# SUBACUTE AND CHRONIC ARTHRITIS

# WITH SPECIAL REFERENCE TO ITS

# ETIOLOGY AND PATHOGENESIS.

Thesis

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## Introduction:

Chronic Rheumatism is a term applied unscientifically and indiscriminately to many and varied forms of disease. The group thus designated is productive of more disablement and pecuniary loss to people of wage-earning age than any other one cause. One-sixth of the disability occurring under the National Health Insurance schemes comes under this head. For these reasons alone is it worthy of consideration.

The Etiology of this group of diseases has always been a subject of controversy and the cause has from time to time been ascribed to endocrin upset, disordered metabolism, specific infection, focal infection with general toxemia, endemic infection, local degenerative changes, and neuropathies. These and other various theories will be fully considered later.

The classification and nomenclature is also varied and confusing, the name applied by each writer to the disease depending greatly on the symptoms and signs predominantly present in the series of cases under observation. The classificationswill be more fully discussed in their proper section below.

The object of this thesis is to give the existing modern views on the subject of Sub-acute and Chronic Arthritis of non-specific origin with special consideration of the Etiology and Pathogenesis.

Pathogenesis, with reference to a series of forty-three cases of early, established and fully developed Arthritis personally observed.

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Nomenclature and Classification:

The Rheumatoid Arthritic conditions under consideration were described by the earlier writers as "Rheumatism" or "Gout" or by a name embracing both, "Rheumatic Gout". In 1804 Heberden differentiated "Chronical Rheumatism" from "genuine Gout" on the one hand and "acute Rheumatism" on the other. An essay was written by Haygarthin 1805 with the title "Nodosities of the Joints". Todd described the disease as "Rheumatism of the Joints" in 1843. In 1857 Adams wrote of "Chronic Rheumatic Arthritis" and differentiated two types, the one monarticular, the other polyarticular. Two differing types were described by Charcot in 1881 under the name of "Chronic Articular Rheumatism". The first occurred in young persons, was relatively acute and had no tendency to bone formation, while the second occurred in elderly persons, was chronic and had a tendency to produce bony outgrowths. In 1890 Garrod, who introduced the term "Rheumatoid Arthritis" in 1858, also noted these two types, calling the first "Rheumatoid Arthritis" with acute and chronic forms and the second "Osteoarthritis". Some of the types then falling under the head of "Rheumatoid Arthritis" were differentiated as their etiology became known but for arthritic conditions of obscure etiology, this classification is still generally accepted

as sub-divisions of the group referred to by the name of "Arthritis Deformans". Goldthwait, under the name "Chronic Arthritis" describes three types:

(1) Infectious)
) Correspond to Garrod's Rheumatoid
(2) Atrophic ) Type.

(3) Hypotrophic. Corresponds to Osteo-Arthritic Type.

The Rheumatoid type Nichols and Richardson refer to as "Proliferative or Ankylosing" and the Osteo-Arthritic type as "Degenerative or non-Ankylosing".

Fisher, in a plea for a more satisfactory nomenclature, drops the term "Deformans", deformity being preventible, omits Tubercular Joints as a separate group, and commences his classification with the group title of "Sub-Acute or Chronic (non-Tuberculous) Arthritis, his sub-divisions being as follows:-

Sub-Acute or Chronic (non-Tuberculous) Arthritis.

| Group A | | Group B | |
|---|---|---|---|
| Proliferative (Rheumatoid) | | Degenerative (Osteo-Arthritic) | |
| $A^1$ | $A^2$ | $B^2$ | $B^1$ |
| Synovial | Mixed | | Chondro-Osseous |

This sub-division in $A^1$, $B^1$, and $A^2$ and $B^2$ depends on tissues involved but further factors can be added to give a complete clinical, anatomical, pathological and bacteriological word picture.

Wilcox gives a classification of Arthritis in two groups, the first of known etiology, the second of obscure etiology. This second group includes Acute Rheumatism and a division termed "Non-specific (infective) Arthritis" which comprises what are known as Rheumatoid Arthritis, Osteo-Arthritis and Chronic Villous

Arthritis.

These more recent nomenclatures depend on the views as to etiology held by the giver. For example, Daniel, although describing Rheumatoid Arthritis and Osteo-Arthritis separately, believes them to be manifestations of the same pathological process. On the other hand, Tubby, while keeping the name Arthritis Deformans, dismisses Osteo-Arthritis as a degenerative process not allied to Rheumatoid Arthritis.

Fisher, in the plea mentioned above, criticises the pathological classification of Nichols on the ground that the pathological processes vary and merge from time to time in the course of the disease; he states it, however, to be accurate in that it gives the first change seen in each group.

In view of the other classifications presented, the question then arises are there two groups or are they manifestations of the one disease, as is held by Wilcox and Daniel?

We are then left with the following terms which are still in general use, namely, Acute Rheumatism, Chronic Rheumatism, Arthritis Deformans, Rheumatoid Arthritis, and Osteo-Arthritis. There are also the two newer terms, Chronic (Non-Specific) Infective Arthritis and Chronic (Non-Tuberculous) Arthritis.

Acute Rheumatism or Rheumatic Fever is defined as an Acute Polyarticular Arthritis, associated with Pyrexia and often accompanied by endocardial lesions.

Chronic Rheumatism is a term loosely applied to inflammation of joint, nerve, muscle or fibrous tissue.

Arthritis Deformans may be defined as a disease of joints of unknown origin, characterised by changes in the synovial membranes, peri-articular tissues, cartilage and bone, resulting in pain, limitation of movement and deformity.

Rheumatoid Arthritis may be termed the acute or peri-articular type of Arthritis Deformans, characterised by changes in the peri-articular tissues and synovial membrane.

Osteo-Arthritis may similarly be termed the chronic or articular type of Arthritis Deformans, characterised by osseous and cartilaginous change and in many cases secondary to Rheumatoid Arthritis.

Chronic (non-specific) Infective Arthritis may be defined as any chronic Arthritis of infective origin but not caused by any special infection.

Chronic (non-Tuberculous) Arthritis may be defined as any arthritis, whether of known or unknown origin, whether infective or non-infective, other than that of known tuberculous origin.

As the term Chronic (non-Tuberculous) Arthritis includes many conditions, the cause of which is definitely known and as the term Chronic (non-specific) Infective Arthritis states a definite infecting origin, the terms Rheumatoid Arthritis and Osteo-Arthritis and the adjectives Rheumatoid and Osteo-Arthritic will be used in this thesis to differentiate the two types of case commonly met with.

Etiology:

As no one definite specific pathogenic factor has as yet been discovered, one finds little attempt at classification of causes has been made by writers on this subject. Thus, what would in another group of diseases be described as a contributory cause is often regarded as the main one.

Humoral Theory: The very word "Rheumatism" is explanatory of the view held by the humoral theorists. They regarded the disease as caused by a "flowing of the humor" from one organ to another. Its Arthritic manifestations were due to the passage of the humor through joints on its way to the skin where it became dissipated.

