3/2

Auscultation. Mitrail area. A well marked rough systolic murmur is heard propagated towards the axilla. A short rough presystolic murmur is also plainly heard. Pulmonary area. The second sound is accentuated but not reduplicated. Aortic area. Sounds are pure.

Respiratory System.

Subjective phenomena. Patient has a short dry cough with no sputum. This cough has largely disappeared since admission & she is no longer breathless. Respiration 24 per min.

Thorax. Inspection. Chest fairly well developed & covered. No sign of reheat, etc.

Palpation. Both sides move equally with respiration. U.F. normal. Perussion. No dulness detected in any area anteriorly or posteriorly.

Auscultation. Breath sounds vesicular in
character in all areas. No morbid accompaniments. Vocal resonance normal.

**Alimentary System.**

- Appetite fairly good. No longer feels sick.
- Bowels regular.
- Tongue - clean & moist. Teeth - fairly good. One or two carious points.
- Throat: Tonsils appear healthy & are not enlarged. No exudate expressible from crypts.
- Abdomen: Moves freely with respiration. No tenderness on light or deep palpation.
- Liver & spleen not enlarged.

**Urinary System.**

- No frequency or dysuria. Urine: No albumen or sugar.

**Nervous System.**

- Higher cerebral & mental functions appear average & normal.
- Cranial Nerves: Nothing abnormal denoted.
- Motor Functions: normal. Reflexes:
  - superficial & deep: present & normal.
- Sensory Functions: normal.

**Locomotor System.**

- No pain, swelling or stiffness in any joints.
Muscles: no cramps, twitching, or hypotonia.

Integumentary System:
No erythematous patches observed.
No evidence of any subcutaneous rheumatic nodules. (Patient has never noticed any at any time previously.)

Progress & Treatment while in Hospital:
Patient was afebrile on admission & throughout her stay in hospital. The pains in her legs disappeared on the day following admission & the cough became less troublesome & disappeared after 5 days.
She was given Sod. Salicylate 2 x 2 & Sod. Biocarb. 2 x 3 x 4 hourly throughout her stay. A light diet was given.

With the rest in bed her breathlessness greatly improved & she had no further "dizzy fits". She felt quite steady when allowed up on 29.12.36.

She was discharged from Ward 33 on 1.1.37 on the understanding that she would require a long convalescence at home. The cardiac murmurs remained unchanged though the pulse was a little slower.
Commentary on Case IV.

This patient was admitted to hospital with a history of giddy attacks, anorexia, shortness of breath & choky cough. These symptoms may all be explained as results of a degree of cardiac weakness i.e. a partial failure in the mechanical driving power of the circulation. The giddiness we may explain as due to cerebral anaemia, the anorexia to venous stasis in the stomach mucosa & to reflex nervous influences through the vagus, the shortness of breath as due to a possible reduction in the vital capacity of the lungs following some pulmonary oedema & the choky cough produced probably by passive congestion of the bronchial mucosa & possibly also by reflex vagal impulses.

Now the heart of a child of 14 years does not show such signs of failure without good reasons & much provocation. Here we have clinical evidence of a definite valvular lesion producing in itself a considerable mechanical embarrassment to the efficiency of the circulation. The physical signs of a rough presystolic & systolic mitral murmur, we know to mean that the
mitral orifice is stenosed & the valve incompetent. Such a lesion implies distortion of the valve cusps by the contraction of fibrous tissue, the result of an old standing endocarditis. It is most probable that this damage dates from the first severe attack of acute rheumatism in 1929, & we know that the mitral valve is peculiarly liable to damage in this disease.

The mere existence of a mitral stenosis however, does not as a rule reduce the patient to a cardiac cripple at the age of 14. Usually the heart can compensate adequately for such a valvular embarrassment & enable the patient to carry on almost symptomless till the age of 30-40, or in some cases even longer. In such cases we can find clinical evidence of the compensation in that the right side of the heart is enlarged & usually percussable to the right of the sternum. Also, a systolic impulse is to be seen in the epigastrium & a possible thrill felt over the precordium. In this case we have found no evidence clinically of any such marked compensation. We
must remember however that hypertrophy of the right ventricle may occur without increase of the size of the cavity (dilatation), i.e. concentric hypertrophy. In such a case the increase in precordial dulness may be slight or absent. An electrocardiogram would have furnished more accurate information as to the relative predominance of hypertrophy of the right or left ventricles, but no such a record is available.

Now compensation requires a fairly healthy state of the myocardium. We can simply therefore that in this case the myocardium has been damaged as well as the mitral value and to such an extent that what compensation there has been is already showing signs of inadequacy. Myocarditis rather than endocarditis has produced the picture here, and the rheumatic process has had plenty of chances to effect this damage in the seven bouts of acute rheumatism which the patient has had.

