THESIS
PRESENTED FOR THE DEGREE OF M.D.
of the University of Edinburgh.

A STUDY OF THE APPEARANCES
OF THE BONES AND JOINTS IN CASES OF
RHEUMATOID ARTHRITIS
AND CHRONIC GOUT BY MEANS OF SIGNAGRAMS.

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DECLARATION.

I, the undersigned, hereby declare that the whole of the work for this thesis has been done by myself, and that the written part was composed by myself.

The X-ray negatives were exposed and developed, and the prints made from them and mounted by myself. Neither the negatives nor the prints have been touched up in any way.

The skiagrams were taken on Ilford Special X-ray plates, and the prints were made on Velox gas-light paper.

The photographs of the external appearances of the hands were done for me by a professional photographer.

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A STUDY OF THE APPEARANCES OF THE BONES
AND JOINTS IN CASES OF RHEUMATOID ARTHRITIS AND CHRONIC GOUT BY MEANS OF SKIAGRAMS.

The following thesis consists of a description of the changes found in the bones and joints of the hands in twelve cases of chronic joint affection. The cases under consideration have all come under my observation during the past six months in Bermondsey Parish Infirmary. Eight of the cases are Rheumatoid Arthritis, and the remaining four are Chronic Gout. I have presented in this thesis all the cases of Rheumatoid Arthritis of which I have been able to obtain skiagrams, but the cases of gout have been carefully selected from among a number of cases which I have X-rayed. They are all undoubted cases of Chronic Articular Gout, and are given in order that a comparison may be set up between the skiagraphic appearances of the bones and joints in the two diseases.

As Luff says, ("Gout"; Cassell, 1907; p.150), "The cases hitherto grouped together as rheumatoid arthritis undoubtedly include more than one disease". Also Bannatyne, ("Rheumatoid Arthritis"; Wright, 1906; p.99), says ..... "it is not only possible, but probable that there are at least three forms of disease included in this term." (i.e., the term Rheumatoid Arthritis).
It is evidently therefore of great importance to follow out any line of inquiry that seems likely to yield fruitful results in aiding in the detection and separation of the different diseases which appear to be included under the term Rheumatoid Arthritis.

One such line of investigation is the skiagraphic examination of joints in cases diagnosed as rheumatoid arthritis. The hands have been selected because they present numerous bones and joints within a small area, and because, as they are very frequently affected in rheumatoid arthritis, and that at an early stage of the disease, it was thought likely that they would show numerous changes in various degrees of advancement - as indeed is the case.

Too much stress cannot be laid on the importance of seizing every opportunity of making post mortem dissections of joints already skiagrammed. For in this way only will it become possible to read a skiagram correctly. By comparing the skiagram with a dissection of the macerated joint, it can at once be seen what the exact pathological changes are, which have given rise to the alterations in bones, cartilages, and periarticular tissues reflected in the skiagram. Unfortunately, in none of my cases has this complete demonstration been possible. My skiagrams have therefore been read in the light of researches which have already been carried out on the complete lines indicated. For
the description of the changes in skiagrams of the hands in rheumatoid arthritis, which have been checked by comparison with dissected specimens, I am indebted to the investigations described in Vol. 1 of "The Bulletin of the Committee for the Study of Special Diseases", published through the Cambridge University Press in 1907. The papers in this volume bearing specially on the subject of the present thesis are numbered 6 and 9.

One result of the investigations detailed in these papers is that a strong resemblance has been found to exist between the conditions found in skiagrams of rheumatoid arthritis and in those of chronic gout, and the need for further investigation of the skiagram appearances in the latter disease.

The work for the present thesis was carried out entirely by myself quite apart from the Committee for the Study of Special Diseases; but is a contribution to the line of study suggested on page 49 of the Bulletin referred to above.

It is evident that an examination, on the same lines, of other chronic joint affections, such as Pulmonary Osteoarthropathy and Chronic Rheumatism, as well as of the changes, if any, to be found in merely senile joints, would be a most valuable addition to the investigation. But the present thesis is confined to the consideration of rheumatoid arthritis and chronic gout.
I propose to give first an account of the various changes which have been observed in rheumatoid arthritis and in chronic gout, on the lines of Paper No. 6 in the above Bulletin, amplified by my own observations.

Next I will describe the attempts at a classification of rheumatoid arthritis into groups by means of the skiagram appearances; and the similarity of the changes seen in skiagrams of chronic gout to those seen in certain groups of rheumatoid arthritis will be discussed.

The next section will be taken up with a description of the skiagram appearances in the twelve cases presented. In each case a short history of the onset and course of the disease, and of the previous and family history will be given; as well as a description of the external appearances of the hands. At the end of each case the provisional diagnosis will be found, and throughout there are some remarks on the various cases, and comparisons between certain of them are made.

Appended to the written part of the thesis, there is a set of plates, one for each of the cases. On each plate are mounted skiagrams of the hands and an ordinary photograph of the external appearances of the hands for comparison therewith. Each plate is numbered with the number of the case. The number which forms part of each print refers to the number of the original X-ray negative taken, and was included in the negative for purposes of easy identification.

*Pp. 14-15: Contain an explanation of the grouping adopted for the cases presented.*
SECTION A.

A GENERAL DESCRIPTION OF THE CHANGES FOUND IN SKIAGRAMS OF RHEUMATOID ARTHRITIS AND CHRONIC GOUT.

These changes will be considered under three headings.

(1) CHANGES IN ARTICULAR CARTILAGES.

These changes are of the nature of atrophy. The normal joint shows a clear space between the articular ends of the bones, which is due to the fact that the cartilage is penetrable by the X-rays.

All degrees of atrophy are found, varying from slight thinning to complete disappearances. Loss of cartilage is seen both in rheumatoid arthritis and in chronic gout.

(2) CHANGES IN THE BONES.

ATROPHY.

This is evidenced in the skiagram by a diminution of the density of the shadow cast by the bones. The whole of the substance of a bone may be involved, and in this case the bone may retain its normal contour, and simply throw a lighter shadow. Or the articular ends only of a long bone may be affected. Or, again, the bone may be diminished in its diameter, and appear as if part of its substance had been symmetrically pared away. Examples of all these atrophic changes
may be seen both in rheumatoid arthritis and in gout. But in chronic gout an increased density of bones appears to be commoner; and, so far as my observations extend, in cases of chronic gout where atrophy of bone is seen, there are also other areas, or whole bones in the same case, where increased density is evident.

INCREASED DENSITY.

As will be seen in the next section, increased density of bones is characteristic of certain groups of cases of rheumatoid arthritis. Increased density of bone is apparent generally, or in localised areas, in practically all cases of chronic gout.