Due to the confusion between the "flow of the humor" and the "distilling of the drop", Rheumatism became identified with Gout. The joint lesions of these diseases added further confusion and for many years Chronic Arthritis was held by some to be due to Gout, by others, Rheumatism, while many combined them as Rheumatic Gout.

Mechanical Theory: The Mechanical School attributed the joint disorders in these diseases to atony, rigidity and spasm of the tissues, caused by mechanical irritation and debility.

Degenerative Theory: That the joint changes, particularly those found in Osteo-Arthritis, are purely degenerative is the idea held by some. Referring to Osteo-Arthritis, Tubby con-

cludes "it is a disease of degeneration". In support of this theory one certainly finds that Osteo-Arthritic changes are frequent in elderly persons and in the prematurely aged. Those who hold this theory, therefore, group Osteo-Arthritis with other senile changes and disorders, such as cholecystitis, cholelithiasis, endarteritis obliterans, atheroma and arteriosclerosis.

It may be advanced against this theory that such changes are not the accompaniments of Arthritis, but rather the cause. An arteriosclerosis of the vessels of the joint capsule is found in cases of Osteo-Arthritis. Such an arterial change would readily, from an impoverished blood supply, give rise to the central cartilaginous degeneration found in these cases. An ineffective but not too greatly diminished blood supply to the periphery of the joint would similarly account for the proliferation seen at the periphery in the form of chondrophytes, osteophytes and villi.

In addition, such arterial changes themselves might arise from a general toxemia due to such disorders as cholcystitis.

Neuropathic Theory: The centripetal symmetry of the lesions in Rheumatoid Arthritis, the existence of an atrophy greater than can be accounted for by disuse, the increase of tendon reflexes and the muscular contractures, as well as such trophic phenomena as the cold clammy skin, the glossy nails, the pigmentation and the peripheral neuritis, would all point to Arth-

ritis being a neuropathy. There is also the relationship known to exist between cord and joint lesions in syringomyelia and tabes dorsalis. The atrophy found in Arthritis is definitely ascribed by Goldthwait to a neuropathic factor and Stockman states that there must be a trophic influence to account for the local phenomena.

There is certainly a similarity between Charcot's joint disease and Arthritis, in that there is destruction of joint tissue, effusion and peri-articular new bone formation in both. But here the similarity ends; as in Charcot's joint disease, there is no pain, the effusion is of sudden onset and the range of movement of the joint is increased, where-as in Chronic Arthritis the opposite is found. Rolleston dismisses the trophic theory as of historic interest only, but states that it may hold in occasional cases as a contributory factor, by lowering resistance. Also against this theory is the fact that no gross lesion accountable for the Arthritis has hitherto been discovered. Poynton and Paine refer to one case of Arthritis described by Triboulet where degeneration of the posterior columns in the dorsal region, of Galls in the cervical and of the posterior nerve roots in the lumbar region was found. This degeneration was caused by local meningitis following puerperal infection. Here though there was a definite lesion of the cord; it arose from an infection which was most likely the direct cause of the Arthritis.

The early ideas of the trophic theory were that the

medulla and cord were disturbed by chilling of the skin over the affected part and that the trophic and vasomoter systems were thus influenced by referred and reflex action. This is in accord with Vulpian, who states the atrophy and increased tendon reflexes to be due to altered trophic activity of the cells of the anterior cornua. Llewellyn Jones ascribes Arthritis to gastro-intestinal disturbance, to which is superadded influenzal infection acting on the nervous mechanism. In these views stated immediately above, we get a definite trophic factor without definite cord lesion of a gross type. If therefore there is a local anaemia or congestion of the cord, would not this arise as a reflex from the local joint lesion and therefore be a result and not a cause: or, as in the case of influenzal infection, be an accompaniment of the Arthritis as equal manifestations of a general systemic disorder? Thus one would rather regard the trophic phenomena present as reflexes from a disordered joint than as evidences of a neuropathic origin of Arthritis.

Metabolic Disorder: The long association of Gout and Chronic Arthritis and the similarity of their manifestations suggested a metabolic disorder as a cause of Arthritis. The disease has indeed been ascribed to excess of uric acid, but where deposits have been found in joints affected by Rheumatoid or Osteo-Arthritis, such deposits have possibly been secondary in nature. Garrod stated the cause of Rheumatoid Arthritis to be a local and constitutional disturbance of the nutrition of

of joints. Cassidy stated that there is a genuine Rheumatoid Arthritis due to disordered metabolism. As a cause of such disordered metabolism, Arbuthnot Lane gives precedence to the putrefactive products of intestinal stasis. This is supported by the fact that many cases of Arthritis show symptoms of gall-stones, cholecystitis and other digestive disturbances, such as achylia. Coates and Gordon suggest that such an achylia allows of the production of toxins with an affinity for synovial membrane. Fisher states that the central area of articular cartilage, which in Osteo-Arthritis is primarily affected, is nourished mainly by the synovial fluid. He further states that an alteration in the nutritive value of the fluid sufficient to account for local changes, is conceivable as arising from metabolic disorder. The presence of the toxins described by Coates and Gordon would no doubt produce a similar result.

Against this theory of metabolic disorder, is the idea that all the digestive disorders associated with Arthritis are accompaniments and not direct causes. This is in fact the evidence that Mutch evolved from the Intestinal Stasis theory of Arbuthnot Lane. Working on the bacteriology of cases of intestinal stasis, associated with Arthritis, he proved that such stasis was infective in origin. This is detailed later in reference to Bacteriology and also Focal Sepsis.

Wilcox classes dietetic errors, productive of metabolic disorder as contributory causes of Chronic Arthritis. Rolleston

states metabolic disorders might act as contributory factors by lowering resistance to infection by a micro-organism of low virulence.

The weight of evidence is against metabolic disorder as a direct cause of Arthritis. Metabolic disorder associated with Chronic Arthritis can be regarded in three ways; where primary to Arthritis it can be regarded, firstly as a contributory factor by lowering the resistance of the subject to infection, secondly as a preliminary manifestation of infection and where secondary, it can in the third place be regarded as an accompaniment of the Arthritis arising from the same source.

Endocrin Disorder: From the inter-relationship of metabolism and the endocrin glands one is led to consider them as factors in the causation of Chronic Arthritis.

This group of diseases has indeed been ascribed as due to thyroid insufficiency, pluri~~p~~glandular inadequacy and ovarian dystrophy.

Thomson associates Rheumatoid Arthritis with Hyperthyroidism and Osteo-Arthritis with Hypothyroidism and states the latter cases to be benefitted by exhibition of thyreoid extract. McCarrison states Osteo-Arthritis to be prevalent in the goitrous areas in the Himalayas and is common in cases of endemic goitre. Endemic goitre McCarrison regards as an infectious disease.

Draper states that a disturbance analogous to acromegaly, plus thyreoid insufficiency, is present in Chronic Arthritis. In relation to this, plus Ovarian upset, is the Arthritis which

arises in women following the climacteric.