Social & economic factors have played no small part in the tragic story of this girl. Her father is a miner. The family of 9 live in a 4-roomed house tenement in a
mining village. As soon as the child was 14, she was sent to work in a pottery factory, doubtless to augment the family wage. They simply could not afford to give her the good food, adequate rest, etc. that she required as a chronic invalid.

We may note that the attacks of rheumatism came on always in the damp autumn months and that she was quite free from pains in the summer. One small point is interesting in view of the streptococcal theory of the etiology of rheumatism. Although the other six children in the family have all had scarlet fever at one time or another, the patient has remained immune.
Case V

Name: William Fuller  Age: 36
Address: Forestfield, Caldercruix, Airdrie
Occupation: Miner (unemployed)

Date of Admission: 17.6.36
Date of Examination: 22.6.36

Complaint: Shortness of breath for about 4 yrs & swelling of ankles & legs 2 mths.

History: Personal

Present Illness: About the beginning of 1932 patient began to notice that he became easily breathless on exertion, especially at his work. He had a "dizzy turn" one day while out for a walk, but managed to get home by himself after resting. He called in his Dr. who kept him off work, & he has not been able to return since. He was shortly afterwards for 4 weeks in the Glasgow Royal Infirmary & was considerably improved at the time of his discharge. He has remained at home since then doing "odd jobs about the house."

About 2 mths ago he began to notice that his ankles were swelling in
the evenings. The swelling was not present when he got up in the morning but appeared soon after this & got worse later in the day. This had never occurred before & he has no varicose veins. At the beginning of June the swelling was so bad that it was extended up to his knees & came on much earlier in the day.

He has felt his heart "thumping" for several years on exertion, but says this has also become more marked latterly.

He has had a hacky cough off & on for some time but with little or no sputum. About 3 wks before admission he was alarmed when he "coughed up a little blood" for the first time. This has not happened since.

He has been sleeping fairly well, but recently has had to sit sit up in bed very now & again to get breath. These attacks have occurred during the night.

Patient says that for many years he has "felt the damp" & gets "twinings of rheumatic" in his muscles & joints. For one wks before admission he has had
Pain and stiffness in his left knee joint which is swollen and "feels hot". Since admission he has felt slight pain on moving his left ankle.

**Previous Illnesses:**

In 1910 when he was 10 yrs old he had a severe attack of St. Vitus' Dance (chorea), was off school for 18 months. He has had no further attacks of chorea and has never had rheumatic fever. He has never been subject to sore throats and his joint pains have never been severe. Otherwise he has been healthy and was quite fit for his work until about 4 yrs ago.

**Family History:**

Married, + has 1 child aged 6 yrs. Wife + child alive + well. No family history of rheumatism.

**Home Conditions + Habits:**

Lives in a small but dry + comfortable house. Smokes about 10 cigarettes per day.

**Teetotaler:**

**State on Examination:**

**General Examination:** Patient is a well-built, well-nourished young man and is an
intelligent & helpful witness. He is propped up in bed (3 pillows) & is slightly dyspneic. His lips & ears are cyanosed & he is sweating at the brow, though his skin is warm. There is a moderate degree of pitting oedema of his feet, but this does not extend up his legs.

Temperature. 97.6 °F.

Cardiovascular System.

There is cyanosis of the lips & ears & also of the finger nails. No clubbing of the fingers is observed.


Heart. Inspection.

The whole precordia is seen to heave with each systole & there is well-marked epigastria pulsation, & pulsation in the 5th & 6th left intercostal spaces. The veins in the neck are distended on each side & show well-marked & venous pulsation.

Palpation. No thrill (pre-systolic) palpable.

Percussion. Apex beat in right 6th space just outside
Percussion: Borders: \[ \frac{1}{2} \text{ to } \frac{3}{4} \] i.e. No apparent increase in dullness to the right of the sternal.

Auscultation: Mitral area. The ventricular rate is 115 per min., i.e. showing a marked pulse deficit at the radial pulse. A soft blowing systolic murmur is heard at the apex and is propagated towards the left axilla. There is also a rumbling, low-pitched murmur heard throughout the first half of diastole. The second sound is loud but pure.

Pulmonary area. The second sound is accentuated.

Aortic area. Both sounds pure.

Tricuspid area. Both sounds seem pure.

In addition to the above murmurs there is a musical, whining murmur heard best towards the lower end of the left border of the sternal. It is short & mid-diastolic in time & seems to be superimposed on the rumbling lower-pitched murmur described above.