TRANSPARENT AREAS.

In a certain group of cases of rheumatoid arthritis, (see next section), localised transparent areas form one marked characteristic. They show as areas having the appearance of having been punched or drilled out of the bone. They may occur near the ends of long bones, sometimes at the site of a joint that has been completely disorganised; or they may appear as gouged out areas along the sides of the shafts of long bones; or as areas as it were punched out from the articular surfaces of bones. In the last variety, the head of the bone involved has a peculiar eaten away appearance. Numerous examples will be noted in the course of the description of
the skiagrams. As has been said, these areas are common in a certain group of cases of rheumatoid arthritis. They are also often seen in cases of chronic or "chalky" gout. On dissection, (see Bulletin, Vol.1. p.93) these areas were found to be erosions of bone, occupied by a gelatinous or mucoid-looking substance. In advanced cases a characteristic deposit of urates was found. There is good evidence to show that this "gelatinous substance may be again transformed into bone." (Note here the description given further on of the lower end of the right ulna in Case 6):-(P.20).

This process is well known in the case of chronic gout, but seems to have been overlooked in certain cases which are at present diagnosed as rheumatoid arthritis.

**BRUCE'S NODES.**

These are small nodes consisting of a deposit of bone on the sides of the shafts of phalanges. They occur both in rheumatoid arthritis and in gout. They are probably not of very great importance. I have myself seen a well marked Bruce's node in the skiagram of the hand of a colleague who has never suffered from any gouty or rheumatic complaint, and this skiagram is otherwise quite normal.

**DEPOSITS OF NEW BONE.**

These are found in many cases of rheumatoid arthritis as well as in chronic gout. The cases of
rheumatoid arthritis in which they occur are closely allied to that group in which transparent areas occur. The deposits may be small or considerable in size. They occur around the edge of the joint in all situations, and cause a nodular, irregular appearance of the end of the bone.

**SPURS AT THE HEADS OF METACARPALS.**

These are deposits of new bone which take the form of a peculiar hook-like projection from the anterior part of the head of a metacarpal. They are common in chronic gout, but are also seen in that group of rheumatoid arthritis cases, which in so many details resembles chronic gout; i.e., Group 5 (see section B-following this).

**DEPOSITS OF NEW BONE OUTSIDE THE JOINT.**

These are seen sometimes in cases of rheumatoid arthritis. They are situated in ligaments or tendons around the joint. They are also seen in chronic gout. No periarticular deposits of bone are seen in any of my cases of rheumatoid arthritis, but several such are well shown in the skiagrams of Cases 10 and 11, (chronic gout).

**EXPANSION OF ENDS OF BONES.**

A state of simple expansion, unassociated with any other marked change, has been observed in the ends of several of the long bones in my skiagrams.
ANKYLOSIS.

Both fibrous and bony ankylosis have been found in cases of rheumatoid arthritis. From the skigram alone it is very difficult to say for certain whether an ankylosed joint is the site of fibrous or of bony ankylosis. "It is easy to understand this, for if the cartilage has disappeared and the two surfaces of the bones are held in close opposition by fibrous strands, an appearance of bony ankylosis may be given if the line of the joint is not parallel to the rays. On the other hand, in bony ankylosis, if the bone uniting the two surfaces of the joint is not compact, a line of demarcation may be seen showing the situation of the original joint." (Bulletin, Vol.1, pp.95-6).

It is interesting to note that in several of my cases there is a condition of ankylosis of the wrist joint. In some of them the whole of the carpal bones appear to have become fused into one mass of cancellous bone. This fused mass of bone may show increased or diminished density. In some of the cases the same ankylosed wrist shows areas of increased and of diminished density of the fused mass of bone. This condition is illustrated in some of my skigrams, both of rheumatoid arthritis and of gout.

(3) CHANGES OF THE JOINT AS A WHOLE.

DISLOCATION.

This is present in various degrees in cases of rheumatoid arthritis. There may merely be ulnar deviation
of the fingers, or there may be any degree of dislocation up to complete displacement. Examples of all degrees of dislocation will be found in my sketches. The dislocation is due to softening and loosening of the periarticular structures. And, in the description of the external appearances of the hands of my cases, it will be noticed that in those hands in which dislocations are most marked, the finger joints have a curious flabby, loosened feeling on handling them. In cases 1 and 2, where the photographs show very exaggerated deformities, the fingers can with little difficulty be replaced in a position very nearly approaching the normal. Dislocation may be associated with very marked changes in the cartilages and bones, but it may also occur in cases where both appear to be unchanged.

COMPLETE DISORGANISATION.

This is due to a combination of several of the changes noted above. The cartilage is completely destroyed, and the articular ends of the bones altered in one or more of the ways mentioned, so that the joint cavity is obliterated, with or without ankylosis. Complete disorganisation takes place both in rheumatoid arthritis and in chronic gout.
SECTION B.

PROVISIONAL CLASSIFICATIONS OF CASES OF RHEUMATOID ARTHRITIS INTO GROUPS.

The probability that a number of different diseases are at present included under the term rheumatoid arthritis has led to attempts to divide cases of that disease into groups by means of the appearances of the skiagrams. Two such provisional classifications will be explained here. Both of them are described in Bulletin, Vol. 1. pp. 87-93 and 145-164.

The first classification is that of Goldthwait of Boston, U.S.A. This observer distinguishes three groups of cases. The first group he calls the INFECTIVE, in which the disease is limited to the synovial membrane and periarticular tissues, and no changes are seen in the bones or joints. A second group he names ATROPHIC, in which the cartilage becomes atrophied and the shafts of the bones rarefied. His third form he calls the HYPERTROPHIC, in which the X-rays show an increase in the density of the bones and the presence of bony overgrowth. The articular cartilages in this group are said to be unaffected.

This classification was found not to be detailed enough to cover all the varieties of the
appearances noted in skiagrams. Accordingly Drs. Strangeways and Burt have elaborated (Bulletin, Vol.1., pp. 145 to 154) a classification into five groups as follows:-

**GROUP I.**

In this group are placed cases which show no obvious changes in either bones or cartilages, the disease being limited to the synovial membrane and periarticular tissues.

In certain cases which may be included in this group there are indefinite changes:—

(a) Slight atrophy of cartilage, but not enough to allow the skiagram to be placed in the next group.

(b) Slight atrophic changes in the bones.

(c) Slight increase of the density of the bones forming the articulations.

(d) Slight degrees of dislocation.

**GROUP 2.**

showing:—

(a) Atrophy of cartilage.

(b) Early erosion of bone or of cartilage.

(c) Fibrous or bony ankylosis, not associated with marked destruction of the joint.