Pemberton of Philadelphia described a lowered basal metabolism and lowered sugar tolerance present in cases of Arthritis and proportional to the severity of the symptoms. The sugar tolerance in such cases was raised by removal of septic foci present.

An upset of the suprarenals is suggested by the acrylia which is common to cases of Arthritis and of Addison's disease.

The Osteo-Arthritis in children is found associated with endocrin upset, mainly thyreoid insufficiency.

Alterations in physical configuration depend greatly upon the predominance of one or more of the following endocrins, viz: Thyreoid, pituitary, gonads and suprarenals. Relative to this are the two types of person described by Goldthwait:

1. Narrow, carnivorous, associated with Rheumatoid Arthritis and Tuberculosis;

2. Fat, herbivorous, associated with Osteo-Arthritis and Diabetes.

From these statements there would appear to be a distinct relationship between Chronic Arthritis of both types and endocrin balance. Considering Chronic Arthritis as a disease due to toxaemia, following infection, this is what one would expect to find, as endocrin upset, particularly of thyreoid is a feature of infections. In that way endocrin upset is regarded rather as an accompaniment of the Arthritis.

From the point of view of causative factors, endocrin upset

would act by lowering resistance to infection. This is proved by the liability of diabetics to infections such as boils, gengrene and tuberculosis, and in the same way in the days prior to administration of thyreoid extract the death of myxaedematous patients from intercurrent infections.

Bacteriology: The similarity in the lesions existing in Sub-acute and Chronic Arthritis and Arthritis of known microbic origin suggests a microbic source. Varying organisms have been discovered associated with Arthritis, some actually present in the joint but the majority in other foci.

In the first group where organisms were found in joint tissues or fluid, the observations of Schuller are the most striking. In 1892 he drew attention to the presence of an organism in the joint tissues of a case of Arthritis, showing villous hypertrophy. On isolation this proved to be a bacillus showing bipolar staining; this he termed the dumb-bell bacillus. By direct injection of this bacillus into the joints of rabbits a villous type of Arthritis was produced. On these lines he worked for fifteen years, having positive results in 150 of a series of 230 cases.

Poynton and Paine in the course of their work on Acute Rheumatism, produced the typical bony changes of Rheumatoid Arthritis in rabbits by inoculation of organisms from the joint of a rheumatic case. They also produced Osteo-Arthritic changes by inoculation from a case of human Osteo-Arthritis; in this case the culture from the joint of the rabbit was,

however, sterile.

Bannatyne, Wohlmann and Bloxall described minute bacilli present in a series of 18 cases but did not culture the organism nor inoculate animals.

Fayerweather is variously stated to have found three differing organisms in three cases and to have had four positive results from a series of nine cases.

Stockman states that in cases of Arthritis examined, bacteriologically he usually finds no organism, occasionally cocci, but never bacilli. He suggests that long continued irritation by varying organisms is the cause of Arthritis.

Wilcox draws attention to the fact that the results of joint examinations by skilled bacteriologists are strikingly negative. One must, therefore look elsewhere than the joint for causative organisms. This is analogous to gonorrhea, where a focus of infection in the genito-urinary tract gives rise on occasion to a toxic Arthritis.

Mutch developing on bacteriological lines the idea of intestinal stasis, states the cause to be a long haemolytic streptococcus of glycophilic nature found in force in the mouth. Its presence is accompanied by impaired digestion, intestinal stasis and local diminution of resistance.

Crowe states as the cause of Rheumatoid Arthritis the staphylococcus albus (micro-coccus deformans) and of Osteo-Arthritis a non-haemolytic streptococcus.

Hastings doing fixation tests for streptococci, had seventeen positive and eighteen negative results in cases of

Arthritis and from that places 40% of cases as due to infection.

Burbank and Hadjopoulos discovered the presence of specific immune bodies in the blood of Arthritics. Working from that they classify Arthritis in three groups:

1. Rheumatoid Arthritis due to heamolytic streptococci;
2. Osteo-Arthritis due to staphylococci;
3. Mixed Type, due to both.

In their researches culture was at first unsuccessful due to growth inhibiting elements in the blood but by neutralisation of alexin, twenty-seven positive results were obtained in a series of one hundred and forty-three cases.

There is a striking lack of unanimity in the results of the various observers, some being completely at variance with others. The later observers are more of one mind and if any organism is specific, the evidence is in favour of the streptococcus. Not one, but many organisms seem to be involved as is feasible from the consideration of such other infections as bronchitis, pleurisy and cystitis.

Specific Infection: The later bacteriological results given above would appear to support the idea of specific infection by a streptococcus, while Schuller's results over such a long period are favourable to an idea of specific infection. Those who hold to the view offered by Stockman that Rheumatoid Arthritis is a clinical entity differing from Infective Arthritis would look for a specific infection. The difficulty of finding foci of infection in the typical Garrod Rheumatoid Arthritis

suggests that a specific joint infection occurs followed by a secondary infection to other joints.

In view of the negative bacteriological results previously stated the conception of a specific joint infection is hardly possible. On the contrary there would appear to be sufficient to warrant the idea of a toxin specificity. Such a toxin need not necessarily be produced by a specific organism but by various organisms under varying conditions.

Endemic Infection: The close geographical relationship mentioned with reference to goitre and Arthritis might be explained by the view that they are both results of endemic infection. This theory receives some weak support from the fact that Arthritis is more common in certain areas than others, (cf. Ireland - Canada). This is negatived by the fact that in these areas other factors abound, such as cold, exposure and natural resistance, due to the high level of the sub-soil water.

Focal Infection: The generally accepted cause of Arthritis is focal infection, followed by general toxaemia. This is supported by the bacteriological findings mentioned above.

The focal frequency would appear to be:-

1. Throat
2. Teeth
3. Gastro-Intestinal Tract
4. Nose
5. Genito-Urinary Tract
6. Respiratory Tract

in this order.

The association of oral foci of sepsis with Chronic Arthritis

is fully recognised but the relative responsibility of teeth and tonsils varies with the observer thus: Wilcox attributes 90% to tooth infection; Lillie and Lyons in a series of two hundred cases, state the tonsils to be causative of 79%; Pemberton states 52% of four hundred cases arose from tonsillar infection and 33.5% from tooth infection.

Apical abscesses occurring in superficially healthy teeth give rise to toxins readily absorbed into the general circulation and thereby are possible direct causes of Arthritis. With regard to this source Goadby found forty-nine out of two hundred and sixty three cases of rarefying osteitis of the jaw with a history of Rheumatism. Of these forty-nine, twenty-nine showed definite Arthritic lesions. Apical abscesses could also give rise to secondary sources of infection in the antrum. Pyrrhoea and caries of teeth are more likely to give rise to secondary foci in the tonsils and to cause disturbance of the alimentary tract than to cause directly a toxic Arthritis. In the presence of achlorhydria, they would also give rise to secondary foci in the gall bladder, intestine and appendix.

Similarly, tonsillar infection, while a possible source of direct infection, can also give rise to secondary foci in the alimentary tract.

