# RHEUMATOID ARTHRITIS.

THESIS

Submitted for the M.D. Edinburgh.

by

Philip William Lam.

M.B.Ch.B. Edinburgh 1915.

Resident Medical Officer

North Evington Infirmary.

Leicester.

Late Senior House Surgeon. District

Hospital. West Bromwich.

CONTENTS.

## INTRODUCTION.

Chronic affections of joints are disorders of frequent occurrence and our knowledge with regard to them is, at the present moment very imperfect. To many different joint affections, the designation "Rheumatoid Arthritis" has been applied, while some authors employ the name as synonymous with Arthritis deformans, osteo-arthritis, and Rheumatic Gout, to mention but a few of them. This confusion is not surprising considering the uncertain etiology of the malady we have under discussion, and the many manifestations which the disease may assume clinically. The close resemblance of the disease to Rheumatism and Gout had long been observed by physicians of the past. Thus Brodie[1] (1818), (ref) regarded the disease as gouty in nature, while MacLeod[2] described it under the title "Capsular Rheumatism" (1842), and "Chronic Rheumatism of the joints" was the appellation used by Todd[3] (ref) (1843). As these latter appellations did not embrace the other side of the clinical picture, namely the distortions and deformities which so closely resemble those of

Gout, Fuller[4] (ref) (1852) considered the condition to occupy a position intermediate to Rheumatism and Gout, and that it was a hybrid disorder of these two diseases, describing it by the compound name "Rheumatic Gout". Later studies and observations seem to disprove these views and Rheumatoid Arthritis is now generally held as a distinct disease entirely apart from Rheumatism and Gout. There is still a point, however, upon which unanimity of opinion is wanting. While some regard Rheumatoid Arthritis as a disease showing various grades of joint changes, others look upon it as a distinct disease to Osteo-Arthritis.

Dr. R. Hutchinson has, however, summarised the position as follows, and recognises:-

(1) An atrophic form in which there is no over-growth of the ends of the bones (Rheumatoid Arthritis), and

(2) A hypertrophic form in which changes begin in the bones and destruction of it is continued with new formation and overgrowth. (Osteo-Arthritis). (Medical Annual 1910).

Having had the opportunity of studying a series of such cases I propose to deal fully with this interesting subject, paying special attention to the recent work and observations upon it.

## CLASSIFICATION OF THE SO-CALLED "RHEUMATIC" CONDITIONS.

The term "Rheumatism" has been employed extensively and indiscriminately for a large number of clinical phenomena, which have very little justification for the name. Any pain in the muscle or joints, or any stiffness of the articulations has been described as a "Rheumatic" condition. Whilst it is true that the word has thus been deprived of much of its real significance, it is nevertheless desirable to review the various maladies which have been included in its province, and to distinguish them from the disease which we are studying. To attempt to classify these various disorders in a scientific basis is obviously impossible, since many of the views which have been advanced, from time to time to account for their causation are still subjects of controversy. Not until anything like universal assent is secured for the etiology of the majority of these conditions, is it possible to group them, in a way, that is at once scientific and

rational. Any method of classification is open to criticism, and I am only too painfully conscious of the defects of the one, which I am going to adopt. It is perhaps well to survey first, the scope conveyed by the nomenclatures, Rheumatoid arthritis, Arthritis deformans, and Osteo arthritis, which have led us to so much confusion. All these are comparatively new names given for a condition, or a number of conditions, which were at one time thought to be intimately related to Rheumatism and to Gout.

Sir Alfred Garrod[5] in 1858 proposed the adoption of the name "Rheumatoid arthritis" and defined it as a form of inflammation of the joints, accompanied with but little febrile disturbance, and distinguished from Gout and Rheumatism by its progressive character, by the peculiar morbid changes which it induces, and by the absence of any known morbid state of the blood. Garrod, by his pronouncement cleared much of the ground of obscurity with

regard to the nature of the disease, and his views have won approval from many of the later observers of the malady. From his time onward most of the authorities seem to recognise the condition as a separate entity apart from Rheumatism and Gout, though Sir Dyce Duckworth,[6] and Jonathan Hutchinson[7] still viewed it as inseparable from these disorders. Since Garrod's time, Rheumatoid arthritis as a disease, has received much prominence, in the field of investigation by clinicians. Senator[8] in 1869, described it under the name Arthritis deformans. C. Hilton Fagge[9], in 1886 adopted this latter designation, in his description of the disease. J. Kent Spender[10] in 1889 discussed the early treatment of the malady under the name "Osteo arthritis", H. Lane, and C. T. Griffiths[11] in 1890 divided the disease into Rheumatoid arthritis Osteo arthritis, and Rheumatic arthritis. Russell Forsebrook[12] in a dissertation on the subject in 1893, found favour with the name Osteo arthritis. Bannatyne[13] in 1896, although adopting the appellation Rheumatoid Arthritis, in a treatise, suggested that there were really two distinct disorders. Samuel Hyde[14] in 1896,

C. O. Hawthorne[15] in 1900 and Julia Cock[16] in 1902 reverted to the use of the name Rheumatoid arthritis, in their description of the disease.

A. E. Garrod[17] in 1907 thought that Rheumatoid arthritis and Osteo arthritis were really two distinct diseases, and this view is shared among others, by A.H.Tubby[18], Robert Hutchinson[19], Llewellyn Jones[20], and Hale White[21], Osler[22], and T. McCrae[23], however do not make such a definite distinction, and employ the designation "Arthritis deformans" in describing the conditions. Some agin, notably Lane and Griffiths regard Osteo-arthritis as merely a later stage of Rheumatoid arthritis. In the introduction, I have adopted Robert Hutchinson's summary of the present position, and I now wish to distinguish briefly, Rheumatoid arthritis from Osteo-arthritis.

(1). RHEUMATOID ARTHRITIS, is a disease which generally pursues a very chronic or insidious course from its beginning, although cases with an acute or subacute onset do not

seem to be infrequent. The lesions are most evident, in the joints and according to most authorities the most primary changes commence in the synovial membrane and in the soft tissues of the joints which in time develop into a fusiform shape. In the acute stages at least, there are no bony changes, and there is an absence of the osteophytic overgrowths, and of the erosion of the central portions of the cartilages, which are pronounced features of osteo-arthritis. The changes in the cartilage and bone in the older cases are regarded as being brought about by the pressure of the hypertrophied synovial fringes. Fresh joints are attacked from time to time, until in the most obstinate cases, hardly an articulation in the body escapes. Later on, the damaged joints become fixed or distorted by the contraction of the wasted muscles, giving rise to the most hideous deformities, and producing much crippling and disability in the victim of this

terrible disease. Persistent pain and agony, especially in the earlier stages, crown the torture of this malady.

(2) OSTEO ARTHRITIS. Under this head probably several conditions are included, namely the more generalized form of the disease, and the various localised forms, such as those cases which exhibit Heberden's nodes, osteo-arthritis of the carpo-metacarpal joint of the thumb, of the metacarpal phanlangeal joint of one of the fingers; and commonplace hip joint disease of elderly people, and Spondylitis deformans. Osteo-arthritis is primarily a disease of the cartilage and bone, leading to the destruction of the cartilage eburnation of the bony surfaces and the production of much new bone at the edges of the joints - osteo-phytes. These manifest themselves clinically as excrescences and can be palpated by the finger. On account of the bony changes, the ends of the bones become very irregular, and when the joint is passively moved, much pain

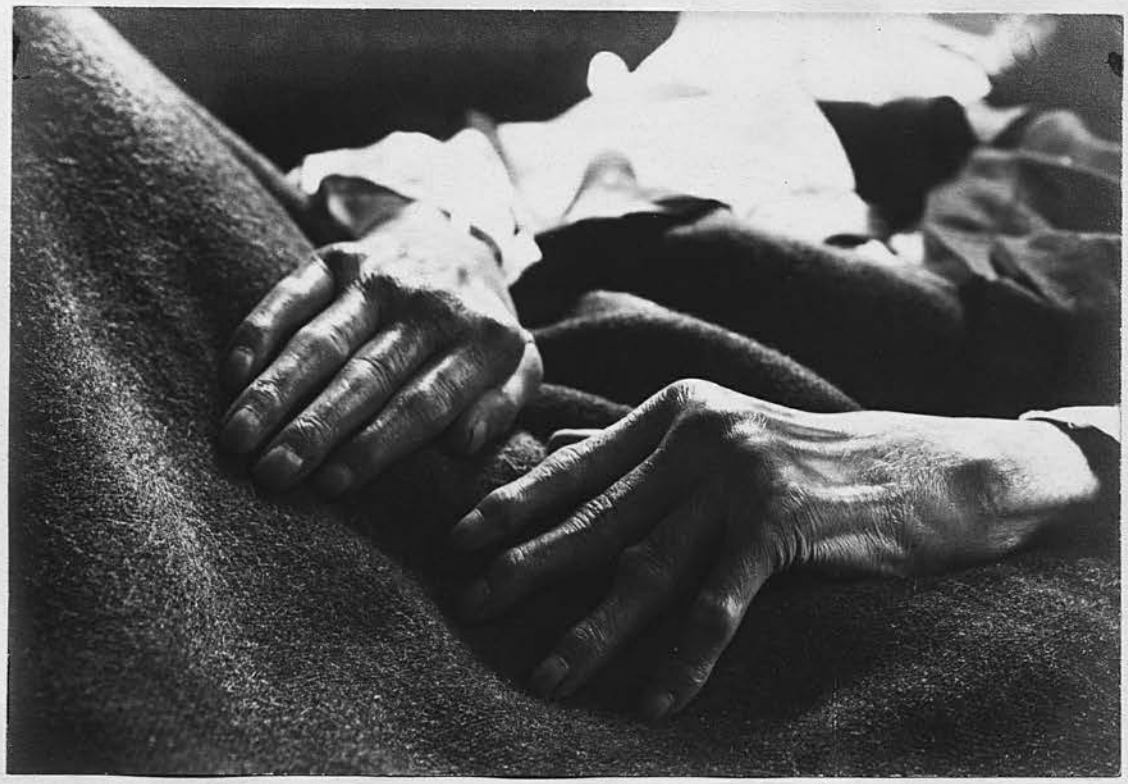
No.1.

and grating are elicited, indeed locking of such joints is not infrequent.

The accompanying photograph (figure 1) shows a case of osteo-arthritis of the metacarpal-phalangeal joint of the index finger of the left hand, in a man 74 years of age. It will be seen that there is a marked bony thickening of the base of the first phanlange posteriorly It does not, however, hinder the movement of this joint, although this is accompanied by pain and crackling. There is no history of previous injury to this articulation.

It is true, in many cases a distinction can be made between Rheumatoid arthritis, and Osteo-arthritis, by studying the character of the morbid changes of the joints, in others again, this would seem impossible. Photograph 2. illustrates a case in point. It will be seen that the fingers of the patient's right hand show the spindle shaped joints of Rheumatoid arthritis, and Heberden's nodes, which represent the characteristic feature of Osteo-arthritis, are seen in some of the

No.2.



fingers of his left hand. (For history of this case, see case 1). The co-existence of such an overlapping of the two diseases has also been noted by T. McCrae, R. Llewellyn Jones and others.

I will now proceed to discuss the various conditions which are frequently confounded with Rheumatoid arthritis, and osteo-arthritis, and these include:-

1. Acute Rheumatism and subacute Rheumatism.
2. Chronic Rheumatism.
3. Gout.
4. Gonorrhoeal rheumatism.
5. Tabetic arthritis.

1. ACUTE RHEUMATISM AND SUBACUTE RHEUMATISM.

In the early stage of an attack of acute rheumatoid arthritis it may be mistaken for acute Rheumatism, and later on, it may be confused with subacute rheumatism. They can be distinguished briefly by:-

(a) The Temperature. This is higher in acute rheumatism than in acute Rheumatoid

arthritis. In the former condition, it reaches 102° to 103° Fahr., and even more in the evening and in the latter it ranges between 99°F. to 100°F., in the morning and 100°F. to 101°F. in the evening. As the temperature of acute Rheumatism does not usually subside until the third to the sixth week, great difficulty may be experienced in distinguishing it from subacute Rheumatism, and here we find the state of the pulse a very useful guide.

(b) The pulse is much more rapid in Rheumatoid arthritis in relation to the temperature, often reaching 100 to 120 beats or even more per minute. A characteristic feature about Rheumatoid Arthritis is that the rapid pulse usually persists sometimes for months or even years after the temperature has subsided. High tension of the pulse is another very important feature of Rheumatoid arthritis.

(c) In Rheumatic fever there is a tendency to cardiac complications but not so in Rheumatoid arthritis.

(d) The perspiration in Rheumatic Fever is more profuse and more generalized in the body. In Rheumatoid arthritis, the perspiration is less profuse, and there is a tendency for it to localise in the palms and the soles. This latter feature indeed, sometimes persists throughout the whole course of the patient's illness.

(e) Rheumatism responds to salicylate medication, but Rheumatoid arthritis does not.

(f) In Rheumatism, the larger joints are generally attacked, in Rheumatoid arthritis, the smaller ones, such as the wrists and the finger joints, are usually involved. If the temporo-maxillary joints are attacked, the case is in favour of Rheumatoid arthritis. There is more muscular wasting in the neighbourhood of the articulations attacked in Rheumatoid arthritis than in Rheumatism.

(g) There are certain sensory phenomea which are sometimes complained of in cases of Rheumatoid adthritis, such as the feeling of

pins and needles and burning sensation in the skin. These are never present in Rheumatism.

(h) In Rheumatoid arthritis again, pigmentation of the skin called "freckles" is sometimes present. This is considered by J. Kent Spender as almost diagnostic of the condition.

(i) There is no residual thickening of the surrounding tissue of the articulations after an attack of Rheumatism, but this may be very marked in Rheumatoid arthritis even after a single acute attack.

2. CHRONIC RHEUMATISM.

It must be confessed that there is a wide diversity of opinion as to the existence of such a condition at all. It seems however, desirable to refer under the name Chronic Rheumatism, conditions of frequent recurrent slight articular attacks in rheumatic subjects, such as those who have a family history of Rheumatism, and those who have had one or two attacks of Rheumatic Fever, or of those conditions regarded as manifestations of this

disease. These include Rheumatic nodules, arythematous eruptions of various sorts, chorea, and tonsilitis.

Cases of chronic rheumatism appear to be very frequent in practice and here is an illustration of a typical one.

R.E. aet. 78 complains of recurrent aching pain in his left knee joint, and his wrist joints. The attacks only come on in wet weather, when these joints become painful, stiff, and at times swollen. These symptoms have lasted 38 years.

Family History. - No history of Rheumatism.

Personal History. - Was a bottler by occupation, and frequently exposed to cold and damp in his work. He as always lived well and wisely, with regard to food and alcohol. There is no history of syphilis or gonorrhoea in this case. He states that at the age of 40, he had an attack of Rheumatic fever, for which he was confined to his bed for 18 weeks. Since that time he has never been free from the complaints

he has just made. Heat, bath, massage, liniments etc. only bring temporary relief.

Present condition. Patient is a man of a medium build, and looks the very picture of robust health. He appears 20 years younger than his age, and does not show the slightest trace of mental deterioration. He lives a very active life, and makes open air exercise his habits.

The joints are all of normal size, and show no deformity or enlargement. The patient can move his left knee joint and wrist joints freely, without causing pain. There is a slight creaking of the left wrist joint on passive movement of this articulation.

Physical examination of the Heart and Lungs. - nil.

(Dr. Chalmers Watson records some cases, which present very similar features to the above, under the name Chronic Rheumatism, in the "Encyclopaedia Medica" 1902).