(d) Dislocation, associated with early atrophy of cartilage.
GROUP 3.

Well marked atrophy of cartilage.
(b) Well marked atrophy of bones.
(c) Obvious bony or fibrous ankylosis.
(d) Considerable dislocation of the joint.

GROUP 4.

In this and the succeeding group are included skiagrams showing for the greater part changes the reverse of those seen in the foregoing groups.

(a) Increased density of the shadow thrown by the bones.
(b) Transverse lines across the heads of metacarpals and phalanges.
(c) Small bony additions around the joints.
(d) Bruce's nodes on shafts of phalanges.
(e) Loss of cartilage.
(f) Dislocations associated with one or more of the above.

GROUP 5.

The characteristics of this group correspond exactly to those seen in cases of chronic gout, and it is impossible to diagnose a case of rheumatoid arthritis belonging to this group from a case of chronic gout without clinical data.

The changes are:-
(a) Increased density of bone.
(b) Bony additions around joint.
(c) Bruce's nodes on shafts of phalanges.
(d) Spurs at heads of long bones.
(e) Loss of cartilage.
(f) Erosion of bone.
(g) Transparent areas.
(h) Dislocation, accompanied by one or more of the above.
(i) Bony ankylosis.
(k) Joints showing complete disorganisation.

SECTION C

THE METHOD OF GROUPING MY CASES EXPLAINED.

In carrying out this investigation, I took skiagrams of all the available cases of what appeared to be rheumatoid arthritis in this Infirmary. And for comparison with these I made skiagrams of a number of cases of undoubted chronic gout. For the purposes of this thesis I took all the skiagrams of cases of rheumatoid arthritis, eight in number; and from among the skiagrams of cases of chronic gout I selected four typical ones, illustrating various degrees of change in the joint structures. On going into a detailed examination of prints taken from the negatives of rheumatoid arthritis, and comparing them
with the gouty cases, I found that the rheumatoid arthritis cases could be naturally divided into two groups by means of the skiagram appearances alone. In Group I I placed four cases which appeared to show a series of changes differing markedly from those seen in the skiagrams of gouty cases. On then examining into the histories of these four cases, I found that all of them were typical of Chronic Progressive Rheumatoid Arthritis.

The second group of four cases of rheumatoid arthritis appeared to present more or less numerous features resembling those found in the skiagrams of the cases of chronic gout. On going into the histories of this group of cases, I found that two of them (Cases 5 and 8) gave a distinct history of typical attacks of acute gout in one or more joints. In one of the remaining two cases in this group (Case 7) the disease began in the big toe, but the patient denies that he ever had any attack resembling acute gout in this or any other joint.

The history therefore of two of the cases (5 and 8) suggests that a gouty element has had a place in the development of the joint trouble. The two other cases (6 and 7) resemble cases of gout in many of the changes seen in the skiagrams, and would therefore be placed in Strangeways and Burt's Group 5. Cases 5 and 8 would be placed in Strangeways and Burt's Group 4.
SECTION D.

CASE I.

NEGATIVE 2.

Female, aged 59. Married (widow). 8 children. The joint trouble began 36 years ago, when patient was 23, in the left knee joint. Since then there has been a gradual spread to all the joints of the body. The last joint to become affected being the right knee joint, 7 years ago.

Patient states that at time of onset she was in a very weak state of health following on a severe confinement. She gives a history of having suffered, many years before the onset of joint trouble, from recurrent sore throats and from otorrhea.

A paternal uncle suffered from rheumatic gout. Her mother and eldest brother died of consumption.

The patient's hands have the flabby loose jointed feeling which is characteristic of certain cases of Rheumatoid arthritis. There is no ankylosis of any of the joints. There is complete forward dislocation of all the metacarpo-phalangeal joints of the fingers, partial forward dislocation of the same joints of the thumbs, and dislocation backwards of the terminal phalanx of the little finger.
1. **RIGHT HAND.**


Loss of cartilage in the metacarpo-phalangeal joints of the fingers, and partial atrophy in that of the thumb.

Atrophic change of the heads of the metacarpals. Bruce's nodes are seen on the middle phalanges of index and ring fingers.

Note the bevelled-off appearance of the outer side of the head of metacarpal of index, and the hollowed out area in the distal half of metacarpal of little finger. This patient uses her right hand a great deal, in spite of the deformity, and these latter changes are probably of the nature of pressure atrophy.

**LEFT HAND.**

Note in addition the expansion of the head of the metacarpal of the thumb.

Marked atrophic changes of the head of metacarpal of index, giving the appearance of an area punched out of the articular surface. Bony overgrowth around the articular ends of the bones taking
part in the proximal interphalangeal joint of little finger. Bruce's nodes on shafts of middle phalanges. Note also bony overgrowth of stylloid process of ulna.

**DIAGNOSIS:** Chronic Progressive Rheumatoid Arthritis.

**CASE 2.**

**NEGATIVE No. 34.**

Female, aged 76.

This patient is senile and very deaf, and the history of the case is incomplete.

The disease is said to have begun about 8 years ago with loss of power in the hands, and it soon spread and became polyarticular. Father had Rheumatic Gout.

The hands in this case have the same loose flabby feeling as have those of Case 1. There is no ankylosis of joints. All the fingers can be passively moved, but the patient cannot move them much herself.

There is marked dislocation and ulnar deflection at the metacarpo-phalangeal joints of the fingers. The heads of the metacarpals are thickened and there are several nodosities about the bones at the phalangeal joints.

**DESCRIPTION OF SKIAGRAM.**

**RIGHT HAND.**

Complete dislocation forward at metacarpo-phalangeal joints of fingers and of the thumb. Backward dislocation of terminal phalanx of thumb.
There is expansion and decreased density of the heads of all the metacarpals.

Note loss of the cartilage in metacarpo-phalangeal joint of thumb, and some bony addition between metacarpal and phalanx at the front of this joint. There appears to be atrophy of cartilage in the radiocarpal joint and in the carpal joints, but there is no ankylosis of the bones of the carpus to one another.

LEFT HAND.

Loss of cartilage is more marked in the joints of the carpus, and the outline of the individual bones is lost (probably fibrous ankylosis).

There is some formation of new bone at inner side of ulna and carpus.

Atrophy of cartilage in metacarpo-phalangeal joint of thumb, and some bony addition around the sesamoid bones at this situation, and there is a spur at the head of metacarpal of thumb.

Note also atrophic condition of the bone at the articular ends of the phalanges.

**DIAGNOSIS:** Chronic Progressive Rheumatoid Arthritis.

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**CASE 3.**

**NEGATIVE No. 16.**

Female, aged 62. Widow. 6 children.