Sinusitis might be a primary source or arise secondarily from oral, dental or pharyngeal septic foci. Unless complete blockage occurs it is more likely to give rise to gastro-intestinal disturbance than to Arthritis by direct entrance of its toxins into the blood stream.

Intestinal intoxication as a cause of Arthritis was especially urged by Arbuthnot Lane. As stated with reference to bacteriology, this has been elaborated by Mutch, who claims that it dominates the problem. Pemberton, while not supporting Arbuthnot Lane, supported Mutch by treating patients with restricted carbo-hydrate diet and so combated the glycophilic organisms described by him. Mutch is insistent on the frequency of masked stasis and hidden intestinal infection in cases of Arthritis. Intestinal foci of infection would appear mainly to be secondary to oral and dental infection; such oral infection giving rise to secondary foci in the intestine or by interference with gastric juice flow, allowing the organisms already present in the intestinal tract to multiply and become sources of infection. Normally this would be combated by the hepatic efficiency which in cases of Arthritis would appear to be low. With regard to intestinal foci of infection the researches of Poynton and Payne raise an important point. They produced in recurring cases in rabbits appendicitis. The primary injection was fluid from the joint of a rheumatic case. The point then is when appendicitis and Arthritis are associated is the appendicitis necessarily causative of the Arthritis? It would suggest that intestinal infection when present arises from the same primary source.

The genito-urinary tract as a source of infection does not play an important part says Rolleston, except in cases of b. coli bacilluria, prostatitis, vesiculitis and occasionally in cases of chronic endo-cervicitis. Macrae associates prostatitis particularly with spondylitis. Hesketh Roberts draws particular

attention to the association of bacilluria and Rheumatism. Young states twelve cases of known Arthritis were cured on successful treatment of cervicitis, while Daniel assigns to leucorrhoea pride of place as the causative factor. With regard to this last statement, there are certainly many women who give a synchronous history of leucorrhoea and Arthritis dating from a previous confinement. One would rather regard them not as cause and effect, but as accompaniments, the confinement being the cause of the leucorrhoea and an exciting cause of the Arthritis. Where a leucorrhoea or a low virulence cystitis was co-existent with an Arthritis, they would be direct evidence of the low resistance of the individual.

The respiratory tract as a causative source of Hypertrophic Arthropathy has long been known. In relation to Chronic Arthritis, Poncet and Leriche put forward the theory, that tubercular toxins from the respiratory tract are the main cause. They state that 50% of cases are due to this source. Rolleston states that the difference between known tuberculous Arthritis and chronic Arthritis is the main reason for the non-acceptance of this theory. He recommends, however, an open mind to it, in view of the theories once held regarding Tabes Dorsalis and the now known cause.

Skin diseases, such as general dermatitis, lupus erythematosis and boils have been associated with chronic Arthritis and there is the known type of psoriatic Arthritis.

Against this theory of focal sepsis, is the fact that few

persons are free from some septic foci and yet all do not suffer from Arthritis. On the other hand, many cases of Arthritis show no septic focus. Again, where there is a septic focus and such focus is removed, there is on occasion no alleviation of symptoms. Some Arthritics show little evidence of systemic infection.

In favour of the theory one can advance the following counter-arguments. In those persons who have septic foci, but no Arthritis, there is absent a further factor of a debilitating nature. They may have developed a natural resistance to further infection from that source which would be overcome by an exciting cause such as an acute infection or even worry or exposure to cold.

In those cases of Arthritis described by Garrod, where no focus is found, it may be that a hidden focus still exists. This focus may be a cryptic tonsillitis or infection of gall-bladder, appendix or prostate, with no localising symptoms. On the other hand, it may have disappeared and the joint infection itself is now acting as a secondary focus. Rolleston suggests, regarding this type of case, that already sensitised joints may be easily exacerbated by minute doses of toxin from microscopic foci.

The third type where a septic focus is removed without alleviation of symptoms, can be explained by the fact that now a secondary focus is functioning. This is seen particularly well in those cases where teeth are removed. By the time this

step has been taken, tonsillar and intestinal infection has taken place. Also, when one removes one focus one cannot be sure it is the causative focus and as stated others may now exist.

The statement that some Arthritics show little sign of general infection is also true of those persons who have septic foci, but no Arthritis. This is possibly a pure matter of individual idiosyncrasy and personal resistance.

While supporting this theory with reference to Rheumatoid Arthritis, Fisher states it is not clearly of ~~æ~~ aetiological importance in Osteo-Arthritis. Daniel, however, states it to be the cause of both Osteo-Arthritis and Rheumatoid Arthritis. The weight of evidence would appear to be in favour of focal sepsis with general toxaemia as, if not the whole cause, at least the main factor in the causation of Chronic Arthritis.

Trauma: Trauma as a factor in the causation of Arthritis is particularly associated with the Osteo-Arthritic form. Fisher maintains it may be the sole etiological element and not merely a predisposing cause. This element he classifies as follows:-

1. Loose body,
2. Fracture,
3. Localised increase of articular stress of an occupational nature or local deformity from disease or fracture.
4. Dislocation,
5. False Joints,
6. Synovitis,
7. Ligamentous stretching,
8. Haemorrhage.

His researches in the physiology of Arthritis certainly bear out the fact of trauma as a cause. Trauma to the central superficial area of cartilage sets up Osteo-Arthritic changes. In support of this factor are the many histories of injury, either severe or trivial, as the starting point of Arthritis. One cannot, however, lay great stress on that as a reliable source of information from the inestimable factor of compensation claims.

In Arthritis, as in other diseases, such as osteomyelitis, trauma may only be the last factor in a series precipitating a local infection from a toxaemia hitherto giving rise to no symptoms. Where long continued, it would also act by lowering local resistance.

In those two ways one would accept trauma as an etiological factor in Chronic Arthritis.

Morphological Defects: In the classification of trauma given above is the factor of localised increase of articular stress from local deformity. Of this nature are morphological defects such as incurved little fingers, small thumbs and ill-formed terminal phalanges. Crookshank argues that these defects are found in persons prone to Arthritis. It is conceivable that articular stress found in relation to these defects would give rise to a local diminution of resistance.

Occupation: Various factors can be dealt with under this head. A diminished local resistance from articular stress can

be regarded as arising in sewing women, many of whom are victims of Arthritis. Other factors diminishing resistance, particularly of this class of woman worker, are irregular meals, giving rise to dietetic disturbances, insufficient exercise and bad ventilation. Regarding men and outworkers in a rural population, exposure to cold and damp is a prime factor. One might also include as an occupational disability of this type of worker, bad housing and worse sanitation.

Physical Factors: Cold and exposure were at one time held to be the main causes. Fuller went so far as to state the cause to be a blood poisoning brought on by cold in the presence of debility. Pemberton of Philadelphia ascribes 60% of cases to exposure as the largest single factor. It would thus appear that cold and exposure are main exciting factors. They act on the sensitive sympathetic and on the endocrins, producing a temporary lowering of body heat and metabolism. From that arises a temporary lowered resistance to infection, similar to that present in starvation. In this way, one can account for those exacerbations of Arthritis that occur in cold and damp weather.