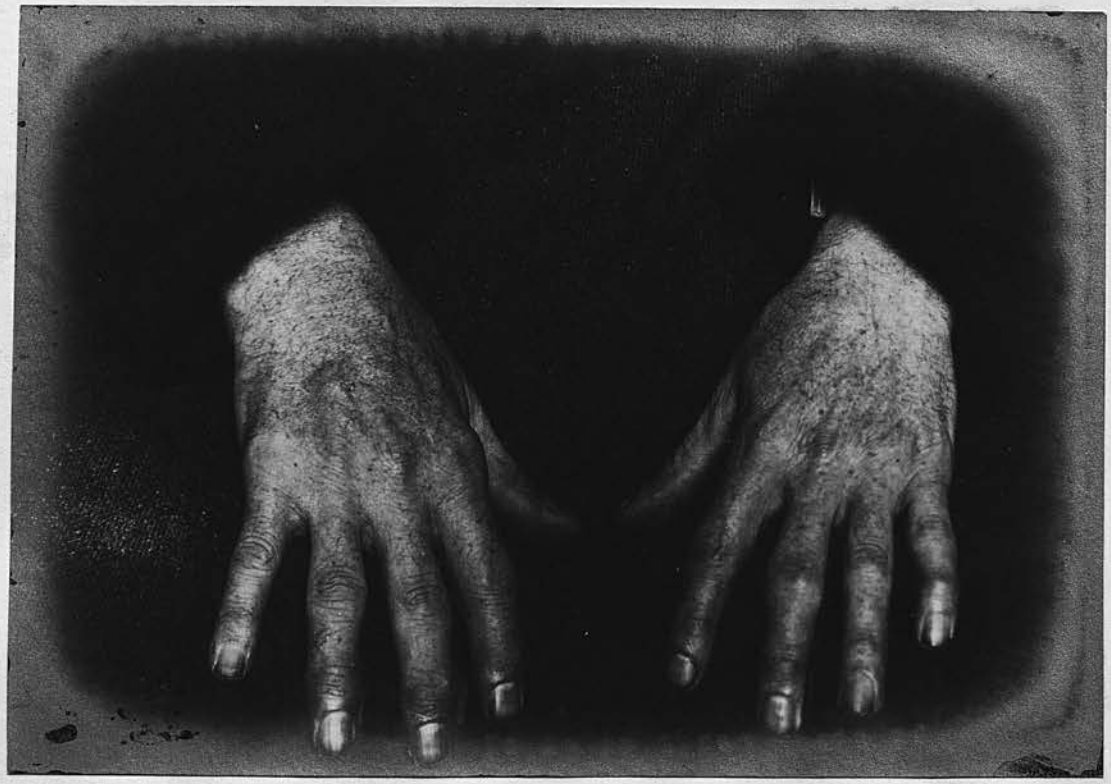
With a case like this, there ought to be no difficulty in diagnosing it from Rheumatoid arthritis, which gives rise to so much deformity

and crippling.

3. GOUT.

In a straightforward case of Gout there is no difficulty in distinguishing it from Rheumatoid arthritis or Osteo-arthritis. The family history of the patient, intemperance or over-eating, combined with inactivity on the part of the sufferer and the characteristic onset of the disease are sufficient to establish the diagnosis with certainty. In the more chronic cases in which tophi have appeared in the damaged joints, e.g. fingers, toes or at the edges of the ears, and advertise their presence by the swelling and redness over the involved joints, a differential diagnosis is hardly called for. It is in those cases of Gout which have lasted for years and which show recurrent attacks in the different joints of the body, that are so liable to be confounded with osteo-arthritis. Urates of soda have deposited in the cartilages, ligaments, and capsules of joints, especially those of the fingers producing

No.3.



in the articulations an irregular appearance, a certain amount of enlargement, deformity, and yet giving rise to no visible tophi or redness over the involved joints, rendering in the latter clinical features indistinguishable from those of osteo-arthritis, at least so far as the articulations are concerned. Of this close resemblance, the accompanying photograph, (photo 3) of a case of Gout amply testifies. But bearing in mind that in osteo-arthritis, the morbid changes are most marked in the bones, it must therefore follow that the thickening here is much harder and denser to the touch than it is in Gout.

Then urate of soda may be seen in and near the joints as light spots in x-ray prints. Again we may have in the latter many constitutional changes, which are not present in the former, namely, hypertrophy of the heart, thickening of the vessels high blood tension and chronic intestitial nephritis, hence albumen is frequently present in the urine. The condition of the urine should be carefully studied The uric acid output is usually very low during the

intervals of the paroxysm. At the height of the attack the elimination as a rule is greatly increased. The ratio of the uric acid to the urea excretion is disturbed in gouty cases and may fall as low as 1 to 100 or 1 to 150. (Osler). Finally I may add that in Gout there is an excess of uric acid in the blood and Garrold's uric acid thread experiment should be tried for its extraction, although many competent authorities argue that uniform results are not always to be expected.

An ounce of blood serum is drawn and placed in a watch glass; add to it 5 minims of glacial acetic acid, mix thoroughly and immerse a thread in the contents which are allowed to evaporate for 24 hours. The thread is taken out and it may show incrustation of uric acid under the microscope.

4. GONORRHOEAL RHEUMATISM OR GONORRHOEAL ARTHRITIS.

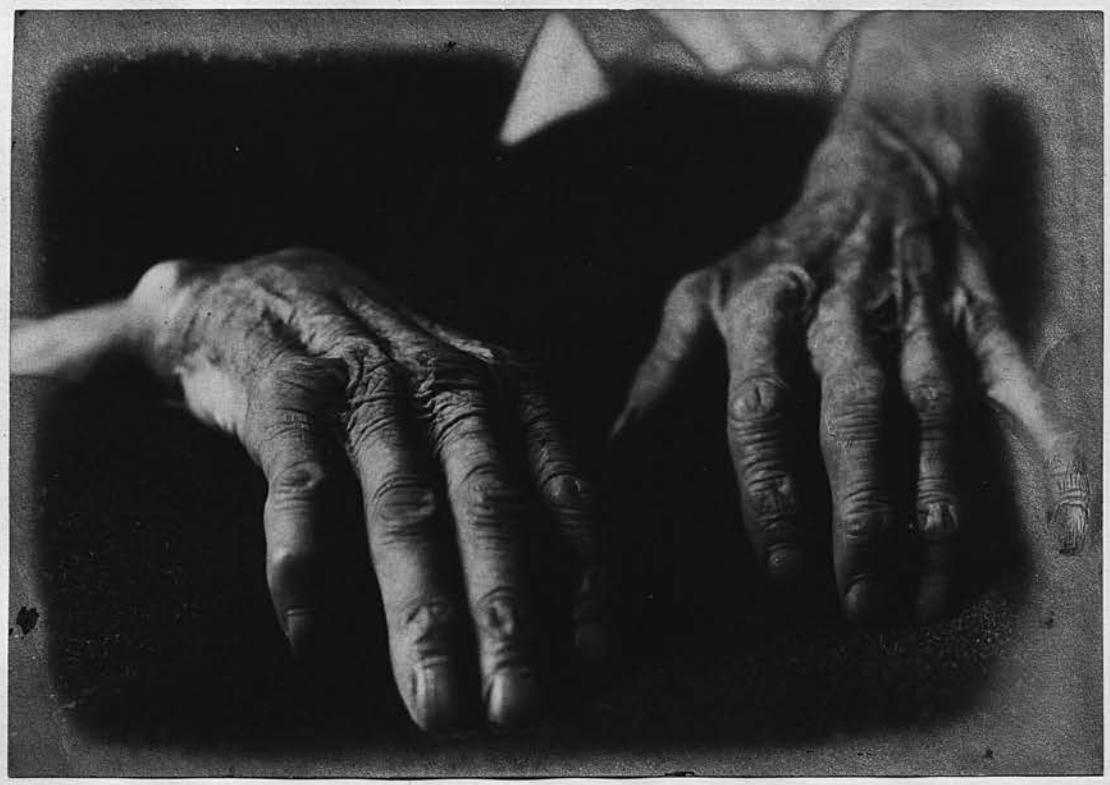
This may be acute or chronic. The acute form usually follows gleet, or an acute attack of Gonorrhoea, not thoroughly treated. Gonorrhoeal Rheumatism may attack one joint, or many joints may be involved. The articulation attacked becomes painful and swollen, but it seldom goes on to suppuration. All the joints are liable to be

attacked, even the temporo-maxillary articulation, and there is often marked muscular wasting in connection with the joint attacked. When this latter articulation is involved there is the danger of a mistaken diagnosis being made, and the condition regarded as Rheumatoid arthritis, especially when the cause of it is not suspected. It is well to remember that in Gonorrhoeal arthritis, there is not that fleeting character in the articular implications, the pain stays in one or more particular joint for months and sometimes even for years, until the pathogenic factor is removed, Sometimes the faciae, bursae, or tendons near the affected joints become inflamed assuming a red colour and are very tender to the touch. When this happens, a very useful clue is supplied.

5. TABETIC ARTHRITIS.

Tabetic arthritis or Charcot's joints assumes several forms, in one of which it shows a slight enlargement of the ends of the bones with slight exostosis. When this occurs in the finger joints, it is possible that it may be confounded with osteo-

No.4.



arthritis. The accompanying photograph (photograph 4) speaks eloquently of such clinical resemblances, but as the other features of osteo-arthritis differ so widely from tabes dorsalis, that an incorrect diagnosis should be impossible.

Finally, it does not seem out of place to mention another possible error in diagnosis, and that is in a case of rheumatoid arthritis of the hands, where there is very rapid muscular wasting, when it may be confused with progressive muscular atrophy. There is in this latter disease, a diminished response of the muscles to galvanic and faradic irritability and even reaction of degeneration may be obtained but not so in Rheumatoid arthritis.

# NOTES ON THE ETIOLOGY AND PATHOLOGY OF RHEUMATOID ARTHRITIS.

In discussing the etiology of Rheumatoid arthritis, it is well at the outset to say that this is very obscure and that although many different factors have been assigned to its causation, there is but little agreement upon the origin of the disease. Many of the views postulated were based on clinical data obtained from careful observation of the course pursued. Of late, the subject in question has received much attention from many accomplished bacteriologists, but the results of their labours differ so widely, that we are almost as far from solving the problem as ever, I may, in passing, observe that much of the literature written on the subject links up the causation of osteo-arthritis with that of this disease and this no doubt tends to accentuate immensely the diversity of opinion on the point at issue. By some individual causes have been regarded as sufficient to give rise to this disease. Others again ascribe the production of it to a combination of causes. This being so, the inevitable way left to one is to take an open-minded view, and to examine

closely the various factors which have been described as capable of producing the condition, and those which are known to associate with its beginning.

1. HEREDITARY INFLUENCES. The conception among the laity about the different joint affections is so vague that very little reliance can be placed on the assertion of patients, that their relatives had been suffering from 'Rheumatism' or 'Rheumatic joints' etc. Amongst the several instances of Rheumatoid arthritis, of which I have taken notes, I have foundn joint affections of one sort or another in relatives of patients in nearly half of my cases. In one instance, I have found a brother and a sister to be both victims of Rheumatoid arthritis, but as the brother is mentally deficient and the sister is extremely deaf, an accurate family history cannot be elicited. It is true that the view of hereditary predisposition in this disease is now out of favour, but it is only fair to mention that Sir Dyce Duckworth maintained that in most cases of Rheumatoid arthritis there was a clear history of

rheumatic elements in the ancestry. Lane and Griffiths are convinced of the influence of a combined family history of gout and tuberculosis as a predisposing cause of the disease. Tubby also says he is able to confirm the latter view.

2. AGE. There is a certain amount of uniformity in the statistics drawn up, regarding the age at the onset of the disease.

Dr. A. E. Garrod analysed a hundred cases and gave the following figures.

Age at commencement.

| | 0-10 | 10-15 | 15-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | Totals. |
|---|---|---|---|---|---|---|---|---|---|
| emales. | 1 | 3 | 3 | 22 | 28 | 14 | 5 | 1 | 77 |
| ales. | 0 | 0 | 0 | 7 | 6 | 3 | 7 | 0 | 23 |
| | 1 | 3 | 3 | 29 | 34 | 17 | 12 | 1 | 100 |

Dr. Llewellyn Jones analysed the onset of the disease in 150 cases, and recorded the following results.

| | 0-10 | 10-15 | 15-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | Totals. |
|---|---|---|---|---|---|---|---|---|---|
| Females. | 2 | 6 | 24 | 37 | 24 | 26 | 9 | 0 | 128. |
| Males. | 0 | 1 | 1 | 6 | 11 | 3 | 0 | 0 | 22. |

It will be seen from the foregoing that the period of the greatest incidence in both the female and the male sex lay between the ages of twenty and fifty. In this connection, it seems to me that the earlier the onset of the disease the more formidable and relentless it is.

3. SEX. The statistics recorded under age and other similar ones, show a far greater preponderance of female sufferers and this special liability to the disorder on the part of the female sex has been noted by many authors of repute. A. E. Garrod observed that, "Women are doubtless very prone to be attacked as they are more liable to be subjected to predisposing causes especially irregularities of the uterine function, and it would appear that deranged menstruation independent of haemorrhage predisposes to the disease. It not infrequently results from rapid child-bearing, or too lengthened lactation, also from night watching. Senator concurred with these views and regarded the various conditions as debilitating influences to the power of resistance

of the organism. Julia Cock, who made a special study of the relation of the disease of the female genital organs with this disease at the New Hospital for Women, corroborated the views of the above writers. She further noted that the occurrence of Rheumatoid arthritis, more or less severe, in association with menorrhagia due to fibroid tumours of the uterus has been frequently observed. Ord considered that nervous influences had a great deal to do with the causation of the disease. He believed that nervous influence was reflected from the uterine organ to the spinal cord, and on to the joints. More recently, with the developments of the auto-toxaemic, and of the infections theories of Rheumatoid arthritis. The uterus which is so liable to catarrhal or to chronic inflammatory changes, is regarded as one of the most potent channels for the absorption of toxic substances and for the entrance of micro-organisms into the blood according to the respective theories.

4. PREDISPOSING CAUSES.

Any condition that lowers the vitality ofthe body, predisposes to the disease, worry, anxiety,

prolonged grief, bad or deficient nourishment, overwork, mental and physical, unhygienic housing, frequent exposure to wet and cold and in the female sex, repeated pregnancies, over-lactation, menorrhagia etc. probably all, by lowering the tone of health, predisposes to an attack in individuals susceptible to it. One frequently notices, in taking the history of cases of this kind that some of the above conditions are present and preceding its outset. The most potent of them seem to be frequent exposure to cold and wet, especially wet feet. Charcot considered damp cold to be one of the most potent factors. Bannatyne states that the disease is more common in the humid air of Ireland than in England, Adams that it is prevalent in Holland, and Stewart that it is very rare in the dry climate of Canada. The combination of damp, cold a low elevation and low average of bright sunshine appears to be favourable to its development - in other words, the climate least likely to lead up to good general health and a high vitality of the tissues, (Cook). In one of my cases, worry and anxiety seem to have had a very decided influence in the onset

of the disease and in its progress. This is in a woman 64 years of age. Her husband met with a very serious accident six months ago, and was removed to hospital. They used to be in receipt of a small weekly allowance, which was just sufficient to pay for their household expenses, but since he entered the institution this was reduced to half its former amount, and with this meagre allowance, coupled with the anxiety over his illness, she has become profoundly grieved. Shortly after that event, she was attacked with pain in the left joint, (She has always been in good health, only previous illness was rheumatic fever at 18). Then the other articulations became involved one after the other, until now, hardly one joint has escaped. She can still walk a little distance with the aid of a stick, but she is practically a cripple. The case is peculiar in that the onset of the disease is at such a late age, and its progress is so rapid.