Joint trouble began in the right hand 23 years ago, spreading rapidly to left hand, and soon became polyarticular.
Patient had an attack of rheumatic fever 25 years ago. Otherwise healthy.

Mother suffered from Rheumatic gout.

The hands of this case differ very markedly from those of the two previous cases. In both hands there is extensive ankylosis of joints. Both wrists are completely ankylosed, as are also the proximal phalangeal joints of the three inner fingers in both hands. The metacarpo-phalangeal joints of both thumbs are partially ankylosed.

The skin of the hands in cases 3 and 4 is in marked contrast to the skin of cases 1 and 2. In the latter the skin is loose and flabby, while in the former the skin has a tight glazed appearance, and the nails are atrophic and grooved longitudinally.

**APPEARANCES OF SKIAGRAM.**

Both hands show very well an atrophic condition of the articular ends of the bones. Note the complete disorganisation of both wrists. In both there is complete loss of cartilage, and the carpal bones appear to be fused into a single mass of somewhat rarefied bone. Note in the right hand the marked atrophy of lower end of ulna, and in both hands considerable deposition of new bone at the inner side of the carpus.

In both hands there is complete loss of cartilage in the metacarpo-phalangeal joint of the thumb,
and there is bony addition around the site of this joint.

In the three inner first phalangeal joints in each hand there is complete loss of cartilage, and either bony or fibrous ankylosis.

In all the metacarpo-phalangeal joints of the fingers of right hand there is marked ulnar deviation, loss of cartilage, and roughening of the articular surfaces of the metacarpals.

In the left hand, only the metacarpo-phalangeal joint of index finger shows marked atrophy of cartilage. The cartilage in the same joints of the other fingers appears normal. The head of the index metacarpal is markedly roughened and eaten away. There appear to be two small transparent areas in base of proximal phalanx of the index finger.

Note also well marked over-growth of bone about the articular ends of the bones in the ankylosed phalangeal joints.

**DIAGNOSIS:** Chronic Progressive Rheumatoid Arthritis

**Remarks:** See under Case 11, p.46.

**CASE 4.**

**NEGATIVE No.15**

Male. aged 48. Married. 7 children.

Occupation Waterside laborer.

The disease began about 12 years ago in the left knee. Patient thinks the onset of the disease was caused by his work, at which he was constantly
getting wet. He had several attacks of pain and swelling in his left knee joint, but went on working in between. These recurrent attacks went on for about 3 years, the knee gradually becoming worse. He was admitted to the Infirmary in May 1900, with a stiff knee, but still able to get about. Shortly after his admission he had an acute attack of rheumatoid arthritis which rapidly spread to all joints. After the subsidence of the acute attack, the disease settled into a chronic progressive form, and the patient has been bedridden since. Every joint in the body is affected, and 4 years ago the disease attacked the cervical spine which is now ankylosed. Patient states that he was a very healthy man up to the onset of present complaint. So far as he knows none of his near relatives suffered from any rheumatic or gouty complaint.

The metacarpo-phalangeal joints of the left hand can be freely moved passively, though patient cannot move them voluntarily. There is fine grating on movement. The three inner fingers show partial backward dislocation at metacarpo-phalangeal joints. The proximal phalangeal joints, except that of index finger, are ankylosed in a flexed position. That of index shows thickening of the joint structures and grating on passive movement. The distal phalangeal joints are partially ankylosed, and the terminal
Phalanges of the middle and index fingers are hyper-extended. The wrist joint is completely ankylosed in a line with the forearm.

The skin of the fingers in this case, as in Case 3, is thin, atrophied, and tightly stretched. The nails are atrophic and longitudinally grooved.

**APPEARANCES OF SKIAGRAM.**

In this case only the left hand was X-rayed, as the right hand is so contracted that it would not have given a clear picture. The skiagram of the left hand shows the following changes.

There is loss of cartilage in the radiocarpal and carpal and carpo-metacarpal joints and the bones of the carpus appear to be in a state of fibrous ankylosis. There is a large mass of new bone at the inner side of the carpus.

The bones of the hand show an atrophic condition of the bony substance especially at their articular ends.

There is atrophy of cartilage in all the metacarpo-phalangeal joints, and the articular surfaces of the bones are irregular in outline. Note some irregular areas of increased density on the articular surfaces of the metacarpals, especially that of the thumb.

The proximal phalangeal joint of minimus appears to be in a state of fibrous ankylosis. Note
also backward dislocation of the terminal phalanx of index finger. The distal phalanges of the middle and ring fingers are foreshortened owing to the deformity.

**DIAGNOSIS:** Chronic Progressive Rheumatoid Arthritis.

**CASE 5.**

**NEGATIVE No. 1.**

Female, aged 59. Single.

Occupation dressmaker.

Five years ago patient was troubled with "rheumatic" pains in her shoulders and upper arms. These pains left her, but about 3½ years ago she had a sudden acute attack of pain in the inner side of the left wrist, which lasted acutely for two days, and was quite better in a week or so. About 3 years ago she noticed pain and swelling in the proximal phalangeal joint of middle finger of right hand. This continued and gradually the joint affection spread and became polyarticular. The last joints to be affected were the knees, about 18 months ago. Patient has had also during the past 7 or 8 years typical attacks of gout in the big toe joints.

Patient was under treatment for endometritis while in the Infirmary. She gives a history of uterine trouble at age 40, when she had a brownish vaginal discharge. Teeth were good up to 10 years ago, when many of them dropped out. The teeth remaining now are foul.
and affected with pyorrhoea alveolaris. No other illness.

She knows very little of her near relations. She states her father was "rheumatic".

This patient was discharged before a photograph of her hands could be obtained, but a skiagram had been taken previous to her discharge and will be described.

The external appearance of her left hand showed slight ulnar deflection of the fingers. There was thickening around the metacarpo-phalangeal joints of the index and middle fingers, and grating on moving these joints. There was thickening over first phalanx of index, and also around the proximal phalangeal joint of the ring finger. There was thickening of the periarticular tissues around the wrist joint, especially on its inner aspect. Thickening of metacarpo-phalangeal joint of the thumb was noted, and slight grating on movement. In the right hand there was some thickening round all the metacarpo-phalangeal joints, especially those of thumb and index finger, with grating on movement. The same conditions were present in the proximal phalangeal joints of all the fingers, and grating was marked on movement.

**APPEARANCES OF SKIAGRAM.**

The joints most markedly affected in both hands appear to show some increased density of the
articul ends of the bones.