Goldthwait regards the Rheumatoid type of Chronic Arthritis as due mainly to physical and mental strain. Prolonged overwork and strain are often given in histories as preceeding the onset of Arthritis or an acute recurrence. They, no doubt, act in a similar manner to other physical factors by a tem-

porary lowering of resistance.

Age: Cases of Arthritis occur in both young and old and age by itself seems of little importance as a factor in the etiology. Osteo-Arthritis is seen mainly after middle life. The endocrin upset associated with Arthritis in children corresponds to premature senile changes. The fact that cases occur mainly after middle life may be due to a lowered resistance on the part of the subject, arising from the added strains, mental and physical, which accrue with the years. Such lowered resistance may allow of infection de novo or an infection present for years may now be lighted up by additional strain.

Sex: Polyarticular types of Arthritis would appear to be more common in women and Osteo-Arthritis and the monarticular types in men, though neither sex has a monopoly. In men, such factors as trauma, exposure and occupation and physical strain, will act as exciting causes. The special factors with regard to women being pregnancy, labour and climacteric. Pregnancy acts by causing a lighting up of an existing infection as occurs in pulmonary tuberculosis in women who become pregnant. Labour acts in the same way and may also act by leaving behind a low virulence infection which aids in lowering resistance or may be the actual source of infection in some cases. At the climacteric we have a profound change in the endocrin balance and in the metabolism of the individual. This lack of stability would offer opportunities of infection from low resistive powers. In

addition, at the menopause, we find in many women, particularly unmarried, extreme mental strain acting in a similar manner.

Social Position: Social position has no relation to Arthritis, though many exciting factors would appear to be avoided by better housing, good food and lack of necessity for exposure and physical strain.

Predisposition: Hereditary predisposition or diathesis may be a factor by lowering organismal resistance. Here we find again the factors of metabolic and endocrinous balance. Garrod associated Rheumatoid Arthritis with familial rheumatism in the form of fibrositis. In relation to heredity, Vincent Coates establishes a relationship between Rheumatic Fever and Chronic Arthritis possibly familial or hereditary. The main argument against a hereditary predisposition is the fact that the sufferers live mainly under similar conditions as their forebears or relatives.

Conclusion: It would then appear that the main cause of Arthritis is an infection followed by a toxaemia. The continued absorption of the toxins gives rise to sub-inflammatory and inflammatory changes in the joint tissues.

Each of the other theories and factors deserves at least a measure of support in reference to some cases of Arthritis. In most cases, however, there would appear to be not one but many factors.

Cawadias argues that R + W = G where:-

R = Predisposed Organism
W = External Factor
G = Disease;

his argument being that in Arthritis, which is due partly to external causes and partly to internal, R plays the greater part and that without a metabolic type W cannot determine the disease.

The relative value of the etiological factors and the influence of the soil as propounded by Cawadias will be left till the clinical and pathological portions have been considered.

Pathology:

There is an agreement amongst writers as to the similarity of the pathological changes in cases of Chronic Arthritis. But they are at variance when a complete or a detailed pathological picture is presented. This arises from the fact that some regard the various types of case met with as separate entities, whilst others regard them as phases or differing manifestations of one process. Thus the former regard the generalised types of Arthritis as four separate entities, viz:-

1. Rheumatoid Arthritis,
2. Chronic Infective Arthritis,
3. Osteo-Arthritis,
4. Chronic Villous Arthritis.

The first two may be grouped together there being an agreed similarity in the pathological lesion. One is then left with three types, grouped according to the tissue showing the most

marked change. These groups and tissues being:-

1. Rheumatoid Arthritis - Capsule and Synovial Membrane,
2. Osteo-Arthritis - Bone and Cartilage,
3. Chronic Villous Arthritis - Synovial Membrane.

When one takes the generally accepted classification of Garrod one is reduced to two main types:-- Rheumatoid Arthritis and Osteo-Arthritis in which the changes are most marked in the peri-articular tissues and in the bone respectively. Bannatyne and other writers regard the Rheumatoid type as acute and the Osteo-Arthritic as chronic manifestations of a similar process.

Considered in this light as two types, one finds the pathological changes to be as follows:-

| Rheumatoid Arthritis. | Osteo-Arthritis. |
|---|---|
| **Synovial Membrane and Capsule:** | |
| Increase in number and size of inflamed villi. | Increase in number and size of vascular villi, especially if whole membrane involved, more generally at articular margins after lipping has commenced. |
| Necrosis or haemorrhage in some peri-arterial round-celled aggregations. | |
| Fibrosis of villi. | Cartilaginous degeneration of villi. |
| Organisation. | |
| Adhesions. | Membrane smooth and atrophic in late stages following arterio-sclerosis. |
| Ankylosis. | |
| | Degeneration of chondromata. |
| **Cartilage:** | |
| Irregular proliferation of cartilage cells, following changes in synovial membrane or simultaneously with changes in cancellous spaces or more rarely after. | Fibrillation and splitting of matrix seen earliest at centre part of cartilage. |
| | Chondrophytic outgrowth at periphery compensatory. |

| Rheumatoid Arthritis. | Osteo-Arthritis. |
| --- | --- |
| Pannus spread from synovial membrane invades underlying cartilage and replaces it. | Cartilage erosion by pressure. |
| Occasionally proliferation of cartilage cells and fibrillation of matrix. | Osseous change in chondrophytes from subjacent bone. |
| **Bone:** | |
| Proliferation of connective tissue cells of marrow. | Increase of sclerosed bone under cartilage. |
| Formation of new blood vessels. | Beneath sclerosed bone osteoclastic action in cancellous spaces. |
| Osteoclastic action in cancellous spaces. | Eburnation of exposed bone. |
| Compensatory dense bone laid down. | Grooving of eburnated bone. |
| | Osteophytic outgrowth. |
| Degenerated articular cartilage replaced by connective tissue or cartilage or bone. Where this does not occur, bone is exposed. | Disintegration of capsule and intra-articular structures. |
| Connective tissue replaced by cartilage or bone. | |
| **Synovial Fluid:** | |
| Increased - variable. | Diminished. |

In comparing these sets of changes one finds in Rheumatoid Arthritis evidence of more acute vascular inflammatory changes than in Osteo-Arthritis. In Osteo-Arthritis the changes, though more generally degenerative are, however, sub-inflammatory where vascular tissues are involved. The alterations in fluid secretion are similar to those found where synovial membrane is involved in an inflammatory reaction, the quantity varying with the intensity of the infection and the resistance of the tissue.

One also finds that what are termed Osteo-Arthritic changes, e.g. fibrillation of cartilaginous matrix, replacement of cartilage by bone, do occur in Rheumatoid Arthritis. It would therefore appear that there is a distinct similarity in the changes in the two types.