DIET AND ALCOHOL.

These probably have very little influence in the disease, although a meagre ration would seem to

lower the vitality of the body, and acts as a predisposing cause. It certainly has a very deleterious effect on a patient who is already attacked by the disease, by hastening its progress as the case above related testifies.

6. TRAUMATISM.

This probably has no influence in determining an onset of Rheumatoid arthritis, although joints, constantly subjected to irritation, or frequently overtaxed in their action, would seem to be the seat of election, should the disease occur. This is probably due to diminished local resistance.

7. PREVIOUS ILLNESS.

It is difficult in any given case to decide whether the previous illnesses which the patient has suffered, had anything to do with an attack of Rheumatoid arthritis, or whether they occurred in a casual way, especially when there is a long interval between them. Such previous illnesses as measles, scarlet fever, mumps, bronchitis, pneumonia, pleurisy, gonorrhoea, syphilis, rheumatic fever, and menorrhagia are frequently noticed.

Jones lays special stress on influenza, and Bannatyne on Chronic catarrhal tonsillitis, as conditions sometimes leading up to the onset of the disease. Then some authors, consider that such affections as gonorrhoeal arthritis the polyarthritis of rheumatic fever, scarlatinal arthritis, and gout, by damaging the tissues of the joint, render it more liable to become a nidus, in which other organisms may flourish This view is claimed by some as proven, but it certainly cannot be denied. It is possible, indeed probable, that such conditions as carious teeth, pyorrhoea alveolaris, chronic tonsillitis, chronic dyspepsia, mucous colitis, and in fact all chronic inflammatory conditions of the mucous tracts have a great significance in the etiological relationship with Rheumatoid arthritis, whether one looks at the clinical standpoint, or whether one clings to the theory of auto-intoxication, or of infection.

BACTERIOLOGICAL INVESTIGATIONS.

I will now briefly survey the Bacteriological investigations carried out to elucidate the etiology of Rheumatoid arthritis, Max Shuller was the first to suggest a microbic origin of the disease in 1892. That form of Rheumatoid arthritis with

villous Hypertrophy generalised thickening of the membrane of joints was specially studied, and organisms were constantly detected in cut sections of their tissues.

A year later he identified the organisms in the cut sections with those cultivated by him from the joint fluids. The organisms were described as rod shaped bacilli, presenting as a rule a dumb bell shape but in exceptional cases the rods were short and clumsy exhibiting but slight mesial constriction, and resembled gonococci, while in others they showed a likeness to diplobacillic. The rods measured 1-2 by 25-75 , staining readily with carbol fuchsin, methylene blue or Bismarck brown, but not so easily with methyl violet. In 1906 he states that the organism are stained by Gram's method and that he uniformly employed it. Whether cultivated in gelatine stabs or agar or potatoes, a white granular formation ensued, and the sultures even after the lapse of ten to twelve months retained their infection potency. When introduced into the joints of rabbits lameness followed with enlargements of the joints which

proved to be permanent. After the lapse of two months the animals were killed, but prior to death the original organisms were obtained from the joints experimented upon. At no time were the injections followed by pus formations, but the synovial membrane showed villous growths in places, and in sections from these the organisms were found.

In 1896 Bannatyne and Wohlmann discovered a bacillus, which they considered to be the cause of the disease. This was obtained from the synovial fluid aspirated from the joints affected by Rheumatoid arthritis. In microscopical preparations the organisms were found in twenty four out of twenty five cases. Their observations were confirmed by Blaxall who succeeded in cultivating the organisms, and arrived at the following conclusions.

1. In the synovial fluid in eighteen cases of Rheumatoid arthritis an organism has been discovered which is constant in its characteristics.

2. The organism is a minute bacillus exhibiting marked polar staining. It is difficult to stain and

and easily decolourised.

3. The organism can be grown in culture media and presents striking characteristics. In beef-broth it gives the appearance of gold-dust and on agar-agar and serum its growth is almost invisible. It does not grow on nutrient gelatine at ordinary temperature.

4. It is present in the blood in severe cases.

5. It has not been found in the synovial fluid from distended joints due to other causes.

The average length of the organism is 2 and the average breadth is ·6 . It is non-motile and does not occur in chains. It is completely decolourised by Gram's Method, but it is stained by carbol fuchsin and with methylene blue. Experimental inoculations yield no decisive results in animals.

In 1901 Painter states that both he and another observer had failed to find Bannatyne's bacillus in cases of this malady.

In 1902 Peynton and Paine reported an experimental investigation in a case of Rheumatoid arthritis and the results are - 25.

1. A diplococcus was present in the synovial

membrane of the knee joint of a man of 67 years several of whose joints showed the chronic destructive changes of one type of Rheumatoid arthritis.

2. This diplococcus had been isolated and cultivated.

3. Intravenous inoculations into rabbits had upon two occasions produced arthritis without cardiac lesions.

4. The organism had been isolated from the joint exudations.

5. In one instance an osteo arthritis had resulted, which was non suppurative. This form of arthritis had not hitherto been observed in animals inoculated with the diplococcus of rheumatic fever.

6. They consider the diplococcus to be the cause of the arthritis both in the case from which it was isolated and in the rabbit.

In the two rabbits inoculated, one was killed on the 15th day, no erosion of cartilage or alteration in the bones forming the joints were found.

The other developed a non arthritis of the right

knee with wasting of the muscles of the thigh and leg.

In 1902, Hale White found in the synovial membrane of a knee joint a case of Rheumatoid arthritis a coccus, which could not be identified with the usual cocci. It grew chiefly in pairs not in chains, was stained by Gram's Method and was not pathogenic for rabbits. From a mesenteric gland in this case a small motile bacillus, non pathogenic to mice and rabbits was isolated.

In 1903, Gask found a streptococcus in a case of Rheumatoid arthritis. Crawford and Malin working at the Royal Mineral Water Hospital, Bath aspirated the joint fluid in forty eight cases, which were found to be sterile in the majority of cases and when organisms were found they were thought to be due to contamination.

In 1904, Mc.Crae reported that in a series of 110 cases of arthritis deformans from Osler's clinic he was unable to obtain any results from cultures, although he followed the method given

by Blaxall.

In 1905 Fairweather in three cases grouped under "Polyarthritis chronica villosa" obtained three distinct organisms which were isolated in pure cultures from the synovial fluid. Two of the organisms which were isolated when injected into the joints of rabbits produced arthritis similar in character to that found in the joints from which they were derived.

In reviewing these investigations one is struck by the great want of similarity in the results and in the organisms obtained, and pending more thorough research the infections origin of the disease can only be held as inconclusive.

## PATHOLOGY.

At the present stage when our knowledge of the disease is so incomplete the Pathology is resolved into a number of conflicting theories, each of which has its respective advocates, but none is thoroughly convincing. The theories of auto-intoxication and infection, each claims many an adherent. The nervous theory though receding from its former strong position, is not without its supporters. The metabolic theory still lurks in the minds of some and should be mentioned if only to be disposed of.

### THE METABOLIC THEORY.

There is a disposition in certain quarters to regard the disease as due to faulty metabolism and associate uric acid with it. This hypothesis is entirely without foundation and cannot be substantiated by evidence. Clinically it is productive of much harm as patients are then put on a destricted diet especially with regard to nitrogenous food instead of being placed on ration of a generous scale.

THE NERVOUS THEORY.

This theory has its expoments in "Rernak" "Senator" "Ord" "F. Fox" "S. Hyde" and others who hold that the disease is due to some abnormal trophic conditions, though they differ as to the cause being due to a primary lesion or only secondary to a lesion elsewhere. Rernak asserts that the malady in women is frequently preceeded by hemicrania. He regards articular affections as a result of irritative states of the spinal marrow and sympathetic. Senator held that the joint changes originate in a similar manner to those occurring in tabes dorsalis. He substantiated his contention of the nervous origin of the disease by pointing out that grief and anxiety appear to have a hand in its production and further dwelt upon the symmetrical invasion of the malady and its neuralgic and tropho-neurotic symptoms. Ord views the disease as entirely by reflex action set up by some uterine or other visceral derangement. This gives rise to impulses which are transmitted to the cord and reflected

on the joints, producing the changes characteristic of Rheumatoid arthritis. Fortesque Fox, referring to the Pathology of the disease said "to my mind there is a strong evidence that some implication of the nervous system takes an essential contributory part". S. Hyde emphasises the psychical conditions as grief, anxiety sudden mental shock as exciting causes and regards rheumatoid arthritis as a trophoneurosis of joints, unassociated with any systematic disorders and probably dependent upon some nervous lesion. It must be admitted that clinically some of the symptoms of the disease and certain psychical conditions often seen preceeding its onset would seem to have established the theory beyond debate, but the pathological findings so far have been entirely contradicted such an assumption, for if it is thought that trophic changes originate in a similar manner to tabes-dorsalis one would surely expect cord lesions of an extensive character. In the latter disease one finds degeneration of the root fibres of the dorsal

columns of the cord, of the dorsal roots and at times of the spinal ganglia and peripheral nerves but in the malady under discussion no such changes have been found. As regards the suggestion that the joint changes result from impulses engendered in the uterus, it must be pointed out that men too suffer from the disease, and besides it seems rather inconceivable that irritating impulses could bring on such gross and permanent arthritic damages as are encountered in the disease. The part which the uterine disorders play can only be regarded as a predisposing cause by lowering the body vitality, again, if the disease is viewed as being brought on by a central nervous lesion it can only be said that no evidence of this is forthcoming.

THE INFECTIVE THEORY

It was seen when we were reviewing the bacteriological investigations into the cause of the disease, how contradictory the results were and how different organisms had been claimed as specific in producing the condition. Moreover competent observers following exactly on the lines of technique suggested by those who have

described the various organisms have failed to confirm their results, and indeed in many cases the joint fluid was found to be sterile.

THE THEORY OF AUTO INTOXICATION.

This theory has lately sprung into eminence and has the recognition of A. P. Luff, Jones, and Tubby in addition to many others. On theoretical grounds many of the ingenious arguments advanced in its favour are incontrovertible but as it fails to stand the tests of practice in many instances, it cannot commend conviction. This theory too, it will be recalled, has been invoked to explain divers symptoms in many complaints of unknown etiology, but its effects have been far from convincing.

I will now sum up the principal statements made inall quarters in its support. It is generally believed that in the catarrhal processes of the mucous tracts, such as the alimentary canal, the respiratory and the genito-urinary tracts, their lining membrane becomes devitalised and affords thereby a favourable portal either for the entrance of micro-

organisms or of the toxic products of their activity into the blood. In this connection the intestinal tract has been singled out as of special significance and it is thought that the chemical products of intestinal fermentation and putrefaction, if continually absorbed would exert a deleterious effect upon the organism. Having gained access to the blood the micro-organisms or their toxins circulate freely in its stream, and settle down in a nidus, where the former flourish. Again the toxins is credited as having a special affinity for certain tissues of the body and in this case the various antomical elements making up the joints are viewed as their seat of election, hence we find the articular damage which constitute rheumatoid arthritis, and how does this theory explain the periodical exacerbations of the disease, the occasional pyrexia and the neuro-tropic symptoms? During the active growth of the organisms, toxins are produced and discharged into the circulation and by their action on the

nervous system, give rise to the nervous symptoms of the disease, while their toxins acting on the vaso-motor nerves of the skin produce the local sweatings and pigmentation which occur in connection with rheumatoid arthritis.

I will not labour further into the speculative side of this subject except to observe that in many of my cases there has been no history of catarrh of any of the mucous tracts and there is no evidence of pyorrhoea alveolaris or any visible septic foci in the body and what is more one finds rheumatoid arthritis in patients who have given due regard to the condition of their teeth and bowels, Mc. Crae writing on the subject remarked "our knowledge of autointoxication is not satisfactory. One therapeutic point is of interest, however, in this connection, some patients are remarkably improved by very free continued purgation. In others a very sharp attack of diarrhoea may result in an immediate gain in the arthritic condition. This can only be regarded as a suggestion and not by any means as an established fact.

## MORBID ANATOMY.

The available literature on the morbid changes of the earlier stages of the disease is extremely scanty. Formidable and intractable as the malady is, it does not kill and what has been written about it is based on material obtained from cases of this kind, where and intercurrent affection develops and causes a fatal issue. With the advance of surgical interferance a certain amount of pathological material is afforded for the study of the articular damages in compartively recent cases. Of the accounts of its later changes given by the many authors no attempt has been made to separate the disease from osteocarthritis, so much discrimination must be exercised to obtain information from these sources.

The following account is based on the observations made of a comparatively acute case, recorded by Hale White[26] where death was due to an intercurrent malady, I will also take the liberty to introduce into this description observations made by others, who necessarily take a different point of view in many respects from

this author.

THE PERIARTICULAR TISSUE.

There is a marked thickening of the periarticular tissue due to the formation of new fibrous tissue but there is no cartilagenous or bony growth either round the joints, tendons or bursae,. This, White considers is a characteristic feature of the disease not only in its acute but also in its later stages.

THE SYNOVIAL MEMBRANE.

The synovial membrane is swollen and of a purpluish red colour from the injections of the vessels and in places it erodes into the underlining cartilage. The surface sometimes shows a velvet like appearance or is covered by material not unlike granulation. It may be covered with a process of varying degrees or shape which have a resemblance to tubercles (Mc.Crae). The synovial fringes which normally exist at the margins of the articular cartilages very often hypertrophy and form synovial villous processes, which vary a great deal in shape, size and colour. Then some are elongated and

present a thread like appearance, others are tortuous or flattened, some are of a purpluish red or bluish red, others are of a yellowish colour. The joint cartilage may contain a few shreds of lymph, or it may be distended by synovial fluid to an immense size. One peculiarity about the fluid is that it may be turbid but suppuration never occurs.

THE CARTILAGE.

According to Shuller and White, the changes in the cartilage and bone are only secondary features. Such damage to the cartilage as is seen appears to result either from the erosion of the thickened synovial membrane or caused by the pressure of the hypertrophical synovial fringes on the articular margin. On the other hand Bannatyne thinks that the cartilage must be involved in a very early stage, the first change noted by the naked eye being a loss of natural polish, then erosion takes place especially in the central part, gradually extending and deepening and finally there may be a formation of cartilage, giving rise to lipping

and heaping up round the articular edge. The cases recorded by Painter[27] also show great destruction of cartilage but no proliferative changes of it is described. This in a young woman of 26 with involvement of both elbow joints, exision of one elbow reveals the following features. Grossly there was very little cartilage left in the face of the condyles of the humerus, over the head of the radius, or on the ulnar. Small greyish islands only, with the bare bone sticking out between. Histologically there is considerable attenuation of the trabeculae fibrillation of the cartilage and necrosis in places, as is shown by the failure of portions to stain, while other adjacent portions do take the stain and are alive.

CHANGES IN THE BONE.

In the earlier stages the bone in the neighbourhood of the joint is the seat of chronic inflammatory changes, the cancellous tissue is more open than usual, and foci of inflammation are seen with small celled infiltration and a relative absence of fat cells. As the

erosion of the cartilage progresses, the bone is exposed and its constituents are absorbed. These are replaced by a red semifluid material differing greatly from the normal marrow. This substance, under the microscope is found to consist largely of giant cells with many nuclei (osteoclasts) in a mass of round cells. As the disease becomes more chronic we find the bone comes to present a hard, white polished, ivory surface, to which the term "Eburnation" has been applied. On the surface of the exposed bone, as it hardens, we see grooves and striae, which are found to correspond with the eminences and protruberences, on the opposing articular surface. In cases of long standing when the articular structures are completely destroyed, fixation of the joint may take place and bridges of cancellous bone may stretch across from one surface to another. There may be some proliferation of bone, with formation of sharp spicules which are very unlike the rounded osteophytes of osteoarthritis (Garrod).