There are no cartilaginous or bony changes in either wrist joint. But the outline of the soft structures shows marked thickening of the periarticular tissues at the inner side of the left wrist. There is atrophy of cartilage in all the metacarpo-phalangeal joints of both hands. The loss of cartilage varies however, being complete in the metacarpo-phalangeal joints of both index fingers and of the left middle finger. Note the punched-out area in the head of metacarpal of right index, and the loss of contour in that of left index finger. All the proximal phalangeal joints of the fingers of both hands show atrophy of cartilage, and there are some small bony additions at the articular ends of the bones taking part in these joints. This is most marked in the little and ring fingers of the right hand. Note also Bruce's nodes on several of the proximal phalanges.

**DIAGNOSIS:** Chronic Progressive Rheumatoid Arthritis, with a possible Gouty element.

**REMARKS.**

This case is of interest as giving a history which is suspicious of Gout. During the six months that she was under observation she had no attack resembling gout. No tophaceous deposits were found anywhere. The appearances of the joints seemed to be typical of
Rheumatoid Arthritis, as was also the history of a slow spread of the joint affection, without intermittent acute attacks. Yet the patient gives a history of attacks of acute gout in its typical joint (the big toe) and also the history of the first attack in the wrist raises the suspicion that it was gouty. In the head of the metacarpal of the right index there is a very distinct transparent area, such (as has already been pointed out) as occurs in skiagrams of pure gout, and may be seen in the skiagrams of chronic gout submitted with this thesis. This case then is one of those which must at present be classed as belonging to the Gouty or Hypertrophic group of Rheumatoid Arthritis.

**CASE 6.**

**NEGATIVE No. 21.**

Male, aged 42. Single.

Occupation, skin-dyer.

Patient states that about 13 years ago he met with an accident, resulting in a sprain and cellulitis of his left foot and ankle. He was laid up for 14 days. Within a year of this he noticed that his left ankle was becoming stiff and sore and gradually getting worse. From that joint there has been a progressive spread of the disease, and now all joints, except hips and right knee, are affected. The deformities of the hands have come on during the past 5 or 6 years.
Patient gives no history of any illness. A paternal uncle has Rheumatic Gout. The left hand is flexed at all joints, and the joints are partially ankylosed. There is complete ankylosis of the wrist joint, and considerable bony thickening at the inner side of the carpus. There is thickening of the heads of the metacarpals and of the bases of the proximal phalanges. There is a marked fibrous nodule in the tissues over the inner side of the phalangeal joint of the thumb.

The left wrist is ankylosed completely at right angles with the forearm, and there is a marked projection of bone at the inner side of the carpus. There is thickening about all the metacarpo-phalangeal joints. This is most marked in that of middle finger. In this case the joint is surrounded by a soft pulpy swelling of the periarticular tissues, and on moving this joint there is coarse grating. There is some grating on moving the other metacarpo-phalangeal joints, and that of the thumb is also partially ankylosed. The proximal phalangeal joint shows partial backward dislocation, and the joint is ankylosed in this position. The ring and little fingers are somewhat hyperextended at the proximal phalangeal joints, and flexed at the distal ones.
RIGHT HAND.

This hand is so deformed that the picture of the finger bones and joints is blurred. But after the negative was developed it was found to show an interesting condition of the wrist joint. The lower end of the ulna has almost completely disappeared and has apparently become dislocated off the radius, and is probably ankylosed to the inner part of the anterior surface of the radius. In the position of the atrophied head of the ulna lies a deposition of new bone. The whole of the carpus has become partially dislocated forwards and inwards. There is complete loss of cartilage in the radiocarpal and intercarpal articulations, and ankylosis which is probably fibrous in the case of the radiocarpal joint, but the carpi appear to have undergone complete bony ankylosis. Note also overgrowth of bone at inner side of the carpus, and expansion of the base of the fifth metacarpal. There is apparently fibrous ankylosis of the metacarpo-phalangeal joint of the thumb. Note also dislocation of the metacarpo-phalangeal joints of the fingers, and the thinning of the whole of the shaft of the fourth metacarpal.

LEFT HAND.

The wrist joint is completely disorganised and all distinction between the individual carpal bones
is lost. All these bones appear to be fused into a single mass of bone which shows an area of decreased density in the middle of the wrist, surrounded by areas of increased density laterally. Note also marked bony addition on the inner side of the wrist. Throughout the other bones of the hand there is a mixture of atrophy of bone and of areas of increased density. The metacarpo-phalangeal joint of the thumb shows loss of cartilage, increased density of parts of the head of the metacarpal, overgrowth and expansion of the base of the phalanx.

The metacarpo-phalangeal joint of index shows atrophy and irregularity of the head of the metacarpal. There is complete loss of cartilage, and some bony deposit at the site of the joint, part of which is increased in density. The outer side of the base of the phalanx shows an eaten-away appearance.

The metacarpo-phalangeal joint of the middle finger shows complete disorganisation. Complete loss of cartilage. The articular ends of both bones are enlarged and show a combination of atrophy and increased density of the bony structure. There is a marked transparent area in the head of the metacarpal, and several areas of increased density both in the head of the metacarpal and in the base of the phalanx. The two inner metacarpo-phalangeal joints both show atrophy of cartilage,
which is most marked in that of the ring finger. There are areas of increased density in the heads of the metacarpals, and marked spreading of the base of the phalanx of the little finger. Note also a spur on the head of the fifth metacarpal.

The phalangeal joints do not show any marked change, but there is condensation of the articular ends of most of the bones. The proximal phalangeal joint of index is dislocated.

**DIAGNOSIS:** Chronic, Progressive Rheumatoid Arthritis, the skiagram showing many resemblances to the changes seen in cases of gout.

**REMARKS.**

The skiagraphic appearances in this case are of interest as they show several resemblances to conditions seen also in cases of Gout. The patient does not give a history of attacks of gout, and his disease appears to suggest, by its mode of onset and gradual progressive character, that it is Rheumatoid Arthritis. But a comparison of this skiagram with those of cases of chronic gout shows that they have many points in common. Note for example:—

The areas of increased density at the articular ends of bones; the distinct localised transparent area in the head of the metacarpal of middle finger of left hand; and the spur-formation at the head of the fifth metacarpal of the same hand. In the right hand, the new deposit of bone in the site of
the atrophied lower end of the ulna, suggests another comparison with gout. For in gout it is found, (as has already been explained), that the punched out or transparent areas in the bones are filled with a gelatinous substance containing urates, and there is evidence to show that a deposit of new bone may take place in this gelatinous substance. The suggestion is therefore made that the appearance seen in the right wrist of this patient may have been produced by a process similar to, if not identical with that found in gout. For these reasons this case also has been placed in that group of cases provisionally called the Gouty or Hypertrophic group of Rheumatoid Arthritis.