Respiratory System:
Patient has no cough or sputum at present.
Thorax. Inspection. Chest is well developed & covered & moves freely with respiration.
Respiratory rate = 22 per min.
Palpation. Chest expands equally on both sides with respiration. Vocal fremitus equal & normal.

Percussion. - Note is resonant in all areas.

Auscultation. Breath sounds vesicular in character & with no accompaniments in all areas.

Alimentary System.
Appetite has been & is fairly good.
Bowels regular. No indigestion.
Teeth. - Artificial in both jaws.

Tongue - moist, slightly furred.
Throat & tonsils, appear quite healthy.

Abdomen. Well covered. Moves freely with respiration. Palpation. No tenderness on light or deep palpation in any area.
No palpable enlargement of liver or spleen.
Percussion. No dullness detected in either flank.

Urinary System.
No frequency, dysuria or other symptoms.

Nervous System.

Higher Cerebral & Mental Functions - appear normal.
Cranial Nerves - appear to be functioning satisfactorily. Pupils, equal, regular & react normally to light & accommodation.
Motor & Sensory Functions - nothing abnormal detected.
Wrist & Biceps jerks present & equal.

Locomotor System.

Left knee is swollen, reddened & hot. There is pain on active & passive movement & extension is somewhat limited. There is fluid in the joint spaces. "Floating" patella can be "tapped."

Patient complains of pain on moving left ankle, though nothing abnormal can be detected.

Other joints appear normal.

Skeletal System.

No subcutaneous rheumatic nodules can be found.

Further Special Investigations.

of the heart in the region of the pulmonary artery; x-ray diagnosis being that of mitral disease with commencing failure.

Knee joints. x-ray negative.

Sinuses. x-ray negative.

Blood Wassermann Reaction - negative.

Electrocardiographic examination 20.6.36.

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**Description of Electrocardiogram:**

1. Rate. Average ventricular rate = 72 per min.


3. Axis. Deviation = +126°, i.e. right ventricular predominance.

4. P Waves \(\frac{P-R}{Intervals}\) Auricular activity is manifested as small undulations of the base line.

5. QRS Complexes. Downward in lead I, upright in heads II & III. Varying in amplitude.

Summary. Atrial Fibrillation

& Right ventricular preponderance.

Joint Fluid (b.p.) Bacteriological examination

25.6.36 & 26.6.36 - negative - no organisms.

Treatment & Progress while in Hospital.

17.6.36. Quin 500 Digitalis - min. X T.I.D.
21.6.36. Quin 500 Digitalis - min. X 5 T.I.D.
23.6.36. Quin 500 Digitalis - min. X 2 T.I.D.
28.6.36. Quin 500 Digitalis - min. X 1 T.I.D.
2.7.36. Stop Digitalis.

The effect of this treatment was most
satisfactory. The pulse deficit, which was
about 50 on admission, gradually shortened
& when the digitalis was finally stopped
there was no subsequent acceleration of
the pulse even though patient was
getting up daily.

The swelling of the left knee subsided
in a few days & movement became quite
free & painless. The left ankle also
gave no further symptoms.

Patient was allowed up for longer
periods each day & no further signs of
mild congestive heart failure appeared. The
cardiac murmurs remained unchanged.

A second Electrocardiogram was
taken on 9.7.36.

Description of Electrocardiogram:

1. **Rate**: Average ventricular rate = 84 per min.
2. **Mechanism**: Atrial Fibrillation.
3. **Axis Deviation**: +132° i.e. right ventric. preponderance.
4. **P Waves** and **P-R Intervals**: Atrial activity is manifested as small undulations of the base line.
5. **Q.R.S. Complexes**: Downward in lead I.

   Upright in leads II & III. Varying in amplitude.
7. **Summary**: Atrial Fibrillation & Right
Ventricular preponderance.

Note that the degree of preponderance is slightly greater than in the E.C.G. done on 20.6.36. (v.i.e. +132° instead of +126°).

Patient was discharged on 13.7.36 & was then free of symptoms. He was impressed with the absolute necessity of leading a quiet leisurely life.

Patient was seen again on 23.12.36 when he was in Ward 23 for the purposes of a clinical investigation. He was very pleased with his condition since his discharge. About 2 weeks after his discharge from hospital he was moving furniture etc in the house & noticed some swelling of his ankles in the evenings. This disappeared when he "took things easier" & got a bottle of medicine from his Dr.

He was still breathless on severe exertion but this was no worse than before. He had had no dizzy turns, cough or joint pains & had a good appetite & was sleeping well. This auricular fibrillation & murmurs were unchanged.
Commentary on Case V.