FORMATION OF LOOSE BODIES.

There are several varieties of loose bodies

in the joint, the fibrinous exudation gives rise to melon-seed bodies, and to fibrinous masses. On microscopical examination the fibrinous mass is found to consist of fibrin with a large number of cells, resembling leucocytes in its meshes.

It will be remembered that the synovial fringes hypertrophy into villous processes, some of which form sessile and pecunculated bodies. The connective tissue cells in these processes may develop into fibrous tissues, fibro-cartilage and bone. As time goes on, the connecting pedicle of the pedunculated bodies grow thinner and finally the body may drop off with a natural movement of the joint or in a slight sprain. Lastly a eroded piece of cartilage or bone may become detached in some slight injury of the joint and exists as a loose body in its cavity.

CHANGES IN MUSCLES.

The only change is a diminution in size of the individual muscular fibre in the affected muscles.

CHANGES IN THE NERVOUS SYSTEM

No constant changes have been found. In

a few cases examined by Folli atrophy of the motor cells in the anterior cornua was noticed. Bannatyne records one case in which degeneration and vacuolation of the ganglion cells of the anterior cornua were seen. Jones, quotes a case examined by Mott and Tudgold, in which the grey cells of the anterior cornua of the cervical enlargement were found fewer in number than normal, and some of them showed chronic degenerative changes, with pigmentary deposits. The Dorsal region showed little changes, while in lumbo-sacral sections of the cord showed similar changes to the cervical region. There was no sign of tract-degeneration. Both sciatic and ulnar nerves were examined and considerable diminution of nerve cells were noted.

CARDIAC AND VASCULAR LESIONS.

Bannatyne analysed 74 cases of which he found cardiac lesions in fourteen instances. The mitral valve being the one most often affected. Of the three cases examined by Dr. Catherine Clark, the arteries were noticed to be generally

thickened, in one of which the patient was only twenty-four years of age. In the latter case both the medium sized and smaller sized arteries being markedly thickened and the tunica intima was thrown into folds, producing an irregular, triangular shape in the lumen, similar changes were found in the veins, when the tunica media was much affected.

SUBCUTANEOUS NODULES.

These were at one time thought to be associated with rheumatism but this belief has been disproved. Hawthorne collected a number of cases, where there was no evidence of a rheumatic element present. I have only found them in one of my cases of Rheumatoid Arthritis.

CONSTANEOUS CHANGES.

Pigmentation, glossiness of skin, loss of hair, especially in the shins appears to be frequently present, the toe-nails are in many cases very brittle and drop off with the slightest provocation.

## SYMPTOMATOLOGY.

All authorities on the subject have recognised the importance of on early diagnosis as the only means for the prosecution of an effectual treatment, and as we have in the disease a very cunning enemy, an emeny which can insinuate itself into its victims in so many ways and under so many disguises that it is imperative that we should devote much attention to studying its early symptoms. In differentiating Rheumatoid Arthritis from some other maladies with which it may be confounded, we have already in an earlier chapter familiarised ourselves with the clinical course pursued by the various forms of the conditions and here I do not propose to survey the ground already traversed but to address ourselves specifically to the many clinical phenomena which are identified with the disease.

### THE EARLY SYMPTOMS.

It is difficult in a disease, insufficiently understood to draw a hand and fast line between premonitory and early symptoms because many of

the former may actually happen very early after its onset so I think it would be more practical to deal with them together. By far the most important of the early symptoms appear to me to be those associated with the nervous system, and these naturally receive themselves into the sensory motor and vasomotor group of phenomena.

THE SENSORY PHENOMENA.

In reading over my records of cases I find certain sensory phenomena sometimes occur very early in the malady, such sensations as numbness in the fingers, feelings of pins and needles pricking the sole of the foot have been noticed to preceed the onset of the arthritic pains. In this connection, I may add that these sensations always occur in places near the articulation about to be involved. It is interesting to record here that sensory phenomena of various kinds have been noted by other observers of the affection. Thus when lecturing on nodular rheumatism (rheumatoid arthritis) Mr. Trousseau[28] drew attention to a periodical megrin accompanied

by vomiting as an antecedent in a case of this kind. Kent Spender characterised such neural symptoms as pain in the ball of the thumb, and a sharp pang on the inner side of the wrist as prophetic notes of a coming storm. Other symptoms such as feeling of great heat in the hand, of being "scalded" or "being stung all over with nettles" and severe headaches of the megrin type were also dwelt upon as of special import.

## THE MOTOR PHENOMENA.

Motor phenomena are sometimes known to occur very early in the course of the malady, and indeed in a particular case of mine, these would seem to precede its onset by a very lengthy period. The case in question happens in a man who gives a history of weakness and wasting of the right foot, which was also the seat of sensations of pins and needles which lasted for three years before there was any onset of articular trouble (see case 8). As a matter of fact, these phenomena so impressed Dr. Ord that

in a communication to Spender, he was induced to believe that the wasting of the muscle and skin and the osteo-arthritis are dystrophies induced by a central nervous origin. The latter also recorded many cases in which motor symptoms such as muscular weakness and wasting tremor and inco-ordination of the pharyngeal muscles appeared as very early manifestations of the affections.

VASO-MOTOR PHENOMENA.

I will now proceed to examine more intimately the vaso motor phenomena to which allusions have already been made while the differential diagnosis of the disease came under review. It will be remembered that localised perspiration is a prominent feature of the disease and that the palms, soles axillae and sometimes the back are the seat of election. There are different degrees of this morbid sweating. It may be mere dampness of the surface of the palms and soles, or these parts may be virtually covered with a perspiring dew. One characteristic point is, whatever the degree of the morbid sweating , there is never any shivering or any evidence of a hot stage. Lastly the vaso-motor phenomena may be represented by local congestion evanescent blushings and blanchings.

PIGMENTATION OF THE SKIN.

We may now conveniently study another aspect of the early symptoms, to which Spender lays great stress namely the disturbance in the chromatogenous function of the skin. According to this authority several varities of pigmentation may be observed. Thus across the forehead it may take the form of a light bronze smear, or like a patch of chloasma: under the eyelids the streak of colour may be very dark, shining with a metalic polish. In people of a dark complexion this discolouration of the face may be swarthy , contrasting sharply with the white luminosity of the eyes. Then there is the yellow pigmentation of the plantar surface of the foot. Lastly there is the desseminated form of pigmentation "Freckles" to which Spender attaches great value as a diagnostic sign. It is well to observe that pigmentation occurs so frequently in persons of ill health or sometimes in many who are apparently enjoying good physique and again so many circumstance may give rise to it that much circumspection must be used before it can of olinical value.

PAIN.

This is undoubtedly the symptom which impresses itself most deeply upon the patient's mind. It is remarkable how in many cases years after the initial attack the patient can still recall into vivid

recollection this feature when it first appeared It may happen suddenly at night and waken the patient while he is asleep or it may come on in the day when the patient is walking and cause him to fall if the knee is the first joint to be implicated. Accompanying the pain there is usually a swelling of the articulations and any movement is attended with great tenderness and rigidity. The initial attack with its periodical exacerbations and lulls may subside in the course of a day or two or it may drift on for a few months thus rendering a clinical picture almost indistinguishable from subacute rheumatism. Before I pass on to discuss the later symptoms, I will first recapitulate the most salient features in the acute stages, to which I have discussed at great length above and to which considerable references has been made in an earlier part of this work (differential diagnosis). These include a comparatively low rise of temperature, the great acceleration of the pulse, the nervous phenonema sensory motor and vasomotor, the pain and pigmentation, to which much attention should be given, as individually these symptoms may mean very little but collectively

they bring home to us the real nature of the malady with which we are dealing.

THE LATER SYMPTOMS AND SIGNS.

I must confess that some of the symptoms and signs to be described are grouped together under the divisions in quite an arbitary manner, as will be seen in the course of this description, although I feel convinced that however, early some of them may seem to appear, the disease is not by any means in its initial stages. The features in this group are the articular changes which usually follow one or more acute attacks of the malady. Sometimes they manifest themslves after the disease has run a prolonged course, which as we have seen bears clinically such a close resemblance to subacute rheumatism. Finally they may develop so insidously that their detection is made quite accidentally. Here is an illustration of such a case - The patient was a young girl of 19 years of age, who following a mental shock became rather depressed in spirits, she lost her appetite, felt languid, wearied and nervous, although she persisted in following her occupation as a tailoress. When she went home one

evening she noticed her glove was getting tight over the ring and middle fingers of the left hand. The same thing happened on several successive evenings but as this caused no pain little heed was paid to it and no medical advice was sought for until one night she was seized with sudden and violent pain in her left wrist (for subsequent history see case 7) It is of course very difficult to conjecture how long the morbid changes have taken place in these fingers, but to my mind the evil process of destruction must have lurked there for some time. Coming to the articular changes it is interesting to note that the joints most liable to be attacked are those which are most subjected to the wear and tear incidental to the sufferer's occupation. It has to be remembered that rheumatoid arthritis runs a most erratic course, it may by a rapid and dramatic turn, main and cripple a patient in a few months, or it may remove the service from his joints one after the other and with the lapse of a number of years he is finally reduced to a helpless cripple entirely dependent on others for the adminstration

of the various offices indespensable to existence. There is a tendency in this disease to centrepital invasion, that is to say, the fingers are first attacked then the wrist, elbow and shoulder. In the lower limbs the implication may first start in the ankle and spread to the knees, the hips being seldom involved. Again symmetry of lesions is often seen but this is by no means invariable. Another characteristic feature of the condition is the liability to involvement of the vertebral and temporo-maxillary joints, which seldom escape if the disease is at all severe. The joints usually assume a spindle shape, the part opposite the articulation being the widest and tapers towards each end, although in some cases hardly any alteration of contour is visible. Again deformities and distortions of varying degree of ungainliness may be lamentably evident, and the limitations of movements in the joints differ greatly, ranging from slight immobility to complete fixation, upon the details of these changes. I do not propose to chronicle here as they will be entered with the clinical cases to be recorded later, suffice it is to say that con-

traction of the joints is one of the outstanding characteristics.

Let us now devote our attention to some of the other clinical features present in this stage.

MUSCULAR ATROPHY.

It is well at the onset to observe that muscular atrophy is an accompeniment of arthritis of any kind. In one or two of my cases it apparently precedes but in most of them it follows the joint lesion. It is of varying degree and is seemingly sufficiently accounted for by the disease in some cases, whilst in others again its extent is entirely out of proportion to the arthritic lesion. In the light of such clinical evidence and other signs which I will describe presently it seems possible that the motor nerves may be influenced in some way.

Occasionally twitching of the wasting muscles are seen under the skin and tremor not unlike paralysis agitans are observed in two of my cases.

The muscles of the hand, namely those of the thenar and hypothenar eminences the lumbricles and the muscles of the forearm are usually the most wasted muscles and the atrophy is generally more marked in extensor than in the flexor aspects. Where the state

of the joint permits of testing the jerk elicited is generally exaggerated or normal. Reaction of degeneration has not been observed in any of my cases.

LATER CHANGES IN THE SKIN.

Subjectively pain, stinging sensation, feelings of pins and needles and of being scolded are complained of in some cases, although in the majority of them, these symptoms seem to be absent in the later stages. Whatever pain that is complained of generally comes from the disorganised joints especially when the patient is moved. Objectively the skin is the seat of much tropic changes and as a rule the dorsal aspects of the limbs are more affected than the flexor aspects and it is usually glossy and more or less denuded of hairs. Pigmentation of the skin is frequently seen, the outer layers of the epidermis being often shed off and replaced. Weeping eczema is occasionally seen and this is not surprising considering the abnormal nutrition of the skin. Pigmentary changes are sometimes observed in the later stages. The nails are generally longtitudinally ridged brittle and easily drop off.

Fibrous nodules are noticed by a number of observers and they were seen in 22 cases out of a hundred analysed by Dr. Hickling[29] but I have only seen them in two of my cases.

CONSTITUTIONAL CHANGES.

These are only seen in the a early stages, anaemia and loss of strength being noticed, in the later stages very little by way of constitutional changes can be traced to rheumatoid arthritis. The pulse which is usually so rapid in the early stages generally resumes normal rate in the later stages.

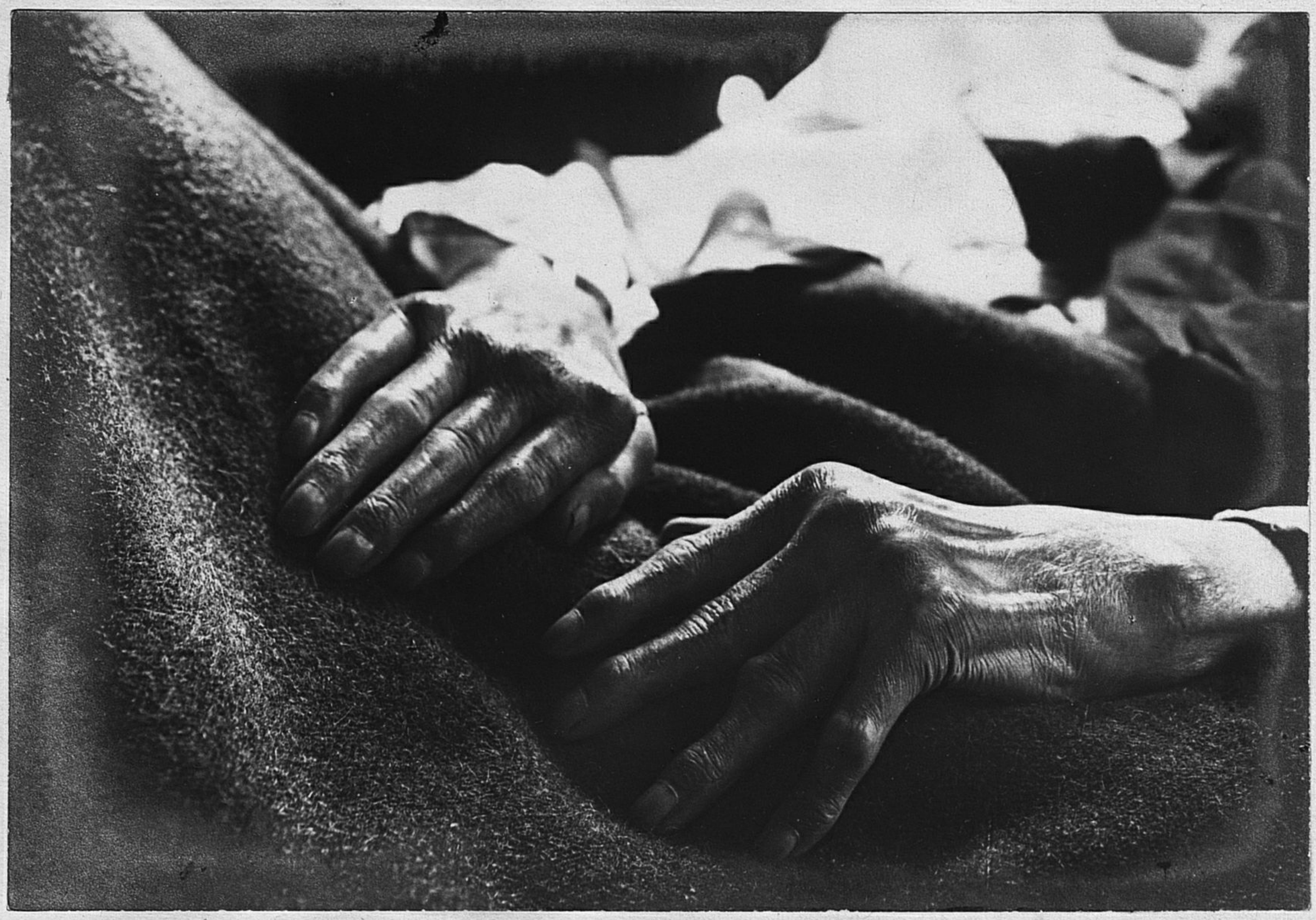
## CASE RECORDS.