Corneil and Ranvier go further and state the lesions of each to be identical and observable in all joint lesions, no matter what the cause. Commenting on this, Stockman says: "No doubt the various tissues and structures composing a joint show individually certain resemblances in the reaction to different pathogenic irritants, but the pathological picture not only as a whole, but in details, differs very greatly in different diseases." Such a statement does not, however, militate against the idea that in all forms of Chronic Arthritis, the irritant is in nature similar. Fisher states that Osteo-Arthritis and Rheumatoid Arthritis may be present in the same person at the same time in different joints, or in the same joint at different times. Either may be secondary to the other. Again, although he holds that Osteo-Arthritis and Rheumatoid Arthritis differ essentially, he admits that borderline cases do occur. That this is the case is evident on study of the changes given above. Thus a joint may in the early stages show the villous hypertrophy of Chronic Villous Arthritis and be classed as such. Later it may be termed Rheumatoid and in the last stages, on exhibition of the typical bony changes, be termed Osteo-Arthritis. One is therefore not inclined to dif-

ferentiate but to agree with Daniel, who states: "Low inflammatory changes are merely a matter of degree, due probably to a prolonged toxaemia of a low type, where vascular changes are slight and tissue changes marked." This is in accordance with the findings of Strangeways in his summary of pathological changes found in 2,000 cases of undifferentiated Chronic Arthritis. He there states that the Pannus formation regarded as a typical Rheumatoid change occurred only in severe cases.

In order to trace farther, if possible, the etiological cause, one must consider separately the tissues affected in Chronic Arthritis. They are Cartilage, Bone, Synovial Membrane and indirectly the Synovial Fluid.

The Cartilage which suffers most in what are termed Rheumatoid and Osteo-Arthritis, is an avascular structure and therefore in itself innocent as a locus of primary deposit of infection. In Osteo-Arthritic changes it is stated to be primarily affected. Such a change must, however, proceed from the underlying nourishing bone, or from the synovial fluid and therefore indirectly from the synovial membrane. In Rheumatoid Arthritis the affection proceeds from the periphery, that is from the synovial membrane and is followed as in a similar tissue, the cornea, by pannus formation. With reference to this tissue, one finds in Osteo-Arthritis the part primarily affected is the central area, as in Acute Suppurative Arthritis. This fact is rather in favour of a similar type of affection, namely, inflammatory.

The bone is stated to be mainly affected in Osteo-Arthritis, but there is in both types a rarefying osteitis present. The epiphysis, which alone is affected, is extremely vascular and therefore a suitable focus for blood borne infection or toxin.

The synovial membrane is well supplied with vessels and also a probable focus for deposit of inflammatory toxins. In Rheumatoid Arthritis it is stated to be primarily infected and certainly is to a greater extent than in Osteo-Arthritis. In Osteo-Arthritis it does not, however, escape as the primary change and the one stated to be the cause of cartilage involvement is a diminution in secretion of fluid.

From consideration of these statements, one finds Chronic Arthritis analogous to Tuberculous Arthritis, with an osseous form and a synovial form. In Rheumatoid Arthritis are all the signs of inflammatory change in vascular and fibrous tissues, while in Osteo-Arthritis are signs of sub-inflammatory change in vascular and fibrous tissues, accompanied by the natural reaction of an avascular tissue to irritants of a similar nature.

One therefore concludes that Rheumatoid Arthritis and Osteo-Arthritis are manifestations of one disease, having a common etiological source, but a differing reaction relative to virulence of infection, path of infection and the natural resistance of tissues.

Typical microscopical appearance of synovial membrane in Rheumatoid type of Arthritis.

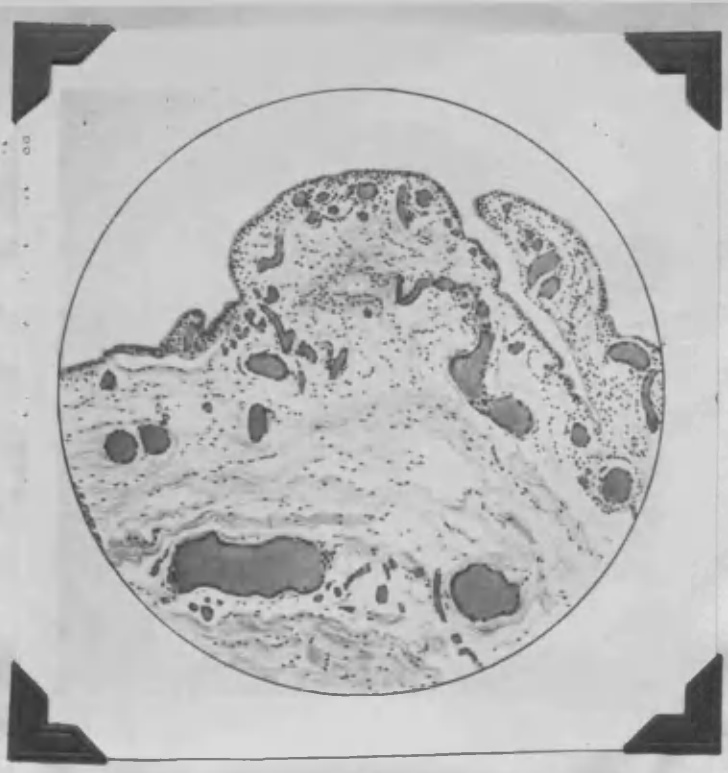
Synovial Villi in Rheumatoid types of Arthritis.

Footnote to Illustrations.

These figures clearly demonstrate:-

(a) that a definite inflammatory reaction is present in the Rheumatoid type of Chronic Arthritis. (Fig. 1. showing presence of small round celled perivascular aggregations).

(b) that there is a similarity in reaction in early cases of Osteo Arthritis and Rheumatoid Arthritis, though of differing intensity. (Fig. 2. shows perivascular aggregations and increase in connective tissue cells.



Vascular synovial membrane in early case of osteo-arthritic type of Chronic Arthritis.

Synovial membrane in advanced case of Osteo Arthritic type showing "peri-capillaritis diffusa".

Footnote Continued.

(Fig. 3. shows increased vascularity and increase of cellular elements.)

(e) that peri-vascular fibrosis is a feature of late Osteo arthritis and is therefore an accompaniment or result and not a cause of the disease.

For permission to reproduce these figures I am indebted to Mr. A.G. Timbrell Fisher and Messrs. H.K. Lewis & Co., London.

Symptomatology:

Having come to this conclusion from a study of the pathology, one is prepared to find that the symptoms of Rheumatoid Arthritis and Osteo-Arthritis have a similarity, but of necessity varying in degree. In support of this is the statement by Daniel that so many exceptions and qualifications are made that the differentiation is strained.

Onset: In the Rheumatoid type is very variable; it may bear a resemblance to Rheumatic Fever on the one hand and Chronic Osteo-Arthritis on the other. More generally is:-

(1) an acute polyarthritis with pyrexia and general febrile symptoms, or

(2) acute monarthritis, spreading to other joints.

In the Osteo-Arthritis type is more generally insidious and rarely acute or sub-acute. Two or three joints may show signs while only one gives rise to symptoms.

Exciting Causes: The acute type generally follows on some general chill or infection.

The chronic type may give a history of trauma or exposure to cold and damp.