This case may be said to represent the last phase of rheumatic heart disease— the cardiac cripple. This is the picture which must flash through the mind of every clinician who sees a case of acute rheumatism, which must also have exalted to renewed efforts countless disappointed research workers engaged on the problem of rheumatism. These cases are tragically common. Approximately one-half to two-thirds of all young subjects who contract acute rheumatism will become cardiac cripples before the age of fifty, (Prof. W. T. Ritchie).

Without labouring on statistics, it will suffice to point out that year after year at least 1000 lives are lost from heart disease of rheumatic origin in Scotland.

The patient was admitted showing obvious signs of cardiac commencing cardiac failure—dyspnoea, oedema of the legs, & the development of an abnormal cardiac mechanism viz, auricular fibrillation. There is a clear history of chorea 26 years before, & there is further evidence of the rheumatic infection which has been smouldering ever since, in the acute.

1. See next page.
sclerotic arthritis in his knees. Note the negative result of bacteriological examination of the joint fluid. It is very rare for any definite organism to be obtained in such rheumatic joints & this is held by many to indicate that the arthritis is really an allergic reaction, i.e. antigen-antibody reaction.

Amongst the associated diseases in auricular fibrillation, mitral stenosis of rheumatic origin is the most common. E.g. in 35% of a series of 500 fibrillations (Prof. Ritchie)1.

Clinically, while the presystolic thrill & mitral presystolic murmur so characteristic of mitral stenosis, disappear with the onset of fibrillation, the rumbling diastolic murmur remains as evidence of the mitral stenosis. This is due to the relaxing ventricle in diastole resulting in a flow of blood through the stenosed orifice. It is not easy to account satisfactorily for the musical diastolic murmur heard best well down at the left border of the sternum. It may possibly be due to a degree of pulmonary incompetence, though this is the rarest of valvular lesions but may be suggested by the X-ray prominence of

The pulmonary artery. More probably, considering the definite musical quality of the murmur, it is due to a half-detached fragment of valve or loose chorda tendinea playing in the blood current.

The absence of any marked signs of congestive heart failure, such as "back-pressure" with engorged veins etc., & the E.C.G. findings of right ventricular preponderance, suggest that the failure in this case was that of the muscle of the left ventricle. Such failure would affect the systemic circulation resulting in venous stasis & malnutrition of the heart itself. Recent work goes to show that attacks of cardiac asthma, as in this case, are due to relative failure of the left ventricle causing acute pulmonary oedema & reduction in the vital capacity of the lungs. Such pulmonary engorgement will also account for the slight haemoptysis in this case.

The failure of the left ventricle may be said to have been due principally to: 1. rheumatic myocarditis resulting from the original lesion, 2. from possible mild recrudescences of the latent disease in the heart, & 3. the onset of auricular fibrillation introducing new factors & strains.

This is the type of case that benefits above all others from the administration of digitalis. The drug does not abolish the curious movement in the auricle, but slows the ventricle by increasing the degree of heart block. This effect is well seen in this case by the shortening of the pulse deficit. Whether or not it acts as a direct cardiac tonic, is a matter of dispute. It is usually held that digitalis slows the whole heart by its action on the vagus thus prolonging diastole, increasing the force of systole & improving the coronary circulation & so the nutrition of the cardiac muscle. It has been shown that in cases of auricular fibrillation, digitalis produces an effect in 2-5 hours after oral administration.

The prognosis in this type of case depends pre-eminent on the condition of the myocardium. In assessing it in this case we may consider as: (a) unfavourable factors: (i) the presence of an old & probably still active rheumatic myocarditis, (ii) the disordered cardiac mechanism, & (c) favourable factors:

(i) the absence of physical signs of marked back pressure such as great enlargement of the right side of the heart, enlarged liver, ascites etc, (ii) the very satisfactory response to rest & digitalis as shown by the shortening of the pulse deficit & by the slow pulse rate continuing after the patient was getting up, (iii) the slow ventricular rate even before digitalisation (72 as shown by E.C.G.). & (iv) most important of all, the improvement in the condition of the patient being continued for six months without needing even a small maintenance dose of digitalis.

On the whole therefore, the immediate prognosis seems to be favourable. We must remember however that auricular fibrillation is a serious condition & not many patients live much longer than 10 years. These are the chronic cardiac cripples who drift in & out of hospital again & again, each successive stay becoming longer & the intervals between readmission becoming shorter.
Case VI.

Name: Alexander Brannan.
Age: 42.
Address: 71, Gibraltar Gardens, Dalkeith.
Occupation: Miners.

Date of Admission: 12.12.36.
Date of Examination: 22.12.36.

Complaint: Swelling & pain in joints for 2 yrs.