Case 1. Joseph S. Age 63, Married, wool-sorter, the subject of almost complete disability and of extreme deformities of the joints.

FAMILY HISTORY. - Brother was the only member in the family who had suffered from rheumatism no other relatives being known to have had any joint affections.

PERSONAL HISTORY. - Patient was a strong and healthy man until his present illness began at the age of 21. His first symptom was the sudden onset of severe pain in the left shoulder joint, which however disappeared in twenty four hours. This was followed by several equally transient attacks in the other joints within the next three years. About the age of thirty two, pain gradually developed in the knees, wrists and interphalangeal joints which were also noticed to be swollen. These symptoms lingered for about twelve months. Several similar attacks implicating different articulations and of varying duration recurred by which patient's power of movement became gradually restricted and by the age of 58 he was finally

No.5.



reduced to a crippled and bed-ridden condition. It will be noticed that the affected joints were never seen to be discoloured.

PRESENT CONDITION - Patient is a very intelligent and observant person and has followed his protracted course of illness with the greatest care. His health is unimpaired but he is troubled with a great deal of pain and parasthaesia, such sensations as pins and needles and "being burnt by hot liquids" are frequently complained of, especially over the forearms and legs. These symptoms always appear just previous to any change in qeather condition and sometimes during it. The only office he can fulfil is limited to that of feeding himself.

The conditions of the patient's hands are fairly well pictured in the accompanying photograph (Photo 5). It will be seen that the fingers of the patient's right hand show the spindle shaped joints of rheumatoid arthritis, and Heberden's nodes which represent the characteristic feature of osteo-arthritis are seen in some of the fingers of the left hand, a point previously referred to under differential diagnosis. The elbow joints

are somewhat flexed, thickened and of a fusiform shape. Flexion and extension of the joints are confined to a very narrow range, pronation and supination of the forearm are almost impossible The muscular covering of the upper limbs only display slight wasting. The shoulder joints are also affected, their actions are limited and are accompanied with pain and crackling, the temporo-maxillary joints although implicated in several attacks are left in a condition for the perfect performance of their functions. The vertebral column is only slightly affected. Both hip joints are involved and flexed on the abdomen, limitation of movement being marked. The knee joints are flexed, enlarged completely ankylosed in the right side and partially so in the left side. Muscular atrophy which is seen in both lower limbs is more conspicuous on the right side. The ankle joints still admit of slight movement, but the toes are almost free from involvement.

The joints are such that the testing of jerks is impossible. Jaw jerks however is absent

no reaction of degeneration is noticed. The skin of the forearm is somewhat pink, glossy, and shiny and almost denuded of hairs. Desquamation is seen in the face, palms, and soles. The dorsal surface of the feet are nearly always slightly oedematous although no albumen is detected in the urine in frequently repeated tests.

No organic disease is found in the heart, lungs and abdominal viscera. The average pulse rate is about 70.

The peculiar feature in this case is that its clinical characters such as the age of onset, the sensory phenomena, the skin lesion and the bony lesion all over the body point undoubtedly to rheumatoid arthritis, yet Heberden's nodes which represent the characteristic feature of osteo arthritis are seen in the left hand. It is interesting to record here that of a 100 cases of osteo arthritis analysed by Garrod not one of them commenced before the age of 30. Presumably this is an instance of an overlapping of the two diseases.

CASE 2. Emily C. age 55. Married. Domestic servant. Complains of pain and stiffness of the joints also itchiness of the skin of the legs. Age of onset of joint trouble 28.

FAMILY HISTORY. - Father suffered from gout, died of dropsy at 71. Mother had rheumatic fever, died at age 51 cause unknown. Has only one sister who is frequently subjected to attacks of "rheumatic joints". Family consisted of only one daughter who died of conculsions at early childhood.

PERSONAL HISTORY. Has never been very robust in health. Previous to her articular complaints she had repeated attacks of "cold" and sore throat, and she often suffered from dyspepsia and constipation. Her menstrual function had been unsatisfactory from early life, she being frequently troubled with dymenorrhoea and menorrhagia. She never had miscarriages. Menpause at 45.

HISTORY OF PRESENT ILLNESS. She states that for some time before the commencement of the present illness, she was "run down" in health and was constantly troubled with headache

and a feeling of dizziness. Then she was suddenly seized with an excruciating pain in her big toes, ankles, finger and wrist joints, which were all swollen but no change of colour was noticed. The temporo-maxillary, the vertebral and the shoulder joints soon become involved, also. The pain was severe at times but had its lulls and it subsided gradually after the patient was confined to bed for three months. For a time she seemed to be free from these complaints but recurring attacks soon followed and repeated at irregular intervals producing gradually and by imperceptable degrees the articular deformities and disabilities which we now find in her.

PRESENT CONDITION. Patient is an intelligent person and is in tolerably good health which she says has rather improved in late years, her cheeks are covered with a pink flush and her face betrays no dissatisfaction of mind. Her hands which manifest almost symmetrical lesions are flexed at the metacarpo-phalangeal joints and

her fingers are slightly deviated towards the ulnar side. The four inner fingers are dorsiflexed at the proximal interphalangeal and flexed at the terminal interphalangeal joints. There is a slight thickening of all the finger joints, which is evidently due to a proliferation of the periarticular tissue as no bony outgrowth or Heberden's nodes are seen or felt. The joints are alslightly moveable although this is accompanied with tenderness and creaking. The thumbs are fortunately only slightly implicated consequently affectual movement is retained. The muscles of the hand are much wasted although the thenar eminences still present a respectable appearance. The palms are moist and clammy and the dorsal aspects of the fingers are glossy and shiny. The wrists show marked thickening of the periarticular tissue and their range of movements is very limited. The muscles of the forearms are much atrophied. The elbow joints are flexed at a right angle and are of an immense size and which no doubt are rendered, all the more conspicious

by the muscular atrophy above and below these joints. There is some bony thickening of the right elbow joint (at the lower end of the humerous) and this is attributed by the patient to be the result of a fall which she sustained five years ago. She can flex her elbows so as to bring her hands to the mouth but extension is strictly limited. The shoulder joints. Movement in these joints is restricted in every direction and is accompanied with pain and cracking. Their covering muscles are dwindled to an insignificant size.

The range of movement of her temporo-maxillary joints is unimpaired.

CERVICAL VERTEBRAE Forward, backward and rotatory movements of head are accomplished with tolerable satisfaction.

The dorsal and lumbar vertebrae are fixed and rigid. The hip joints. Movement is every direction is limited and accompanied with pain.

The knee joints are fixed in an almost extended position.

The ankle joint. Only very slight movement is possible.

The right foot is everted.

The big toes are displaced outwards and lie beneath their two neighbouting fellows, which are extended at the metatarso-phanlangeal joints and flexed at the other articulations.

There are no signs of disease in the internal organs.

The pulse rate is 90 on the average.

Case 3. - William H. Age 44, unmarried, stone mason.

FAMILY HISTORY. Both father and mother suffered from rheumatism, and died of heart disease. One brother died of consumption at the age of 31, another brother is said to have had an attack of rheumatic fever recently.

PERSONAL HISTORY. No illness of consequence Frequently exposed to cold and wet as a boy while engaged in form work. The first articular attack dates back to age 12. The patient states that as a result of getting damp feet he was seized with a sudden and violent pain in the joints of big toes. This pain which lasted a whole winter became less pronounced after the

first few days and so medical attention was sought for. A similar attack of a less intense character happened in the same joints in each of the two successive years. He was then free from this ailment until he reached the age of 26, when following a chill he was assailed by a very excruciatings pain in the back between the shoulder blades, which however began to subside in 24 hours, but soon after the shoulder joints became painful stiff and swollen. Following a month's rest and treatment at home he was much improved and resumed his work, only to find a recurrence of the symptoms with the implication of the wrists, knee and ankle joints of both sides as well. At this stage he was sent to Buxton where he obtained much relief. The next six or seven years saw many periodical attacks in which different articulations were involved in different times and he gradually became more and more disabled until at the age of 33 he was left in an entirely helpless state and has been bed-ridden thenceforth.

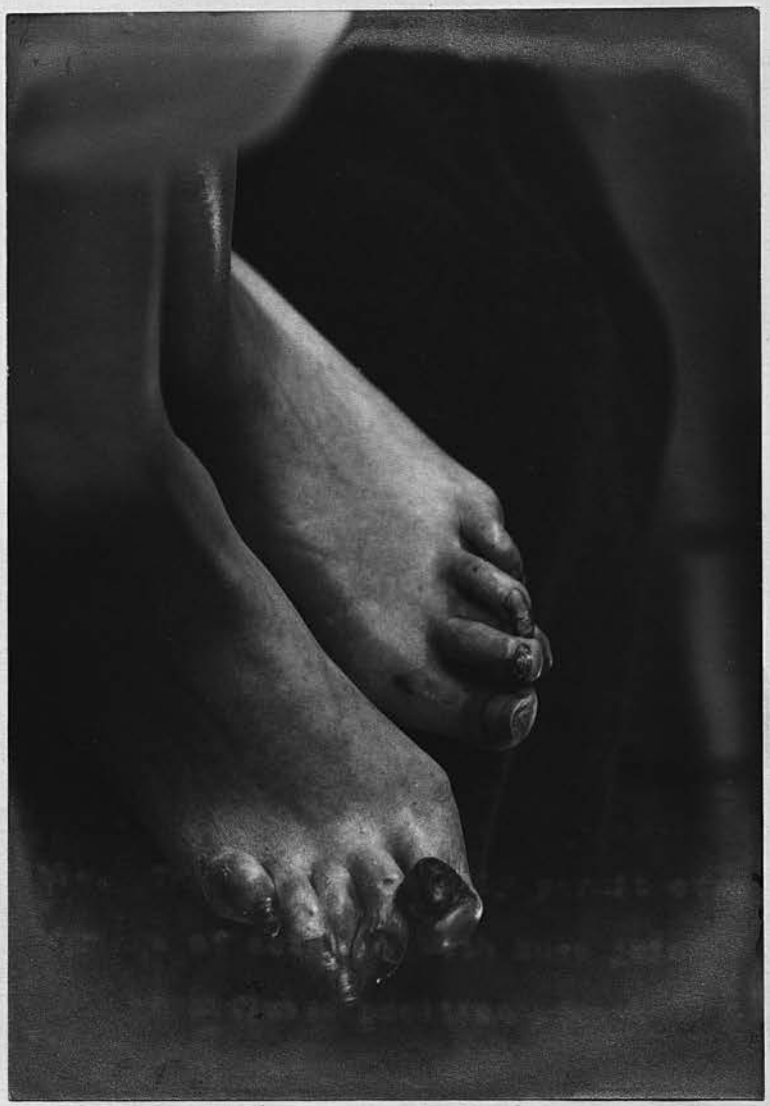
No.6.

PRESENT CONDITION. Patient is a very intelligent person, and evinces a philsophical resignation for his sufferings. He enjoys good health but is not able to carry out the ordinary actions necessary to existance for himself.

The deformities of the hands are well displayed in the accompanying photograph (see photograph 6) and it will be seen that the right forearm rests on the chest. Neither the right nor the left elbow joints is capable of movement, both being ankylosed. The range of action in the shoulder joints is extremely restricted in every direction.

Temporo-maxillary joint, the mouth can only open a little way. The whole spine is like a rigid rod, no movement of any description being possible. The hip joints only permit of a very narrow range of action. Both knee joints are ankylosed in a flexed position presenting each an ovoid mass, in front. The ankle joints are partially ankylosed. The toes are well illustrated in the adjoining picture (see photograph 7). The irregular character of the toe nails which grew

No.7.



on after the original ones had shed is seen in the two inner and outer toes of the right foot.

Only slight muscular atrophy is seen in this case, it being most marked in the thigh. There is an abundant deposit of fat in the subcutaneous tissue all over the body.

The skin covering the thighs and shins is smooth, glossy and entirely denuded of hairs.

The internal organs present no signs of disease.

The average pulse rate is 60 per minute.

CASE 4. Mary Ann R. Age 63. Married. Two sons. The subject of very hideous deformities of the joints.

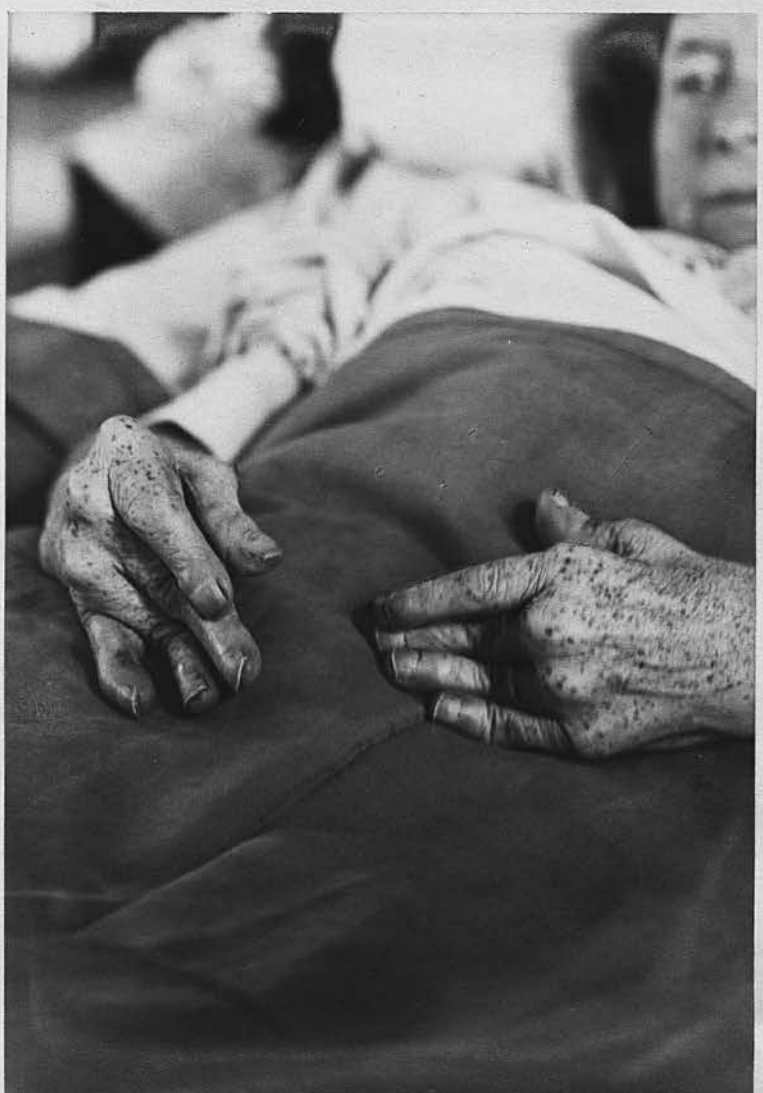
FAMILY HISTORY. One sister is said to be suffering from "Rheumatic Gout" but on close inquiries, the case appears to be one of Rheumatoid Arthritis.