CASE 7.
NEGATIVE No. 7
Male, aged 44. Single.
Occupation, Sailor R.N.
The joint affection began 22 years ago while he was serving in the Royal Navy. He noticed pain and stiffness, but says he never had an acute attack like gout in this or any other joint. The right knee became affected, and he was invalided out of the service in October 1888. During the following ten years or so the disease gradually spread and became polyarticular. The last joints to be affected were those of the cervical spine. All joints are now affected except the hips. Two years before onset
patient had an attack of what was returned on his medical sheet as lead colic. This occurred after working with paint and whitelead on board a gunboat. He was ill for a few days only. He never had malaria or dysentery.

Father and mother healthy. A sister has "rheumatism". A brother died of consumption.

The right hand shows ankylosis of wrist joint including the carpo-metacarpal joints.

There is great thickening of the periarticular tissues of the metacarpophalangeal joints of the thumb and fingers. There is complete ankylosis of the proximal phalangeal joint of index, and partial ankylosis of the others. There is marked hyperextension of the proximal phalangeal joint of middle finger and slightly of the ring finger. That of the little finger is flexed. Note also marked thickening of the terminal joint of the middle finger.

The left hand shows similar changes externally but flexion at the carpo-metacarpal joints and the thickening are more marked.

Note longitudinal lining of the nails, which is well seen in the photograph. There is grating on moving the metacarpo-phalangeal joint of the right index finger and in all those joints of the left hand.
APPEARANCES OF SKIAGRAMS.

The general appearance of the finger bones in both hands is that of increased density.

RIGHT HAND.

The wrist is completely disorganised and the bones appear to be fused into a single mass of bone with somewhat decreased density. The base of the first metacarpal is expanded, and there is some atrophy of the cartilage in this joint. In the metacarpo-phalangeal joint of the thumb there is partial forward dislocation, partial loss of cartilage, and some increased density of the articular ends of the bones. The metacarpo-phalangeal joint of index is disorganised. There is complete loss of cartilage. The articular ends of the bones taking part in this joint show a combination of expansion and atrophy of the bony substance, with irregular areas of increased density. There are some small bony additions at the outer side of the bones. The other metacarpo-phalangeal joints in this hand show subluxation and loss of cartilage, and there is a commencing spur at the head of the fifth metacarpal. The proximal phalangeal joints of the three outer fingers show ankylosis. This joint of the index finger shows bony addition at the articular ends of the bones and probably bony ankylosis. The ankylosis in the other two joints is probably fibrous,
and there is some general atrophy of the articular ends of the bones concerned. Note the small bony deposits about both joints, and the eaten away appearance of the base of the middle phalanx of the middle finger. Note also well marked Bruce's nodes on proximal phalanges of index and ring fingers. There is loss of cartilage, irregularity of the head of the proximal phalanx, and dislocation of the proximal phalangeal joint of the little finger. There is apparent atrophy of cartilage in all the terminal joints of the fingers and marked expansion of the bases of the terminal phalanges.

**LEFT HAND.**

This hand presents most of the points noted in the right hand. The wrist is disorganised in a similar fashion. The destruction of the cartilage of the carpo-metacarpal joint of the thumb is complete, and there are two indistinct areas of diminished density in the base of the metacarpal. In addition to changes described for the right hand, note the greater destruction of the bases of the proximal phalanges of the middle and ring fingers, and the marked increase in density of part of the base of that of the middle finger. Bruce's nodes are seen on the proximal phalanges of the index and middle fingers, and both phalangeal joints of the little finger are dislocated.
DIAGNOSIS: Chronic Progressive Rheumatoid Arthritis, belonging to the Hypertrophic or Gouty group.

REMARKS.

In this case again, by reason of the general increased density of the bones, of the commencing spur formation, and of the marked erosion of the bases of some of the proximal phalanges, it is thought desirable to class this case with the Hypertrophic or Gouty group of Rheumatoid Arthritis.

CASE 8.

NEGATIVE No. 18.

Male, aged 39.

Occupation, Dock labourer.

The joint trouble began with weakness and stiffness in the right hand. This was 16 years ago, and, soon after the first symptoms set in, he had an acute attack lasting 8 weeks, when all joints were affected. He had no recurrence for 10 years, but his hands remained stiff and sore. 6 years ago patient had a second acute attack, and since this time there has set in gradually increasing deformity. During the past 6 years patient has had no acute attack, but is able to walk about, and can use his hands fairly well. He has been troubled all his life with 'bad feet', and he has at present marked pes planus and hallux valgus, with enlargement of the joints.
of the great toes. He gives a history of typical attacks of acute gout in big toe joints. There are no tophi.

The patient gives a history of having had abscesses in left ankle, finger, and groin when a boy. These lasted a long time, and were probably tuberculous.

Father died of consumption, and his brother is at present ill with the same disease.

The external appearances of the hands in this case are as follows. The hands are thin and knotted-looking, all the joints showing some enlargement. There is distinct ulnar deviation of the fingers. The hands have the same flabby loose feeling as was noted in cases 1 and 2. The feeling suggests to the observer that all the joint tissues have been loosened and stretched.

**APPEARANCES OF SKIAGRAMS.**

In both hands there is some increase in the density of the bones generally. The ulnar deflection of the fingers is well seen. There appears to be some atrophy of cartilage in the metacarpophalangeal joints. There are small, relatively transparent areas in the following situations:—Base of proximal phalanx of little fingers of both hand, and indistinctly in the heads of the metacarpals of both index fingers. Note also the tendency to spur—
formation at the heads of the fourth and fifth metacarpals of the left hand, and of the fifth of the right hand.

**DIAGNOSIS:** Chronic Progressive Rheumatoid Arthritis of the Hypertrophic or Gouty group.

**REMARKS.**

See under next case (No. 9).

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**CASE 9.**

**NEGATIVE No. 19.**

Male, aged 40.

Occupation, Waterside Labourer.

This patient has suffered from recurrent attacks of acute gout, which began in the big toe joints about 6 years ago. The attacks gradually spread to other joints, and patient has been frequently in this infirmary with typical attacks of gout in feet, hands, knees, and shoulders simultaneously. The attacks are rapidly relieved by Colchicum.

The appearances of this patient's hands differ entirely from those of Case No. 8. There is considerable thickening of the periarticular tissues of all the joints, and the hands are stiff to the feel. There is a marked hard projection opposite the terminal phalangeal joint of the middle finger of left hand.
APPEARANCES OF SKIAGRAMS.