Joints Affected: In the acute or sub-acute forms the small joints of the hands and feet, generally the proximal interphalangeal joint of the second or third finger or the meta-carpal phalangeal joints. Then follows a centri-petal spread to wrists or ankles and knees, suggesting blood-spread. The tempero-

maxillary, spine and hip joints are rarely involved in this type.

In the more chronic forms the hip-joint is the site par-excellence in monarticular forms. When polyarticular, the carpo-metacarpal joint of the thumb and the distal inter-phalangeal joints of the fingers are involved.

The Signs and Symptoms of Sub-Acute and Chronic Arthritis are:-

| | | |
|---|---|---|
| 1. Pain | 2. Swelling | 3. Crepitus |
| 4. Impaired Mobility | 5. Muscle Wasting | 6. Deformity |
| 7. Fibrositis | 8. Trophic Phenomena | 9. Constitutional Disturbance. |
| 10. X-ray Appearances | | |

1. Pain: Very variable symptom, depending on:-

(i) acuteness of attack

(ii) personal susceptibility.

It may arise from:-

(i) Inflammation in joint
(ii) Pressure on villous fringes
(iii) Neuritis reflex or independent
(iv) Fibrositis
(v) Apposition of sensitive surfaces.
(vi) Stretching of adhesions or contracted muscles.

In the acute type pain is aggravated by:-

(i) Pressure
(ii) Movement, or
(iii) Warmth.

In the chronic type, it may be the only symptom and varies greatly, being aggravated by:-

(i) Cold, damp, or exposure
(ii) Mental or physical depression
(iii) Movement. This varies. On first moving joint there is marked pain, which passes off on continued movement, but increases again when long continued. In this type there is, depending

on pathological stage of disease, no pain on forcible coaption of articular surfaces.

2. Swelling: This may be due to:-

(i) involvement of the capsular elements when it is fusiform in shape;

(ii) effusion which may be slight or great when it is spindle-shaped, bounded by capsule. Effusion may also be present in surrounding bursae and tendon sheaths;

(iii) enlargement of bony extremities.

Where the proliferation of the villi is great the swelling gives a doughy yielding sensation to touch, closely approximating Tuberculous Arthritis, and fringes may be palpable.

The effusion is less marked generally in the chronic type but may be very great.

3. Crepitus: This is present in both types, both audible and palpable. In many cases disappears on continued movement of joint.

4. Impaired Mobility: This is due to muscular spasm reflex in the first instance and later to contracture by strong flexors opposed to weakened extensors.

Active movements may be of full range though slow but are more painful than passive movements.

This impaired mobility or stiffness may be the first sign of an insidious arthritis.

In advanced cases this is due to fixation by shortened capsule, ligaments and tendons with in the Osteo-Arthritic type

osteophytic outgrowths interfering with free movement.

Reflexes are generally exaggerated over affected joints.

5. Muscle Wasting: Is an early and prominent sign in the Rheumatoid type and occurs too early to be due to disuse.

In the Osteo-Arthritic type is rarely so marked but may be extreme in absence of remedial treatment. In this type the muscles though flaccid are generally kept in use as the actual disability is generally less.

6. Deformity: This is due to:-

(i) muscle spasm of flexors;

(ii) contracture of flexors and elongation of extensors, rapid in Rheumatoid type, slow and insidious in Osteo-Arthritic.

(iii) where Osteo-Arthritic changes take place, alteration in the shape of articular surfaces by bone absorption and bone formation, enlarged extremities, lipping and osteophytes.

(iv) fibrous anchylosis in Rheumatoid type.

This primary spasm is stated by Hilton to be involuntary but not instinctive in an effort to give position of least pain and fullest capacity of joint. It is in the early stages reducible under anaesthesia and massage if bearable.

Deformity is not reducible when permanent changes have set in.

The actual deformities of the joints are:-

Hand. Ulnar deflection at metacarpal phalangeal joints. Flexion at interphalangeal joints. Hyperextension at the distal interphalangeal joints.

Wrist. Flexion.

Elbow. Midway between flexion and extension - pronated.

Shoulder. Flexion. Adduction. Inward Rotation.

Foot. Hallux valgus or rigidus. Toes deflected outwards at metatarso.— Phalangeal joints. Flat foot.

Ankle. Plantar flexed.

Knee. Flexed; if severe, subluxated and rotated out.

Hip. Flexed. Adducted. Rotated in.

7. Fibrositis: In Rheumatoid type all fibrous tissue is sooner or later involved.

Subcutaneous nodules appear near affected joints or over bony prominences. These are extremely tender.

Aching pain, stiffness and fatigue in cold weather, and some of the pain and difficulty in movement are due to increasing fibrositis, panniculitis, and periostitis.

8. Trophic Phenomena: Prickling sensation of 'pins and needles' in limbs is an early symptom and is marked when joint is giving no localising symptoms.

Cold and sweaty hands and feet are common.

Heat and oedema are usually absent but are found where there is an accompanying tenosynovitis when redness is also present.

In advanced cases the skin has a smooth glossy, soapy feel and appearance and local syncope or asphyxia may be present.

Loss of hair adds to the smoothness of the skin to touch.

9. Constitutional Disturbance: In the more acute cases, fever may be an accompaniment at the onset and even during

periodic attacks.

The pulse rate may be raised similarly, without presence of fever.

In acute forms, general cachexia with secondary anaemia results from infection.

The general condition varies, due to effect of pain, sleeplessness and lack of exercise.

General toxaemia and localised signs and symptoms depend for this existence on source of infection.

The cardiac muscle is sometimes involved in the general muscle atrophy and the valves are occasionally affected.

10. X-ray Appearances: In X-ray photographs, rarefaction of the bone is early seen, accompanied by a fuzziness of outline of the articular surfaces.

In chronic insidious types X-ray is generally negative until sufficiently advanced to be identified clinically.

Case 1.

Widow of Farm Servant. Age 74.

Living Conditions: Brought up and lived until ten years ago in farm cottage in Lincolnshire. Present living conditions good. Dry, warm, well-aired house. Good food.

Past Illnesses: Rheumatic fever at age of fifteen. Recurrent sore throats. All teeth removed 'before War'.

Family History: None available.

Present Illness: Commenced seven years ago with stiffness of both ankles and pain on movement. Progressed, involving knees, shoulders, elbows and wrists. Has been unable to walk for five years and cannot raise herself in bed owing to pain in arms. Now confined to bed. Joints more painful in wet weather.

Joints Involved: Both ankles, knees, wrists, shoulders and elbows.

Condition of Joints: There is no deformity present. Active movement is limited. Passive movement more complete but painful. Crepitus audible and palpable on active and passive movements. Crepitus and stiffness most marked right wrist and elbow.

General Condition: Good. Appetite and digestion good, though edentulous. Well nourished. No apparent focus now present. Short, stout type. Well preserved. Good head of white hair. Slight thinning outer side, both eyebrows. Such muscle wasting as is present is accountable by reason of age and bed-ridden condition.

Mitral systolic murmur present but no subjective or objective signs. Fully compensated.