PERSONAL HISTORY. She considers herself to have enjoyed fairly good health, she never had menstrual derangements. At the age of 42 she had an attack of erysipelas for which she

was confined to bed for three weeks. Shortly after and while still in convalescence she was taken with a severe pain in the hands which became much swollen but not discoloured. These symptoms disappeared in a fortnight. During the last five or six years, she has had many recurrent attacks of a similar character in which different joints are involved, but so far the temporo-maxillary articulations and the vertebral column have escaped.

PRESENT CONDITIONS. Until recently she has enjoyed very good health. She has however been troubled lately with a distressing cough and on two occasions blood stained sputum was expectorated. This was stained by Ziehl-Neelsens method and examined under the microscope in both times but no tubercle bacilli were detected. The right apex however yields a dull note on percussion and in auscultation a harsh jerky breathing is heard over this region but no accompaniments are audible. There is no cardiac mischief and the abdominal viscera present no signs of disease.

No.8.



average pulse rate is 72. The patient experiences much pain in the joints in wet and stormy weather.

CASE 5. Willoughby N. Age 59. Leather sorter. Complains of pain and stiffness of his joints.

FAMILY HISTORY. One sister is said to be troubled with "rheumatics".

PERSONAL HISTORY. Shows rheumatic fever at 10 and small pox at 16. According to his own story he had much exposure to cold and wet but he had always enjoyed excellent health until the onset of the present illness which dates back to three years ago, when the shoulder joints became suddenly painful swollen and stiff. Since then there have been many recurring attacks, distinguished by the same features, and in which the various articulations including those of the cervical vertebrae are involved but so far the temporo-maxillary joint are exempt.

PRESENT CONDITION. Patient is big framed man, and is in a satisfactory state of health The fingers are slightly deflected towards the ulnar side and their joints show marked thickening of the soft tissues, no bony outgrowth being

felt. The joints are all flexed except the proximal phalangeal articulations of the right middle finger which is dorsiflexed.

The wrists exhibit enlargement but no bony thickening is felt.The elbow joints are enlarged and flexed with the forearms pronated. The left joint admits of a slight flexion and extension but the right one is completely ankylosed. The thickening is confined to the soft tissues.

Both thighs are flexed on the abdomen but a narrow range of movement if permissible in both sides.

The knee are ankylosed in a flexed position with marked thickening of the surrounding structures especially in the lateral aspects. The toes are deviated towards the outer side, fibular tendency being the name given to this condition by Lane. The feet are puffy especially over the dorsal aspects. The general muscular wasting in this case is slight.

The internal organs reveal no signs of disease in repeated physical examinations and there is no cardiac mischief. The pulse rate averages 86 per minute.

No.9.

CASE 6. Alfred S. Age 61. Married. Shoe finisher. Complains of pain and stiffness of the joints.

FAMILY HISTORY. Father said to be suffering from "Rheumatism".

PERSONAL HISTORY. Early history of alcoholic excess. According to the patient his earliest manifestation of joint trouble dates back to the age of 26, when after exposure to wet and cold, his shoulder joints became painful and stiff. These symptoms were not severe and lasted about a month. Then recurrent attacks occurred at irregular intervals during which most of the joints in the body have been involved but the temporo-maxillary joints are so far exempt. The patient has enjoyed uninterrupted good health in every other respect.

PRESENT CONDITION. Patient is the picture of robust health. The condition of his hands is well exhibited in photograph 9. It will be seen that no Heberden's nodes are present. There is a fibrous thickening of the wrists. The elbow joints also display a similar character, they are

flexed and their movements are restricted. The muscular atrophy in the arms is not marked. The movements of the shoulder joints are limited, and accompanied with marked cracking, their muscular covering is conspiciously wasted. The actions of the vertebral column is only slightly impaired. The thighs are flexed on the abdomen and the hip joints do not permit of full extension. The knees are flexed and partially ankylosed allowing only very restricted actions. The functions of the ankle joints are much impaired. The feet lose their natural arches and the soles are flat.

According to the patient the feet have only assumed their present character about three years ago.

No constitutional changes are discovered. The heart show no lesions. The pulse rate averages 64½.

CASE 7. Nellie W. Age 32. Single. Tailoress. Enquiries into family elicit no joint affections of any kind.

PERSONAL HISTORY. In the earlier years of menstrual life her periods used to be painful and excessive, otherwise she enjoyed good health The earlier symptoms of her present illness appeared at the age of 19 when following a slight mental shock she became rather depressed. Lost her appetite, felt languid, wearied and nervous although she persisted in her occupation. When she went home one evening she began to notice that her glove was getting rather tight over the ring and middle fingers as she took it off her left hand. The same thing happened on several successive evenings but as no pain was felt very little notice was taken of it until one night she was seized with a sudden and violent pain in her left wrist which was much swollen and red in colour but soon it turned into a bluish hue. Other joints became rapidly implicated and before the end of nine months from the onset of the illness she was reduced to the helpless state in which we now find her.

PRESENT CONDITION. Patient is a thin and delicate looking woman, she shows marked muscular wasting in the limbs, but her general state of

No.10.

health is satisfactory although there is a tendency to constipation. She is unable to stand so she sits in a wheeled chair all day, her knees are in an extended position and her legs are supported by a board fixed to the chair. She can write, knit and crochet but she cannot feed, wash or dress herself on account of the conditions of her elbow joints which are ankylosed in a flexed attitude. The wasted state of the hands are well shown in photograph 10. Fortunate for the patient the finger joints still permit of the actions above described. The movements of the shoulder joints are much restricted and accompanied by marked cracking. The mouth can only open a little way. Rotation forward and backward movements are carried out with much impediment. The dorsal and lumbar vertebrae are utterly rigid. The hips move freely. The knees are enlarged and ankylosed in the extended position with the petella fixed to the lower end of the femur on each side. The ankles are ankylosed while the feet assume extreme planter flexion. The nerves and muscles react normally to electrical stimulus. The heart

and lungs show no sign of disease, pulse rate is ·76 per minute.

CASE 8. George G. Age 76, married. Watchman.

FAMILY HISTORY. Nil.

PERSONAL HISTORY. Early history of syphilis and gonorrhoea. Patient has lead a very active life, but being a watchman by occupation he has necessarily exposed to all sort of weather. His first symptom which commenced at the age of 64 was a gradual loss of strength of the right foot, the sole of which later experienced constant sensations of pins and needles. On close inquiries it is found that ten years back this foot was run over by a wheel but the injuries sustained were only trivial the skin being bruised. These symptoms having lasted about three years he was taken with a sudden and severe pain involving the neck, shoulder joints, arms, wrists and knees. The joints were not swollen but extremely painful and stiff. Then followed a lull, after which recurrent attacks declared themselves through which the patient has felt conscious of a rapid decline of

strength in the various groups of muscles.

PRESENT CONDITION. Patient is a man of remarkably good physique for his years, he has lately been troubled with dyspeptic symptoms, which are due to no doubt the necessary inactivity attending the disease.

The phalangeal joints are flexed, somewhat rigid and cannot be passively moved without causing great pain. No bony thickening can be palpatated. The interossei, the lumbricles and the muscles of the thenar and hypo-thenar eminences are much atrophied. The palms are moist and clammy, The surrounding tissues of the elbow joints are much thickened and these joints are slightly flexed and do not allow the full range of action. There is a slight restriction of movement in the shoulder joints.

The cervical spine. The slightest rotary and nodding movements of the head produce the most excruciating pain.

The dorsal and lumbar vertebrae are rigid.

The hip joints are also affected and passive movements produce pains. Movement is limited in every direction but most marked in abduction.

The knees are slightly flexed and enlarged. The enlargement is due to a thickening of the periarticular tissue, no bony outgrowths being felt. The muscles of the thighs and legs are somewhat wasted. With the exception of the dyspeptic symptoms referred to above, no ailments or organic changes are detected. The pulse is 72 per minute.

CASE 9. Jane P. Age 63. Widow.

FAMILY HISTORY. Mother died of pulmonary tuberculosis.

PERSONAL HISTORY. Patient says that she had Rheumatic fever at 17. No history of other illness or menstrual disorder. Menpause at 50. Her first symptoms of the present illness, which commenced at the age of 49, was stiffness in the left knee. This subsided in a week. About a year later she experienced sensations of pins and needles in the hands and feet. This was followed by pains which attacked in rapid succession the right knee, left knee, finger joints, wrists and neck. The joints implicated were much

No.11

swollen and those of the fingers showed a red and shiny appearance. Repeated attacks followed at irregular periods and the articulations have become progressively distorted.

PRESENT CONDITION. Patient is a well nourished woman and enjoys good health. She sits up in the day time and can manage to walk a short distance with the assistance of two canes. She can knit and crochet wash and dress herself but she has to be helped to put on her stockings and boots owing to the rigidity of the back. The distorted condition of the hands are well shown in photograph 11.

The wrists are enlarged, there being some thickening of the surrounding tissues. The movements of the shoulder joints are confined to a limited range and accompanied with a cracking sound. The spine is involved in its entire length and is very rigid. The knees show some thickening of the periarticular tissue and a fibrous nodule of the size of a pea is felt to the outer side of the left patella. It can be moved freely under the skin. The toes are deviated towards the outer side ( Fibular tendency)

inboth feet. The knee joints are slightly exaggerated. The internal organs show no signs of disease, the average pulse rate is 76.

CASE 10. Elizabeth C. Age 57, single, an inmate of the Poor Law Institution, Leicester. Complains of pains in her finger joints.

FAMILY HISTORY. Nil.

PERSONAL HISTORY. Patient generally enjoys good health, her periods were always normal and ceased two years ago, soon after which she had pain and stiffeness in the left shoulder joint. The wrists and the interphangeal joints were next involved and became much swollen after which there have been many exacerbations and lulls.

PRESENT CONDITION. Patient is a spare built person with a delicate look, she has a happy disposition but her intellectual functions appear to be somewhat impaired. Her fingers which are slightly deflected towards the ulnar side show marked periarticular thickening in the proximal phalangeal joints, the movements of which cause pain and are accompanied by creaking. There is a slight tenderness in the wrist joints

when they are palpated but no enlargement is evident. The internal organs show no signs of disease. The average pulse rate is 70.

CASE 11. William T. age 68. Suffering from Rheumatoid Arthritis. Patient, the subject of mental deficiency, has been an inmate of the Poor Law Infirmary, Leicester since 19 years of age. His sister who is paying him occasional visits is, I find, also affected with rheumatoid arthritis, but as she is extremely deaf and unintelligent an accurate family history cannot be elicited.

He had always been able, under supervision to help in cleaning the wards and to make himself generally useful until ten years ago when he appeared to perform his work in an unsatisfactory manner. Later he began to complain of pain and showed signs of puffiness in his wrists and ankles. He ran a moderate temperature. He was given salicylates of soda and allowed to rest. When he got up again he became quite incapable of any ordinary action, he was weak in the legs, walked with a gait,

easily lost his balance and reeled over when anybody happened to come up against him. He then complained of pains in the different articulations now the knee joints and now again the wrists etc. which have become gradually and progressively disfigured.

PRESENT CONDITION. Patient is a man of a spare build. He lies curled up in bed silent and apathetic, uttering now and then a meaningless cry or laugh. His attitude is one of general contraction, the fingers, wrists and elbows are flexed, the hips are drawn up on the abdomen and the knees are flexed. He is helpless, bedridden and requires constant attention. The fingers are markedly deviated towards the ulnar side and the proximal phalangeal joints show great thickening of the periarticular tissue. The interossi muscles of both the flexor and extensor aspects are markedly wasted so are the muscles of the thenar and hypothenar eminences. The wrists, elbow joints and shoulder joints all show thickening and limitation of movements. The mouth can only open a little way. Rotation of

the head is limited but flexion and extension can be carried out freely. The thighs are adducted so that knee joints are almost approximate. The knees are flexed and enlarged and stand out in bold relief, no doubt due in a great measure to the muscular wasting above and below the joints.

Full extension of these joints is inadmissible.

Both feet are everted thus rendering the internal malleoli to appear very conspicuous and producing in each ankle the appearance of Pott's fracture, but on palpation no thickening of the fibular can be made out on either side. The toes all point outwards displaying the fibular tendency. Physical examination of the internal organs gives no signs of disease. The average rate of pulse is 80.

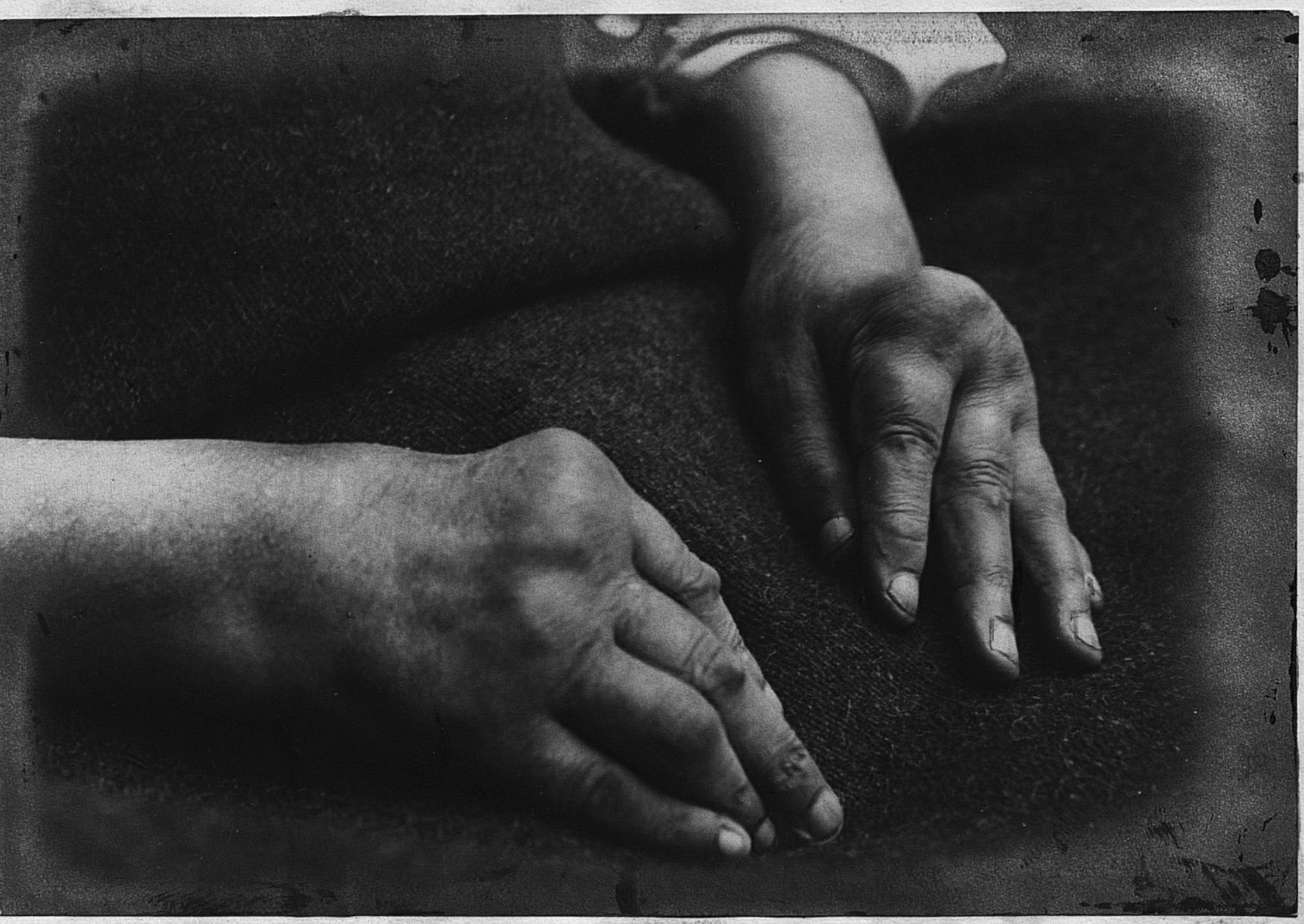
CASE 12. Sarah Y. Age 49. Single.