History: Personal.

Present illness: Patient was quite well until about 2 yrs ago when he noticed that the knuckle joints of both hands were gradually becoming stiff & swollen. There was no chill or anything that seemed to determine the onset. The condition progressed for some months & he gradually felt weaker in his grip owing to the stiffness. Some months after the onset he so noticed a similar stiffness in his elbows & later his ankles & knees were affected. It was only with difficulty that he managed to continue at his work until August 1936. About 9 months ago he felt "firm bumps under the skin" which on
the back of the left elbow. These nodules are painless & have increased in size. A
similar nodule began to form behind the right elbow about 2 mths ago. His main
complaint now concerns the right ankle & left knee in which the swelling & pain increase
considerably if he walks for a long distance. His elbows & knuckle joints are still stiff,
but not as bad as they have been before.

Previous Illnesses.

During the War at Salonica in 1917 patient was in bed for a short time with some
swelling & pains in his elbows & shoulders. He had 9 attacks of malaria - the last
in 1918 - & he cannot remember whether the pains etc. were during one of these attacks
or were rheumatism.

He had no more joint pains until his present illness. He was treated
in Ward 32 for stomach pains & indigestion in 1932 & still takes
Mackain's powder occasionally.

Social History. Moderate smoker. Alcohol moderate. Patient says that his illness is
due to working in a damp pit.
Family History
Father died of cancer at 65.
Mother died of some thoracic lesion at 69.
Wife died of pneumonia at 36.
Three children alive & well.
No family history of rheumatism.

State on Examination.
Patient is a well built, healthy-looking man, lying comfortably in bed. He is of average intelligence & is a helpful witness. Temp 97.4°F.

Locomotor System.
The left knee & right ankle are the joints most affected. The left knee is swollen visibly, but not tense. Active movements are slow & painful, but there is no limitation of range & no abnormal mobility. The left ankle shows no abnormalities.

Right knee, no swelling & movements full & painless. Marked ecchymosis is heard.

Right ankle, is swollen behind & in front of lateral malleolus. No pain or limitation of movement.

Feet - N.A.D.

Hips - N.A.D. Shoulders N.A.D.

Left elbow, no swelling or limitation of movement. Several fibrous subcutaneous
modules are felt over the posterior aspect of
the joint & the olecranon bursa is enlarged.
Right elbow — no swelling or limitation.
A subcutaneous nodule is felt posteriorly.
Wrist — N.A.D. Metacarpo-phalangeal
joints of both hands are swollen & there
is slight ulnar deviation. Movement of hands
& pronation are good & painless.
Interphalangeal joints of both hands show
mild fusiform swelling & there some
stiffness is present. There is some
weak wasting of the small muscles of the
hands with consequent weakness of the grip.
Other joints — N.A.D.
Cardiovascular System.
No dyspnoea, cyanosis or sedgea.
Radial pulse — regular in time & force &
wave of good volume & well sustained.
Rate 90. Vessel wall is palpable &
tortuous. P. P. 160/102
Heart — Inspection: — no obvious pulsation.
Palpation: No palpable thrill. Apex beat
in Vth space inside mid-clavicular line.
Percussion: No obvious enlargement — III
Auscultation: Mitral area: — there is a soft
blowing. Systolic murmur propagated towards
the aorta. Pulmonary area - the second
sound is a little accentuated. Aortic
area - the second sound is sharp & a
little slightly accentuated. Other sounds are
pure.

Respiratory system:
No cough, dyspnoea, or pain or clubbing
of fingers. Respiratory rate 20 per min.

Thorax: Inspection - moves equally on both
sides with respiration & is well developed.

Percussion - vocal fremitus normal & equal.

Respiration - note is resonant in all areas.

Auscultation - breath sounds are vesicular in
character with no accompaniments in any area.

Vocal resonance - normal or equal on two sides.

Alimentary System:

Appetite good. Slight indigestion at times.

Bowels regular.

Tongue moist & clean. Teeth - none
in upper jaw. Several very septic teeth in
lower jaw. Throat & tonsils N.A.D.

Abdomen - moves freely with respiration.

No tenderness or palpable mass. Liver not
enlarged.
Nervous System.

Urinary System.
No urinary symptoms.
Urine - no albumin or sugar.

Haemo poetic System.
No obvious anaemia.

No enlargement of glands, liver or spleen.

Legamentary System.
N.A.D. - no nodules found except those on the elbows.

Further special investigations:
15.12.36. Blood B.C. Fixation test - very weak positive.