In neither hand are there any changes in the cartilages. What changes are present are in the bones. There is general increased density of the bones, and this is especially noticeable in the left hand at the distal end of the proximal phalanx of the ring finger, in the shafts of the proximal and middle phalanges of the middle finger. There is a well marked exostosis at the distal end of the shaft of the middle phalanx of middle finger, with a small transparent area in the middle of it. Note also the marked spur at the head of fifth metacarpal of left hand, and distinct tendency to the formation of spurs on several of the other metacarpals. There is a small bony overgrowth on the inner side of the base of the middle phalanx of the right hand.

DIAGNOSIS: Chronic Gout.

REMARKS.

Taking this case (9) and Case 8, together, it is interesting to compare the two. Both cases give a history of acute attacks of typical gout in the big-toe joints. But in Case 8 the gouty attack seems to have been a mere incident in the course of a chronic and gradually progressive joint affection, and this joint affection was not characterised, in all the joints affected, by frequent typically gouty attacks. While in Case 9, the history is one of
frequent recurrent attacks of typical acute gout in all the joints affected, and moreover these attacks yielded to treatment with colchicum.

On comparing the skiagrams, however, there is a remarkable similarity. Both show increased density of bone. Both show bony spurs at the head of metacarpals, though this is more marked in Case 9. In Case 8, the atrophy of cartilage is more evident, and this case shows distinct ulnar deviation of all the fingers of both hands, which feature is absent from Case 9. I have not seen ulnar deviation of all the fingers in any case of Gout of which I have taken a skiagram; but whether this deformity is characteristic of Rheumatoid Arthritis or not I am unable to say without further observations of cases of both diseases. On combining the history and the appearances of the skiagrams in each case, one would class Case 8 as probably Chronic Progressive Rheumatoid Arthritis of the Hypertrophic or Gouty group; and Case 9 as Chronic Gout.

**CASE 10.**

**NEGATIVE No. 20.**

Male, Aged 49.

Occupation - Dock labourer.

Typical attacks of gout first occurred 9 years ago, and this patient has been, on and off, in the Infirmary for the last 9 years. The disease began
in both big-toe joints and soon spread during the recurrent attacks to the knees and hands. All joints of the body have been affected. About 8 years ago he noticed small hard lumps forming in his ears. At present there are tophi in that situation, and also over several of the distal phalangeal joints of both hands and over the right elbow. He does not remember to have heard of any gout or rheumatism among his near relations. His own previous history includes two severe attacks of acute rheumatism, one 20, and the other about 10 years ago.

The present condition of his hands shows in the right wrist nearly complete ankylosis and marked creaking in the tendon sheaths on movement. The metacarpo-phalangeal joint of the thumb is partially dislocated forwards and ankylosed. The metacarpo-phalangeal joint of index is thickened and partially ankylosed and there are tophaceous deposits over the joint. There is thickening of the proximal phalangeal joint of this finger, and a tophaceous deposit. The middle finger is hyperextended at first phalangeal and flexed at the terminal phalangeal joint. The two other fingers show marked thickening of the metacarpo-phalangeal joints and stiffness in moving. The whole of the little finger is ankylosed beyond the metacarpo-phalangeal joint, and there is no sign of the usual wrinkling of the skin at the site of the proximal phalangeal joint, though a ridge of bone can
be palpated here. The whole finger is markedly shorter than that of the left hand. The terminal phalanx is flexed, and there is a tophus over it, with a scar of old ulceration in the skin.

In the left hand the deformities are not so marked. The wrist is stiffened but not ankylosed. There is thickening over the various joints. Note the marked thickening of the distal half of the proximal phalanx of middle finger and of the proximal phalangeal joint. This joint is completely ankylosed.

**APPEARANCES OF SKIAGRAMS.**

Both hands show various areas of increased density of the bones. Note especially an appearance that appears to be a very characteristic one in gout, namely the condition of atrophy of the bony substance of several of the articular ends of the bones combined with irregular areas where the bone is of markedly increased density. This is shown very well in the head of the metacarpal of the right index finger.

**RIGHT HAND.**

There is disappearance of cartilage between the bones of the carpus, and apparent fusing of these bones, the resulting mass being of increased density. The metacarpophalangeal joint of the thumb shows loss of cartilage, atrophy of the head of the metacarpal, combined with deposit of new bone on the head of the metacarpal and in the line of the joint. Note numerous
Small bony additions around the heads of the second, fourth and fifth metacarpals. There is a small mass of bone alongside the index metacarpal which appears to have been deposited in the periarticular tissues. Note the punched-out areas in the atrophied head of the fifth metacarpal, and also the increased density of part of the head of this bone. The shaft of the proximal phalanx of the little finger shows two scooped-out areas along its length, one at the base and another near the head of the bone. These areas show destruction of bone, and, by analogy with specimens of this condition which have been dissected, these areas are filled with gelatinous material containing urates. (A further degree of this process of destruction of bone is well shown in the skiagram of Case 12.) The proximal phalangeal joint of the little finger appears to be in a state of ankylosis (bony), though a dark line indicates the site of the joint. The head of the middle phalanx is eaten away, and the terminal phalanx has been largely destroyed.

LEFT HAND.

In this hand the changes in the wrist joint and in the metacarpo-phalangeal joints of the thumb, middle and ring fingers are much less marked. The cartilage of the metacarpo-phalangeal joint of index has completely disappeared, and the articular ends of the bones concerned are irregularly but markedly increased in density. There are some small
bony additions on the ends of the bones, and one or
two distinct small masses of new bone which have been
deposited in the periarticular tissues.

Note the atrophy of cartilage in the metacarpophalangeal joint of little finger, and a small transparent area in one side of the base of the phalanx.

Note the increased density of most of the other phalanges.

The proximal phalangeal joint of the middle finger shows complete disappearance of the cartilage, markedly increased density of the bones, expansion of and bony additions to the base of the middle phalanx, and numerous bony additions near the head of the proximal phalanx, and several distinct Bruce's nodes on the shaft.

**DIAGNOSIS:** Chronic Articular Gout.

**CASE II.**

**NEGATIVE No. 33**

Female, aged 65.

Widow. 7 Children.

Occupation: Charwoman.

Acute attacks of gout began in the big toe joints 10 to 12 years ago. She had acute attacks in these joints every two or three years. About 6 years ago these attacks spread to other joints, until the affection became polyarticular. For the past two
years she has had no very acute attacks, but some of the numerous tophi present break down at times and discharge chalky material.

She had acute rheumatism 30 years ago, and was laid up for 4 months.

Her father suffered from Gout.

The photograph shows the appearance of the hands very well, and over several of the joints scars can be seen where ulceration of the skin over tophaceous deposits has taken place. Both wrists are almost completely ankylosed, and there is ankylosis of all the proximal phalangeal joints except those of the little finger of right and little and middle fingers of left hand.

APPEARANCE OF SKIAGRAMS.

RIGHT HAND.