Complains of pain in the joints.

One brother and one sister died of pulmonary tuberculosis.

PERSONAL HISTORY. Her menstrual functions has

No.12.



always been regular and normal. She was always in good health until the age of 30 when she began to be troubled with dyspepsia which was accompanied on one occasion by a"bilious attack" characterised according to her own story by the presence of jaundice, vomiting and diarrhoea. The jaundice disappeared in a fortnight and has never since returned but she has often had renewals of digestive disturbances and diarrhoea. About the same time she experienced pain in her right wrist which turned red and glazed. These symptoms developed quite suddenly waking her up one midnight. Other articulations quickly became involved and she has since had many lulls and excerbations of these attacks. She is not aware that the conditions of her alimentary tract are in any way connected to the recurrent articular attacks, certainly not in point of time at least.

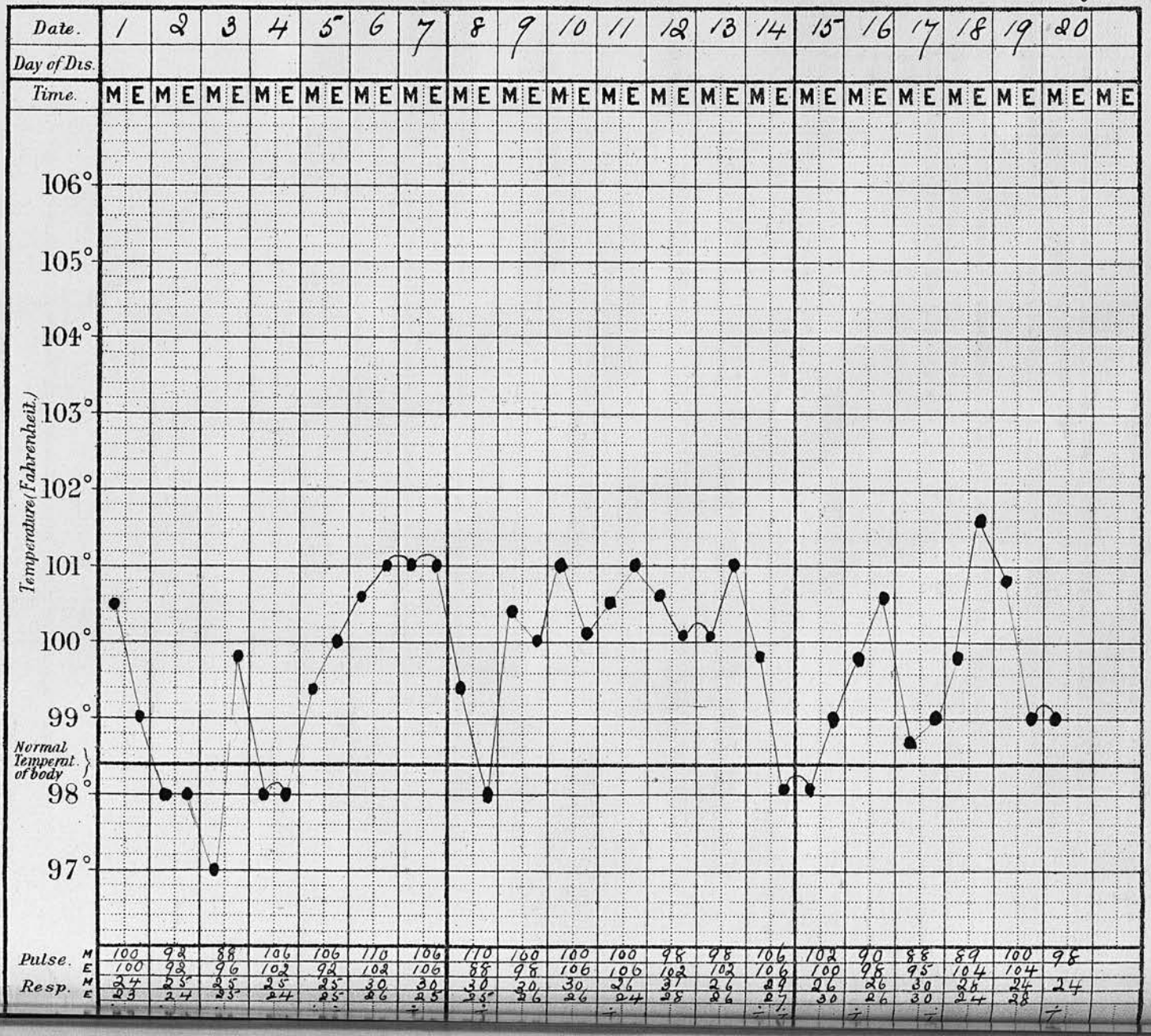
PRESENT CONDITION. The patient is of a good physique and but for the occasional digestive disturbances and pain in the joints she is leading a fairly comfortable existence. Her wrists, hands are well pictured in Photograph 12.

# LEWIS'S HANDY TEMPERATURE CHART.

Name Case 13. Margaret C. Age 55 Disease Rheumatoid arthritis. Admitted January 1917

**Notes of Case.**

**Diet, etc.**



It will be seen that there is a great thickening in the metacarpo phanlangeal joints which slope down to meet the somewhat enlarged wrists describing in the process a concave appearance on the dorsal surface of the hands. On palpation there is a dense and elastic feeling over these joints thus showing that their enlargement is not due to any bony elements. The knee joints are somewhat thickened, flexed and do not admit of the full range of action.

The heart and lungs.....nil. The average pulse rate is 68.

CASE 13. Margaret C. Age 55. Married. Eight children. Complains of "Rheumatics". She has also a troublesome cough.

FAMILY HISTORY. Nil.

PERSONAL HISTORY. Her periods, which were always normal ceased at 40 years of age. She states that she had much exposure to cold and wet which she is convinced brought on the present troubles. Up to two years ago she had enjoyed uninterrupted good health and after a period of fatigue weariness and exhaustion coupled with cold and damp she began to

feel peculiar sensations such as extreme cold and heat in the hands, followed soon afterwards with pain and stiffness in the finger and wrists joints. The joints were gradually noticed to be swollen but no discoloration was seen. Then she felt pain in her jaws in speaking and eating. The pain soon appeared in the neck, knees and most of the other articulations. She was laid up for six months on this occasion. She thinks she was free for about three months but the same trouble returned and she has since been more or less and invalid.

PRESENT CONDITION. Patient is a very stout woman with a pale dark complexion. She has pain in her knees and wrists and has been troubled - lately with a cough. The conditions of her hands present features very similar to those of the previous case (case 12) so I do not propose to describe them. She can secure free actions of her temporo-maxillary joints, vertebral column and elbow joints with impunity. The knee joints are much swollen and tender to the touch. The feet too show great oedema and pit on pressure.

She has a moderate rise of temperature, and its characteristic relation with the pulse rate can be seen in the clinical chart opposite. The pulse is regular and tense. The heart shows no signs of disease. The lungs, Harsh vesicular breathing is heard in both lungs anteriorly and posteriorly and a few harsh rhonchi and creptations are heard.

Pucussion yields a resonant note all over.

The urine is of normal quantity and a small trace of albumen has been detected periodically, no other abnormal conditions have been found.

CASE 14. Mrs. Charlotte F. Age 64.

Complains of "Rheumatics".

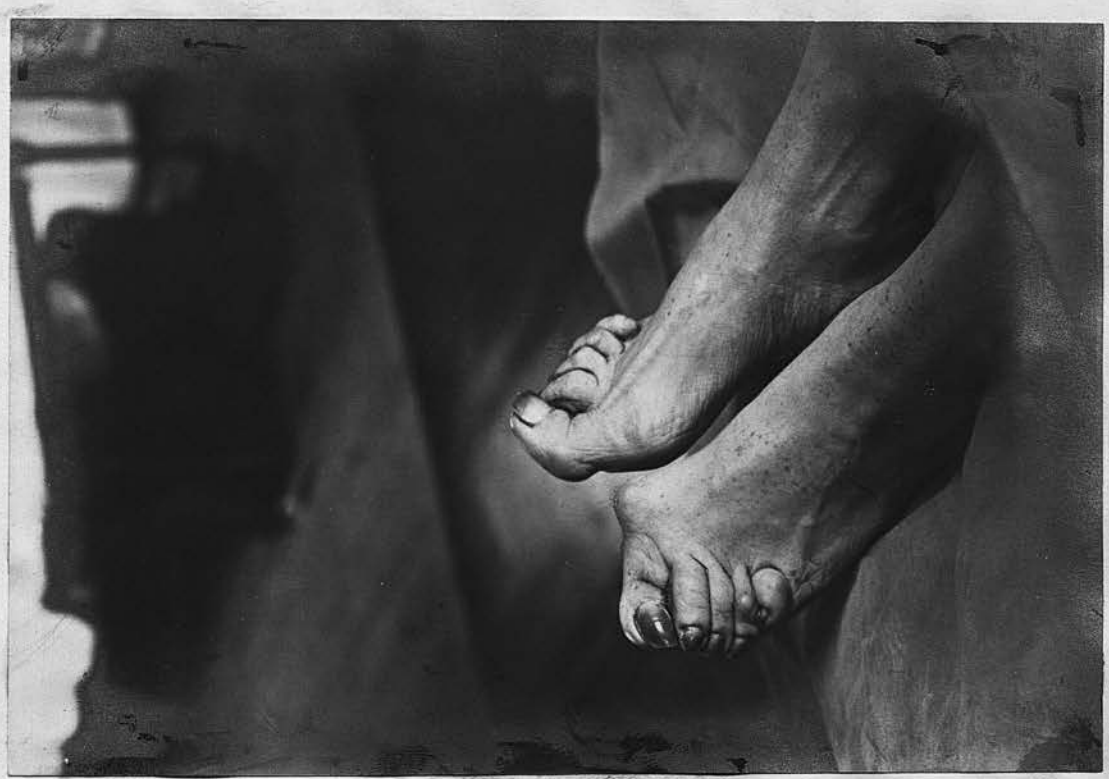
FAMILY HISTORY. Nil.

PERSONAL HISTORY. Had "Rheumatic Fever" at 18, otherwise she had always enjoyed good health. This is a comparatively acute case in which worry and anxiety seem to have had a very decided influence in its onset and in its progress. Her husband met with a very serious accident six months ago, and was removed to hospital. They used to be in receipt of a small weekly allowance

which was just sufficient to pay for their household expenses but since the husband entered the Institution this was reduced to half its former amount, and with this meagre allowance coupled with the anxiety over his illness she has become profoundly grieved. Shortly after that event, she was attacked with pain in her left knee joint. Then the other articulations became involved one after the other until now there is hardly a joint which has escaped. She can still walk a little distance with the aid of a stick but she is practically a cripple. The case is peculiar in that the onset of the disease is at such a late age and that its progress so rapid.

PRESENT CONDITION. She is a delicate looking woman with a sallow complexion. Her face presents a careworn expression, no doubt reflecting an inward perturbation of the mind. She walks with the aid of a stick in her left hand and as the left knee joint is flexed, this side of the pelvis and body tilts upwards with each advancing step, the forward progress being extremely slow. When she sits down the hands exhibit a tremor not unlike

No.13.



that of paralysis agitans, which as far as she can remember has only been present for five or six months.

The hands. The metacarpo phalangeal and the proximal phalangeal joints are much enlarged and thickened, the latter presenting the typical spindle shaped joints. The thickening of the joints is due to a proliferation of the periarticular tissue as no bony element can be palpated. Movements of the joints are accomplished with much difficulty and pain. The muscular atrophy in the hands is slight and insignificant but the grip of the hands is extremely feeble. The wrists joints are thickened. Cracking is audible in the movements of the elbow and shoulder joints. The right knee presents no pathological changes. The left knee is swollen and enlarged, it is flexed and does not permit of full extension. On palpation the structures making up the thickening are soft and elastic. There is a slight restriction of movement on the ankle joints. The toes as will be seen in photograph 13 are all deviated towards the fibular sole (fibular tendency) a few freckles

are seen in the dorsal surface of the foot and in the legs. These the patient tells me have not been present for any length of time although she cannot remember when they first appeared. The face and the hands are free from these pigmentation.

## TREATMENT.

We are confronted with a very difficult problem but judging from many clinical facts, the disease is not necessarily incurable. Indeed with the willing co-operation of the patient on the one hand and the careful attention of the physician on the other hand we are justified in looking forward to the prospects of very gratifying results. It is of paramount importance to approach the question of THERAPEUTICS from the point of view of pathology, at least in so far as we know it. In the earlier part of this work we have already disposed of the view of a relationship between this disease and rheumatism or gout but unfortunately such a conception still prevails amongst many in the laity. There is no doubt the drug advertisements in the lay journals do much to foster the idea of the presence of uric acid in the system in joint complaints and in many other affections with the result that a stringent restriction in dieting is fervently practiced by many victims of the malady. On the contrary we are dealing with a

disease of debility or at least with a disease whose inception is frequently at the ebb of health and vigour and nothing is more important than to reestablish the strength of the patient and to restore him in as favourable a condition of natural defence as possible. Another very important point to remember is that the disease may lead a very protracted course and it is well to instil into the patients mind this knowledge at the earliest opportunity and to induce him to persevere with a prolonged treatment should the necessity arise. Finally we should bear in mind that the measures adopted to combat the disease in its acute stages differ from those of the later and quieter stages. With these preliminary observations, I will now pass on to discuss the treatment under the following headings.

1. Diet and Hygiene.
2. Rest and Exercise.
3. Massage.
4. Local applications.
5. Baths.
6. Climate.

7. Drugs.

8. To deal with septic foci or local disorders.

9. Surgical treatment.

DIET & HYGIENE. We now know that no articles of food have any contributory effect to the causation of the disease, nor do they exercise any deleterious influence in its course and keeping in mind that we are dealing with patients who are generally bodily weak and insufficiently nourished, we have got the key note to the whole question of dieting. In the stage of pyrexia, we are guided by the general principles governing the dietry of the febrile state and liquid foods such as milk, beaten up eggs, gruels, meat broths, beef-tea, jellies etc. will be found most beneficial. In the quieter stages the diet should be on as generous a scale as is compatible with the digestive power of the patient. Meat, game, fish and fat should be freely partaken and wholesome vegetables in substantial quantities should be indulged in. Such are the broad principles and much depends upon the ingenuity of the nurse or housewife to produce varied

and delicious dishes that are palatable and gratifying to the patient. Is he to be allowed any alcoholic drinks? Experience shows that they do not exert any harmful effects on the disease and therefore no restrictions should be made to a limited amount of sound wine such as good claret, port, burgundy, stout or bitter beer. Should any exacerbations of the joint affections follow their consumption they should at once be with held. Then the mistaken notion believed and acted on by some that stimulants can take the place of food should be discountenanced.
Next comes the question of hygiene the importance of which can hardly be over estimated. In the febrile stage excessive perspiration is often present, it is best for the patient to be confined to bed in a room which is kept fresh and airy but a draught is to be scrupulously prevented. Later when the temperature is subsided he should be encouraged to rest in the open air whenever the weather is favourable. Amongst the numerous beneficial influences of the role of open air, I may be permitted to mention how conductive it

is to promoting the inclination for food, a matter of great importance in the convalescence.