X-ray report 17.12.36.
"Knee joints show considerable diminution of joint space on left side, both show bony rarefaction. Peri-articular soft-tissue swelling on the left side. Generalised rarefaction of bones of the hand and marked peri-articular soft tissue swelling seen best at the inter-phalangeal joints. The joint spaces are considerably diminished. There is dislocation of the 3rd metacarpophalangeal joint on the
right side. Wrist joints show considerable diminution of joint space. There is indentation of the lower end of the right radius. Arthritic changes are present in both elbow joints. The appearances are those of a rheumatoid arthritis of long standing.

**Treatment & Progress while in Hospital.**


Blood sedimentation rate = 12 mm.

8 teeth were extracted from the lower jaw & patient was given frequent mouth washes.

17.12.36. Solganol B. oleum 0.01 Gm. I.M.I

21.12.36. " " " 0.01 Gm. I.M.I.

24.12.36. Urine contained slight trace of albumen & also hyaline & a few epithelial casts.

25.12.36. Solganol 0.02 Gm. I.M.I.


27.12.36. Urine " " " " " "

The right ankle had improved, but the left knee was still swollen & painful.

28.12.36. Solganol 0.02 Gm. I.M.I.

Scott's dressing applied to left knee.
Urine  N.A.D.  Blood sedimentation rate = 15mm.
30.12.36.  Solganol B. oleosaum. 0.05 ccm. I.M.I.
2.1.37.  Scott's dressing applied to left knee.
3.1.37.  Solganol 0.05 ccm. I.M.I.
4.1.37.  Urine being tested daily for albumen. It contained occasionally a faint trace by the salicyl-sulphone acid test. No casts present.
5.1.37.  Sand bags applied
7.1.37.  Scott's dressing applied to left knee.
         Solganol 0.1 ccm. I.M.I.
Urine  N.A.D.
8.1.37.  Scott's dressing to left knee.
10.1.37.  Solganol 0.1 ccm.
13.1.37.  Solganol 0.2 ccm.

The hands were being moved much more freely & the left knee though still swollen, was softer. Movement was free & painless.

16.1.37.  Solganol B. oleosaum. 0.2 ccm. I.M.I.
19.1.37.  Patient was discharged to
          the Ashtree Home Institution. There was a very definite improvement in the condition of the joints, but they had by no means returned to normal.
Commentary on Case VI.

It is evident that in this case we are dealing with a different type of joint affection to that studied in the cases of acute rheumatism. The clinical picture here is that of a slowly progressive condition starting in a healthy middle-aged man, involving first the small joints of the hands & later other larger joints & causing marked disability by reason of pain, stiffness & swelling in the joints, made worse by exercise. This contrasts greatly to the intensely tender, hot, reddened, swollen joints in acute rheumatism, which is an acute process characteristically flitting from joint to joint & leaving them apparently undamaged. Furthermore, acute rheumatism is a self-limiting disease & even if left untreated, tends to subside in from 3-8 weeks.

The only difficulty that might have arisen in the diagnosis of this case was in ruling out gonococcal arthritis, especially in view of the positive G.C. fixation test. This however was a very weak positive reaction, whilst the  

characteristic firm or soft swelling of the small joints of the hands with ulnar deviation & wasting, in addition to the characteristic X-ray appearances, are quite sufficient evidence to make a diagnosis of Rheumatoid Arthritis.

Now, "rheumatoid" means "like rheumatism", & we must therefore proceed to find out what justification there is for including this case in a series of rheumatic cases.

There are two features here which point directly to an underlying frankly rheumatic infection being the cause of the patient's condition. The first is the history of an acute attack of pain & swelling in the shoulders & elbows, which he had in 1917. Taken by itself, this history is not very convincing evidence, when one remembers his nine attacks of malaria & wonders whether he may not have mistaken an attack of malarial ague for acute rheumatism. The patient however is quite certain in regard to this point & the second feature, the presence of several definite subcutaneous rheumatic nodules, is a positive sign that a rheumatic process is at work. Subcutaneous nodules are rare in rheumatoid arthritis, but
are known to occur in a small percentage of cases.

The history and clinical appearances here are sufficient to permit a diagnosis of a chronic infective arthritis with rheumatism as the probable causal agent. The septic teeth might well have provided a focus from which toxins might have affected the joints.

Many similar cases have such septic foci and are greatly improved following their removal. Many cases however have no history or suggestion of rheumatism; whilst again there are others which show all intermediate clinical forms between the joints of acute rheumatism and the joint condition seen in this case.