Note the marked differences in density of the different bones. With the exception of the head of the index metacarpal, the proximal phalanges of index and middle fingers, and the middle phalanx of the ring finger, the bones are rather decreased in density.

The wrist is disorganised, the cartilage lost, and the bones appear fused into a continuous mass of bone.

The metacarpo-phalangeal joint of index is completely disorganised, and the bones appear to be
The head of metacarpal and the whole of the first phalanx show increased density. The first phalanx is thickened and shortened and both ends are expanded. The proximal and distal phalangeal joints both show complete loss of cartilage. At the terminal phalangeal joint note several localised transparent areas of large size in the articular ends of the bones, and also a large transparent area at the site of the proximal phalangeal joint of this finger.

The metacarpo-phalangeal joint of middle finger shows dislocation, loss of cartilage, and enlargement of the base of the phalanx which has a rounded-off appearance. The whole of this phalanx is markedly increased in density, & the distal end of it is also enlarged, and presents the same rounded-off appearance. The proximal phalangeal joint of middle finger is hyperextended.

The proximal phalangeal joint of the ring finger is disorganised and the cartilage lost. It is apparently the site of bony ankylosis, and there are several large transparent areas present.

LEFT HAND.

Note the destruction of the inner part of the lower end of the ulna, and compare this skiagram with that of the right hand of Case 6 in which the same condition is present but in a more marked degree. (See p. 29.)

The wrist joint in this case also is disorganised and fusion of the carpal bones has taken place.
Note the irregular patches of increased density of bone in the bases of the metacarpals, most markedly in that of the fifth. In this hand also the patchy areas of increased density are noticeable features. The bones of this hand show, in general, decrease of density even more marked than in the bones of the right hand. Note the dense outline of shafts and articular surfaces of the metacarpals, and patches of irregular increased density (in addition to those already mentioned) in the head of metacarpal of thumb, and in the base and shaft of proximal phalanx of the same, also in the middle phalanx of the ring finger. The last area of increased density crosses the site of the joint, which is apparently in a state of bony ankylosis. The proximal phalangeal joint of the index finger is ankylosed, and both this joint and the corresponding joint of the ring finger show bony additions about the articular ends of the bones. Note the small deposits of bony material on both sides of the proximal phalangeal joint of index, and the numerous localised transparent areas in the bones taking part in this joint.

DIAGNOSIS: Chronic Gout.

REMARKS.

It is instructive to compare the skiagrams of this case with those of Case 3. Both are females of about the same age. Case 3 gives a clear history
which would lead one to diagnose Rheumatoid Arthritis; while Case 11 gives an equally clear history which points to chronic Articular Gout as the diagnosis. And yet on comparing the skiagrams of the two cases there is a marked superficial similarity. But on making a detailed examination of the skiagrams a considerable number of points of divergence can be demonstrated. The first thing that strikes the eye is that the bones in Case 11 show a more generalised decrease of density in comparison with the decrease of density confined to the articular ends of the bones in Case 3. Another point is that the areas of increased density in Case 11 are patchy and irregular, whereas the increased density present in Case 3 is distributed evenly throughout the shafts of certain of the bones.

But the most marked difference between the two skiagrams is the entire absence from that of Case 3 of the transparent areas which are seen in such numbers in several of the bones of Case 11.

Without further experience of reading skiagrams of both Gout and Rheumatoid Arthritis, no definite conclusions can be drawn from these contrasts. But I have mentioned them as occurring in skiagrams which on a superficial view appear to be very similar.
CASE 12.

NEGATIVE No. 27.

Male, aged 60.

Gout began with an acute attack in right big toe joint at age 30. A year later he had an attack in both feet; about 20 years ago the attacks began to spread to other joints, and the disease became polyarticular.

He has two brothers with gout.

Nothing of importance in the previous history of patient.

The right hand shows thickening over several joints, most markedly over the metacarpo-phalangeal joint of middle finger, and there are tophi over several of the phalangeal joints. Note the apparent shortening of ring finger.

The left hand presents a very remarkable appearance. The index, middle, and ring fingers are all much shortened, and there are numerous scars in the skin where ulceration has been present, with chalky discharge. One small ulcerated area is seen in the photograph near the metacarpo-phalangeal joint of middle finger. The reasons for these curious deformities will be seen during the description of the skiagrams.

APPEARANCES OF THE SKIAGRAMS.

RIGHT HAND. Note the jutting outwards of the
part of the lower end of the ulna which articulates with the radius. The carpus is inclined towards the radial side.

There is some loss of cartilage between the carpal bones. Note some irregular areas of increased and decreased density in the bones of the carpus.

The metacarpo-phalangeal joint of the thumb shows loss of cartilage and an atrophic and eaten away appearance of the head of the metacarpal.

There is increased density of the two proximal phalanges of both the index and middle fingers, and also some irregular areas of increased density in the head of the metacarpal of the latter finger. Note a very distinct transparent area at the base of the proximal phalanx of the middle finger, and a large area of decreased density at the site of the metacarpo-phalangeal joint of this finger. This joint is completely disorganised. There is expansion and increased density of the bases of the middle phalanges of the index and middle fingers, and atrophy of cartilage in the joints adjacent.

The distal half of the proximal phalanx of the ring finger is markedly thinned away and the distal end of it seems to have been destroyed. The middle phalanx of this finger has almost totally disappeared. The proximal phalanx of the little finger is also thinned away to about half its normal 49.
diameter, and the two other phalanges of this finger are also much thinner than normal.

**LEFT HAND.**

Besides several changes similar to those seen in the right hand, including complete disorganisation of two of the metacarpo-phalangeal joints of the fingers, the skiagram of this hand shows a very remarkable destruction of some of the finger bones, which accounts for the deformed appearance of the fingers of this hand. In the index and ring fingers the distal half of the proximal phalanx is thinned away to less than half its normal diameter, and in both these fingers the middle phalanx has almost completely disappeared. The terminal part of the middle finger is foreshortened owing to the deformity, and the actual state of the two distal phalanges cannot be seen.

**DIAGNOSIS:** Chronic Articular Gout.

**REMARKS.**

This case shows the extent to which destruction of bone may take place in gout. All stages of destruction can be illustrated from this skiagram. The process probably begins with the eating away of the bone, which shows first of all as a transparent area, such as is seen in the head of the metacarpal and base of the proximal phalanx of the middle finger, and also in the eaten-away head of the metacarpal of thumb.
It is easy to see the importance of taking a series of skiagrams of such a case as this at intervals of some months, and noting the progress of such transparent areas. To make the research of such a case complete, a post-mortem dissection of the bones and joints should be made, and the macerated specimen compared with the skiagram.