A few words must now be said about the important matter of clothing which should be light and warm with absorbent material worn next to the skin, light woolen undergarments which cling to the skin with a sort of an elastic pressure are most desirable. The feet should be carefully protected by wearing porous cork or straw soles in the boots and stockings with double knitted soles are to be recommended.

REST AND EXERCISE. These are two practical aspects in the treatment, the importance of which is not generally appreciated. To begin with we are dealing with an inflammed joint and nothing is more imperative than to give it rest which in the active stage must be complete. The articulation is to be fixed in a splint, not in plaster of Pariscase but in a light millboard or poroplastic splint which can later be removed from time to time, to

allow of passive movements being carried out. But what is our guidance and delimitation in this mode of treatment? To this question "Spender" has furnished us with an effective answer "Pain and fatigue are our sentinels and they cannot err" These measures are adopted not only in the joints actively but to those in which pain smoulders for a lengthy period, months or years. They are both just as dangerous and if not properly treated crippling is the final result. We do not want to leave the joints to rest too long and to allow them to lapse into idle atrophy but at the same time we do not want to subject them to violence so we have to steer the middle course with the utmost discrimination. How often do we find indolent and neglected joints become fixed and distorted and how seldom do we find the temporo-maxillary joints get hopelessly ankylosed? In the latter case we know that no very pressing duty need be imposed on these articulations for the greater part of the day and yet they have to carry out their functions at certain allotted

intervals with the result that their physiological actions almost provide for the necessary therapeutics in this respect. It should be remembered that in the acute stage provision must be made to secure rest for the temporo-maxillary joints and to ensure this the diet must be exclusively liquid and a small rubber tube is passed into the mouth over a broken tooth so that the fluid may be slowly sucked up. Short of this we may have to recourse to nasal or rectal feeding for the time being. Later and after a course of passive and active movements have been carried out the patient should be encouraged to exercise his joints systematically, due regard being given to individual articulations and care should be taken to avoid excess. To prevent stiffening of the fingers, piano playing, knitting, needle work will be found most suitable. Light exercise devised after "Sandow's" methods will be found useful for the elbow and shoulder joints. If the lower limbs are involved graduated walking exercise should be practised. The limbs are with advantage equipped with domestic bandages and laced kneecaps. Sticks and crutches are

necessary to take off the strain from the damaged joints.

MASSAGE. This is carried out to order to counteract muscular atrophy, toevert the graver forms of contractive deformity and in promoting the nutrition of the body generally. It should be practised throughout the active stage provided that the joints themselves are left severely alone. If the patient cannot tolerate it at this stage a postponement may be made till a later period, it being meanwhile carried out in the trunk alone. The massage should first be applied lightly and only for a few minutes daily, to be prolonged and administered with more vigour later, but care should be taken that fatigue and exhaustion of the patient are to be studiously avoided. To realise its full effect the treatment must be persisted with patience for months. There is no doubt that massage when skillfully and scientifically employed will confer great benefit on the patient. It promotes a more active circulation with the result that the waste products of the inflammed joint

structures are more easily absorbed thus enabling the process of regeneration to take place more readily. The skin becomes softened and more pliable. There is a marked decrease of paraesthaesia, the muscles become firmer, the appetite is increased and the general health improved.

LOCAL APPLICATIONS. For the relief of pain the external application of various substances has been employed. Almost all the counter-irritants have their respective advocates and they are all more or less efficient. The liniments of aconite, belladonna and chloroform in equal parts applied on lint are often very efficacious. As a cheap and efficient remedy the lotion of Plumbi cum opio used as an evaporating solution or as a fomentation is very soothing and often affords great relief. "Bannatyne" speaks highly of guaiacol as a local application.

If pain is severe in the peripheral joints Bier's method of passive hyperoemia may be tried. For this purpose we employ a Martin's bandage which is applied above the joint to

be treated and which is so adjusted that it greatly impedes the venous flow but does not arrest the arterial circulation. Very soon the skin will assume a bluish red tint and oedema results if the pressure is kept up for some time. But the point to remember is that unless the bandage is so adjusted that oedema happens it will have no effect. "Bier" recommends the application of the bandage in these cases for as long as 10 to 22 hours per diem, the oedema which results being removed by one or two applications of massage, the massage consisting in a stroking of the limb from the periphery upwards. To obtain the desirable effect this method of treatment should be persisted in for weeks or even months. For the larger joints such as the shoulder or knee, hot air baths or douche are preferred in which case the hyperaemia induced is active hyperaemia. The acute pains which result from the implication of nerve roots when the vertebral joints are involved may be treated by blisters or by the application of

the actual cautery near the spine.

BATHS.

Balneo-therapy has conferred no small benefit on numerous victims of rheumatoid arthritis, its favourable reception and its ever increasing popularity are the measure of its attainments. Be that as it may, due consideration must be made before a patient is dispatched to a Spa resort, for in injudicious judgement lies the path to very grave consequences. A case in which acute or subacute inflammation is in progress is certainly much better kept ay home at perfect rest than to be submitted to the discomfort and hardship of travelling, and besides rest is the best therapeutic agent that can be desired at this stage. Later on when the active stage has subsided and deformity threatens to develop in the damaged joints, the more active measures such as massage, movements, douche and bath which the Spa treatment offers, become more serviceable. It must be understood that the value of a Spa depends not so much on the intrihsic qualities which its water

possesses but on the special methods by which its application is made. Since many of the Spas in this country, which adopt the more advanced methods practised in the Continental Spas, have at least attained to their measure of success. The combination of douche and massage, a pre-eminently useful method, which had its origin in Aix-les-Bains is now carried out in Bath and many British Spas. Amongst the watering places in this country at which great improvements have been effected in this disease we may mention Bath, Buxton, Harrogate, Leamington and Strath-paffer. For the internal use of the water, the benefit depends on its mineralisations. Thus cases associated with anaemia will benefit by drinking chalybeate waters and those complicated with portal congestion and hepatic troubles are assisted by the internal use of saline waters. It must be remembered that apart from the application of water, the climate influence the dietic regime and other factors enter into the course of treatment at the Spa. One cannot close this

subject without addressing a word of warning against the use of Turkish baths, hot immersion baths and vapour baths which by promoting excessive perspiration, lower the tone of vitality of the patient and are not only unsuitable but are apt to favour a rapid progress of the disease.

CLIMATE. Climate has a soothing and beneficial influence and whenever practicable the patient should be advised to reside in a dry, elevated and sparely populated locality, with much sunshine and protected from north and north-easterly winds. Advantage should be taken of the favourable weather and open air exercise should be freely indulged in. With the well-to-do sufferers the winter may be spent in Egypt or in the Algerian health resorts.

DRUGS. We have no specific in the disease and no drug is known to exercise any definite influence in its course.

In the febrile stage the effervescing quinine mixture is probably the most efficient remedy. Bannatyne speaks well of guaiacol carbonate and

recommends its use as an antitoxic substance, believing in the infectious origin of the disease. He gives it in 5 to 10 grains doses three times a day to be increased in quantity gradually and continued for long periods months or years. Luff in addition to ordering gusiscol gives a mixture of iodide of potassium with tincture of nox vomica and compound syrup of glycero-phosphates in chloroform water. He gives the iodide in full doses starting with 10 grains three times a day. The salicylates do not seem to have any effect in the malady, although in an occasional case they ease the articular pains. The tonics are useful as adjuncts to treatment and combination of iron and arsenic should be prescribed especially when anaemia is present. A good plan is to give a mixture containing, liquor arsenicalis and syrup ferri iodide in water. Cod liver oil is useful. Extracts of thyroid and thymus have been tried so far with very little effect. For the sleeplessness caused by pain chloral in ten grain doses give the most satisfactory results.

TO DEAL WITH SEPTIC FOCI AND LOCAL DISORDERS.

Whatever views may be held with regard to the origin of the disease the propriety of searching for septic foci and local disorders and to deal energetically with them cannot be questioned. Such conditions as otitis media, nasal polypi adenoids, enlarged tonsils, decayed teeth, pyorrhoea alveoralis and ulcerated piles should be dilligently sought for and dealt with accordingly. Special attention should be given to the disorders of the uterus and any digestive disturbances or any mischief in other systems should call for appropriate measures. Whether these local troubles are the origin of an infectious process or not has not been determined but there can be no doubt that their presence undermines the vitality of the body and aggravates the articular conditions. Further success in their removal is followed by an amelioration of the general health and in some cases is even followed by an improvement in the articulars affections.

VACCINE TREATMENT. In the belief that the disease is of infectious origin it has received much attention from the vaccine therapist but so far the results of his efforts obtained from clinical experience have not been encouraging.

SURGICAL TREATMENT. We shall now study the measure that may be of service when ankylosis and contractive deformities have established themselves. As we know ankylosis in rheumatoid arthritis is more often due to fibrous adhesions than to bony ankylosis, an attempt should be made to straighten it by means of extension and weight, and if this should happen in the knee joints although it must be said that this treatment is not generally attended with much success. In exceptional cases as when one knee joint is ankylosed and the other knee is free from damage excision of the joint, may be advisable, but unfortunately disease may follow comparatively rapidly in the other knee probably brought about to some extent by the increased strain thrown on the movable articulation by the

stiff limb. (Cheyne and Burghard) Operative procedures in the other articulations are no more satisfactory, as the restoration of any ankylosed joint to function is exceptional and of short duration. On the whole it is perhaps better to try the milder measures first, and passive movements and manipulations should be persisted in all cases where ankylosis is not of bony origin.

## SUMMARY AND CONCLUSIONS.

### ETIOLOGY.

1. Age of onset. This may occur at any age but most commonly between 20 and 50. Generally speaking, the earlier the onset the worse the prognosis.
2. Sex. Females are more often attacked probably because they are more exposed to debilitating influences.
3. Heriditary influences. A Heriditary tendency to joint affections is fairly evident in many cases. Gout and tuberculosis are only present in the family history of a small proportion of cases.
4. Predisposing causes. Constant exposure to cold and wet, worry and care are very important predisposing causes,. Anything that lowers the standard of health can be calculated as a predisposing cause.
5. Diet makes no influence as an etiological element.
6. Occupation. The same may be said for occupation.

7. Previous Health and illnesses. The previous health is more often good than poor, and any illness that may precede the onset appears to have occurred in a casual way. A previous history of Rheumatic fever is sometimes present but the extent of its influence is probably the same as that of any other arthritis, that is by damaging the joint structures it renders the latter more vulnerable to an attack of Rheumatoid arthritis.

PATHOLOGY.

The acute onset in some cases, the pyrexia, the periodical exacerbations and lulls, and the clinical features such as sweating etc. can only be satisfactorily explained by a germ infection, although the pathogenic organism, its path of entrance, the particular tissues in which it resides and propagates have still to be determined.

METHODS OF ONSET.

Sudden and gradual onset appear to occur with equal frequency. It is not uncommon to trace

the exciting cause of an acute onset to exposure to cold and wet.

POINT OF ONSET.

More often at the smaller joints though not uncommon at the shoulder joints.

THE CLINICAL COURSE.

Is largely influenced by the duration of the attack and the frequency of the recurrence. Long quiescent periods are a common feature. The earliest symptoms may manifest themselves as neural symptoms and may precede the onset of pain for a very lengthy period. The polyarticular nature of the disease is well established and no joint is immuned.
Symmetry of lesions is often seen but this is not invariable. The enlargement of the joints is due to the thickening of the periarticular tissue and in cases due to a distension of the joints by fluid or by hypertrophy of the villous processes, but not to bony growth hence such bony thickening as Heberden's nodes is only seen in an exceptional case. Ankylosis is more often

due to fibrous adhesion than to bony fixation.

Ulnar deviation and fibular deviation are often seen in this disease but they may be present in other diseases as well. Muscular atrophy is marked in some cases and muscular tremor is sometimes seen.

Atrophic changes in the skin are often seen and subcutaneous fibrous nodules are sometimes present.

CONSTITUTIONAL CHANGES.

The patient is generally feeble and anaemic after any attack but sooner or later the normal health is re-established.

Tachycardia is present during an attack and for a time after it, but the pulse rate is soon restored to normal in the majority of cases.

TREATMENT.

The disease is not necessarily incurable if early diagnosed. A prolonged course of treatment may have to be persevered with.

DIET AND HYGIENE.

In pyrexia, dietry for febrile state, otherwise diet should be substantial and nourishing. Hygiene rules with regard to housing,

work and clothing to be strictly adhered to. Avoid chills.

REST. Essential to acute stage, passive movements later, followed by graduated exercise, avoid excess.

MASSAGE useful for acute and later stages if skillfully administered.

Local Application - To sooth pain.

BATHS good for later stages.

CLIMATE - Dry, sunny, protected from wind and sparsely populated.

DRUGS - Quinine, guaiacol carbonate can be tried, Tonics and cod liver oil are useful. To deal with septic foci and local disorders in every case whenever present.

SURGICAL TREATMENT - not satisfactory.

# BIBLIOGRAPHY.


1. Brodie on "Disease of the joints" 1818.
2. Macleod on "Rheumatism" 1842.
3. Todd "Practical Remarks on Gout, Rheumatic Fever and Chronic Rheumatism of the joints" 1843.
4. Fuller on "Rheumatism, Rheumatic Gout, Rheumatic Fever, Sciatica" 1852.
5. Garrod A.B. "A system of medicine" edited by J. R. Reynolds. Volume 1. 1886.
6. Duckworth, "Heath's Dictionary of Practical Surgery". Vol. 1. 1886.
7. Hutchinson. "Transactions of International Medical Congress" Volume 2. 1881.
8. Senator. Ziemssen's "Cyclopoedia of Medicine" Volume XVI. 1877.
9. Fagge. Principles and Practice of Medicine Vol. II. 1886.
10. Spender. Osteo-Arthritis. 1889.
11. Lane and Griffiths. The Rheumatic Diseases so called. 1890.
12. Forsebrook. A Dissertation on Osteo Arthritis. 1893.

13. Bannatyne. Rheumatoid Arthritis. 1896.

14. Hyde. The Causes and Treatment of Rheumatoid Arthritis. 1896.

15. Hawthorne. Rheumatism, Rheumatoid arthritis and Subcutaneous Nodules 1900.

16. Cock. Encyclopaedia Medica Volume 10. 1902.

17. Garrod A. E. System of Medicine. Edited by Allbutt and Rolleston. Volume 111. 1907.

18. Tubby. Arthritis Deformans. Lancet 1908.

19. Hutchinson. Medical Annual 1910.

20. Hones. Arthritis Deformans 1909.

21. White. An index of Differential Diagnosis of main Symptoms edited by Herbert French 1913.

22. Osler. Principles and Practice of Medicine. 1913.

23. Mc. Crae. A system of Medicine edited by Osler and Mc. Crae. Volume V1. 1909.

24. Bannatyne. Wohlmann and Blaxall. Rheumatoid Arthritis. Lancet 1896.

25. Poynton and Payne. Experimental Investigations. Lancet Vol. L. L902.

26. White. Pathology of Acute Rheumatoid Arthritis. Guy's Hospital Reports Vol. LV11. 1902.

27. Painter. Rheumatoid Arthritis. The Boston Medical and Surgical Journal. Vol. CXLV. 1901.

28. Trousseau. Lectures on Clinical Medicine. Vol. 1V. New Sydenham Society. 1871.

29. Hickling. Notes on The Clinical History of Rheumatoid Arthritis. Medical Chronicle. Vol. LV11. 1913.