No pretence is made here to solve the problem of the etiology of rheumatoid arthritis. This however is one typical case in which the combination of cold, damp, repeated minor trauma, rheumatism, or a septic focus, are all present as possible causal factors. It is striking how well this fits in with the views of Davidson and Boldie recently expressed as follows. "Several factors are essential for the

production of chronic infective arthritis. The constitutional factor, emphasised by an abnormal capillary circulation often present from childhood, is very important. When a person with this type of constitution is exposed to factors such as cold, damp, occupational strain or infection, singly or in combination, a chronic arthritis is apt to appear far more often than in an ordinary individual. Of the factors which predispose to arthritis we believe infection to be the most important, of the many organisms which can sensitize the predisposed individual, the evidence incriminates the haemolytic streptococcus as the most frequent infective agent.

This patient has been treated by removal of his septic teeth & by injections of a gold salt. His condition has been greatly improved & he may be fit to return to work. He certainly wishes to do this as he is only 42 & has three children to support. It is most unfortunate that a return to his work as a miner would at once reintroduce three of the factors which we believe to have brought on his condition, viz. cold, damp & trauma.
prospects of continued improvement in such chronic arthritis are never too good even in women who form a large proportion of the cases; but one feels that a few days in the mine may undo the good of many weeks of treatment and the patient may become more and more of a cripple. Here again there is the all-important economic factor, seen in so very many of these cases, which presents an almost unsurmountable obstacle to the success of any form of therapy resulting in anything other than a complete cure.

There can be few classes of patents who as a whole have had more varied forms of therapy than those suffering from rheumatoid arthritis. The variety of methods of physiotherapy to which these cases have been subjected, is perhaps only surpassed by the variety of therapeutic agents which they have received as injections. Vaccines, peptides, boiled milk, sulphur, histamine & bee-venom are but a few of the more recent & popular substances administered by injection & claimed to produce marked improvement in these cases. The very multiplicity of remedies points to the inefficiency
Injections of gold salts is a form of treatment that has outlasted many others, while its limitations are realised, it has established itself as being justifiable and useful in all cases of rheumatoid arthritis as long as the disease is developing. The treatment was introduced by Forestier in France in 1928, in the belief that forms of treatment which had proved valuable for tuberculosis could help in the treatment of rheumatoid arthritis. Forestier considers that the treatment is justified in cases showing pains, stiffness, swellings, disability or blood tests such as leucocytosis or accelerated sedimentation rate. Used in such cases in conjunction with massage etc., he claims a cure in 70% of early cases. He reported in 1934, the results of treatment in a series of 500 cases. In many he used the preparation used in this patient, viz. aureothioglucose in an oily suspension (Aleo-Solganol B).

It is as well to remember the possible dangers and contraindications of gold therapy.

pain & swelling in the joints, usually diminishing from the third to tenth injection, though in some of these cases the joints may actually remain in this worse condition.

2. Nephritis. Renal impairment, as shown by albuminuria, is a contra-indication, & the urine must be tested daily throughout the treatment for such a sign of renal damage.

3. Prolonged treatment with gold may cause a permanent mauve pigmentation of the skin after much exposure to sunlight.
Having studied in detail some of the more clinical aspects of these rheumatic cases, it is interesting in conclusion to consider briefly the etiology & nature of the rheumatic process.

It would be futile & ridiculous to attempt to draw general conclusions from a series of six cases. Rather than let us enumerate such possible etiological factors as have been found in these cases, & then see how they fit in with the current theories as to the etiology of rheumatism.

1. All the patients have been of about the same social status viz. the decent artisan class: miners, domestic servant, street scavenger etc.

2. Most of them live, or have been brought up, in overcrowded houses. e.g. 12 in 3 rooms, 9 in 4 rooms, 7 in 2 rooms.

3. In three of the cases the patients attribute their rheumatism to cold & damp. e.g. "walked 4 miles in the rain", "work in a damp mine", "out in all weathers", whilst another - Case IV - lived in a damp condemned house. In most of the cases the attacks occurred nearly always in the autumn or winter months.
4. In three cases the patients have been susceptible to sore throats, which have often preceded the attacks of rheumatism by about 14 days. In Case I. these intervals have shortened progressively in subsequent attacks.

5. Three of the cases have never had scarlet fever even though all or most of the other children in the same family have contracted it at some time. (Case I. was shown by skin test not to be susceptible to the exotoxin of Streptococcus hemolyticus.)

6. Case II improved when treated with streptococcal antitoxin.

The pathology of rheumatism may be generally and briefly described as follows. It is an inflammatory condition of the fibrous tissues involving first & foremost the heart & as a rule the joints, subcutaneous tissues, occasionally the brain & probably certain other organs.(Boyd)

The basal rheumatic lesion is the rheumatic or Aschoff node which is a small inflammatory focus characterised by fibrinoid degeneration of connective tissue fibrils. Such focal deposits are found around the blood vessels of muscles & tendons including the heart muscle.

The majority of these lesions cause no symptoms, but in some there is an associated peri-focus inflammation mainly responsible for the pain in the muscles and joints, which in the heart may spread to the endocardium setting up endo- and peri-endocarditis. Nodules have never been found in the brain. The "infection" is apparently conveyed by the blood-stream.

In France, some authorities regard rheumatism as a tuberculous manifestation, though this theory finds little support elsewhere. Some say that rheumatism is due to a filtrable virus infection. A recent American paper supports this view.

For thirty-six years, since Poynton & Paine first published their studies on the relationship of streptococci to the rheumatic diseases, evidence has been mounting up incriminating the streptococcus haemolyticus as the causal agent in rheumatism. Many have held that a direct infection is present, but that the organisms are actually to be found in the nodules, blood stream and joints; but on the whole these views have not been adequately substantiated by repeated experimental proof.

The modern tendency is to regard rheumatism rather as an allergic state, or state of hypersensitivity, to haemolytic streptococci. The rheumatic illness has been shown to be very similar in many respects to allergic states induced experimentally. Thus acute rheumatism becomes a manifestation of hypersensitivity to haemolytic streptococci, which in 40-50% of cases are known to have infected the throat about 14 days before the development of the polyarthritis. This polyarthritis is explained as an antigen-antibody reaction in the joints, exactly similar to that seen in serum sickness.

These observations are backed by much convincing evidence of the work of Coburn & Pauli in America, is worthy of especial note. They have shown that following an acute streptococcal infection, such as tonsillitis, the antistreptolysin titre of the blood is raised. In individuals with a rheumatic tendency, this titre remains abnormally high, it rises steeply during attacks of acute rheumatism.

All observers agree that cold, damp, overcrowding, malnutrition, & lack of sufficient fresh air & exercise, are contributory biological factors.

factors in rheumatism, acting by reducing the general resistance of the individual. Many postulate in addition an inborn constitutional factor predisposing the individual to the toxins of the haemolytic streptococcus.

Scarlet fever has been proved to be due to the exotoxin of one strain of haemolytic streptococci. (Note that 3 of the 6 cases were evidently immune to this.) Bacteriologists have always held that endotoxins are non-diffusible & cannot provoke allergic states; but this view is now being modified in the light of recent experiments.

The latest work on rheumatism, now being carried out by Goldie & Griffiths & also in Edinburgh, suggests that rheumatism is an allergic state to the endotoxin of streptococcus haemolyticus. Skin tests, similar to the Dick test for scarlet fever, have been devised to investigate the susceptibility of individuals to this endotoxin. According to this work, a negative skin test (as obtained in Case 1), indicates a lack of antibody formation to the endotoxin of streptococcus haemolyticus, it being assumed.

that for a positive reaction to appear, both
toxin and antitoxin must be present. In the
stable reactive stage of rheumatism (i.e. between
the acute recurrences), where adequate
anti-endotoxin has presumably been formed,
positive skin tests appear in a high proportion
of cases.

The practical possibilities which such work
would seem to offer in the near future, are
far reaching and most encouraging. Thus individuals
susceptible to rheumatism may be discovered by
skin tests, or placed under the optimum
conditions to avoid or combat the disease. It
does not even seem too much to expect
that, if these subjects are hypersensitive to
the endotoxin of Streptococcus haemolyticus,
a method of desensitization may be evolved
which will confer on them the blessings of
immunity.

Even from a study of this short series of
cases, it is apparent that at present we
have no sure means of curing rheumatism.
Once it has become established in a susceptible
individual, less still can we cure the results
of rheumatism such as heart disease. The most
that can be said about the results of treatment in these cases is that the rheumatic process has been assisted to subside. It is abundantly evident that the prevention of the disease lies in the avoidance of the known etiological factors. This implies vast nation-wide problems such as dealing with overcrowding, bad environment, malnutrition & lack of the provision of space & time for fresh-air exercise. The public conscience is being gradually awakened to the ravages of acute rheumatism & health authorities are coming to realise that a co-ordinate, intensive anti-rheumatic campaign is needed, comparable to those so effective against tuberculosis & syphilis.

In the meantime the clinician can give most valuable help in the fight against rheumatism. It is he who can discover the etiological factors in the many cases he sees & who is therefore best able to suggest to health authorities the measures necessary for their elimination. Secondly, he alone can offer to the laboratory worker the facilities for the practical proof & trial of new theories & therapeutic measures, as necessary.
in research. We can feel confident that, when eventually this combined campaign against rheumatism is crowned with success, the Edinburgh Medical School will have played a leading part in bringing about so great an achievement.