Response to Treatment: Local treatment by massage and active and passive movements over three months produced general improvement in movements both in range and lessened pain.

Case 2.

Spinster. Retired Cook. Age 70.

Living Conditions: Previously worked in dark kitchen with garret bedroom in a town. Working in a hot stuffy atmosphere, never had any inclination for meals. Lived mainly on cups of tea. Present conditions, house damp, sanitation nil.

Previous Illnesses: 1921. Pyloric Ulcer (operation). Same year, Cataract right eye.
1923. Goitrous swelling neck. No exophthalmos.
1925. Left lobe goitre. Some exophthalmos.

Present Illness: Early in 1926 developed pain in lower lumbar region, back. Made worse by movement after resting. This condition remained for six months, when following attack of "Summer Diarrhoea" became more painful apart from movement. Movement itself was very difficult, especially bending. Carrying weights, such as pails of water, became impossible.

Joints Involved: 2nd., 3rd. and 4th. Lumbar Vertebrae.

Condition of Joints: Pain on pressure over affected vertebrae. Impairment of movement, rotation or flexion. Spasm of muscles. X-ray report states definite Osteo-Arthritic changes present.

Response to Treatment: Relieved by use of belt and local massage. Treatment for goitre produced very slight improvement in joint condition. Temporary not maintained.

Case 3.

Spinster. Tailoress. Age 65.

Living Conditions: Now very good, but previously poor. Lived in poor lodgings in town, working long hours in badly ventilated rooms with insufficient food of a nourishing quality.

Past Illnesses: Negative. No history of tonsillitis or rheumatic fever or any serious illness.

Family History: Two sisters have "rheumatics". Mother (deceased) had rheumatic fever.

Present Illness: The condition commenced gradually in right knee in 1917, gradually spreading and involving other joints. Commenced as a gradual impairment of movement with little pain. Disease was fairly well advanced before patient suddenly became aware of markedly increased difficulty in movement of legs and arms in morning and of fingers after sewing for some hours.

Joints Involved: Knees and ankles, both legs; both wrists; metacarpal phalangeal joints, both hands, 2nd, 3rd, 4th and 5th; interphalangeal joints, both hands, all digits.

Condition of Joints: Knees semiflexed, no gross bony deformity of extremities. Fluid present left knee. Ankles plantar flexed. Fluid present right ankle and in tendinous bursae below outer malleolus. Elbow semi-flexed across chest, pronated. Swelling around joint due to bony enlargement and outgrowth. Wrists rigidly extended. Little bony deformity. Metacarpal Phalangeal Joints flexed. Gross bony deformity of distal extremity of metacarpal bones. Ulnar deviation. Interphalangeal Joints, flexion with extension at distal joint, with further ulnar deviation of distal phalanx. Active movements very laboured but not painful. Passive movements very limited at all joints. Skin around joints soft, pliable and thickened. Muscles in fairly good condition. Little spasm present and easily overcome.

General Condition: Good. Well preserved. Pulse regular in rhythm and force, fair volume, normal rate. No alteration in sounds at cardiac areas.

Teeth all removed ten years ago. No history of pyorrhoea, or toothache.

Appetite good. No alimentary disorder noted.

Most prominent feature was a very marked hypertrichosis, in shape of well-developed moustache and beard. This has been present for twenty years, commencing two years after menopause.

Menstrual history till menopause normal.

Case 4.

Housewife. Married. Age 58.

Living Conditions: Could be better, as there is a grown up family of five, all working, also husband, but case is poor caterer. Lives mainly on pastry and tinned meats. Housing conditions poor. Walls at back of beds run in wet weather. Sanitation is primitive and necessitates going outside.

Previous Illnesses: Five pregnancies - all normal. Influenza in post-War epidemic. Recurrent sore throats. Twice had aural discharge.

Family History: Father had 'joint rheumatism'. Two sons have recurrent tonsillitis, generally quinsy. One daughter has chronic bronchitis (tubercular.)

Present Illness: Commenced two years ago with stiffness, pain on movement and peri-articular swelling of left wrist. Right wrist followed immediately when left wrist then abated. This was followed by swelling and tenderness on pressure and movement of right knee and ankle. Pain worse on movement and in morning but eased off through day. No fever present. Has had recurrences of lessening severity frequently.

Joints Involved: Left and right wrist. Right knee and ankle.

Condition of Joints: Red, swollen and hot to touch and tender on pressure (synovitis present).

In case of right knee, supra-patellar bursa was not involved.

On abatement of condition no local symptoms or signs present, excepting slight pain while in bed between attacks.

General Condition: Fat, seborrhoeic type. Chronic bronchitis present. Cardiac condition - sounds soft and prolonged, suggesting fatty condition of muscle. Cardiac dullness enlarged latterly. Apex beat, fifth interspace. Pulse rate normal.

Digestive system apparently normal. Bowels active. Has occasional scalding from acid urine. No albuminuria, no sugar present.

Response to Treatment: On local and aural and pharyngeal treatment, acute attack abated in ten days. Attacks have been of lessening severity and of less frequent recurrence.

Case 5.

Housewife. Widow. Age 79.

Conditions of Life: Hard working woman until ten years ago. Farmservant. Married at age of twenty to shepherd, ultimiately dairy-farmer. Conditions of life simple and hard; poor housing conditions, exposed to all weathers. Local water supply for main part of life doubtful.

Previous Illnesses: Four pregnancies. No history of trouble.

No history of illness until commenced Arthritis.

Family History: One daughter crippled by Arthritis.

Present Illness: Commenced about twenty-five years ago with acute attack in small joints of hands. Progressed in recurrences and involving all joints of legs and arms. Never has, at any time, been wholly free but was not to any extent crippled until following influenza in 1918. Following that, there was an acute exacerbation in all joints with a general advance of the disease. Had complete freedom from pain while in Western Canada for six months; returned from there one year ago, when pain returned. Has been rather worse since return and such warm weather as is available affords but little relief.

Joints Involved: All joints of both hands. Both wrists, elbows and shoulders. Both knees and ankles and hips.

Condition of Joints: Hip joints and shoulder joints are least involved, but give very slight creaking on movement which is painful.

Knees swelling and thickness of peri-articular tissues. Enlargement of bony extremities. Semi-flexed. Kept in this position for preference, but active and passive movements fairly free, though painful. Ankles: Peri-articular swelling. No gross bony change. Elbows: Semi-flexed. Active and passive movements extremely limited. Wrists: Slight flexion, peri-articular thickening. Crepitus on movement. Movement relatively free. Hands: Ulnar deflection at metacarpo-phalangeal joints, which show gross swelling both of joint tissues and of

extremities of metacarpal bones. Flexion of these joints. Active movements very difficult and only perceptible. Passive movement little better. Flexion at interphalangeal joints. Bony enlargement around these joints.

Pain due mainly to neuritis and panniculitis; worse at night immediately after going to bed. While in bed inability, from "pins and needles" to keep limbs in one place. When on occasion, by chance, or administration of sedative, there is relief from this, then the morning finds a further complication from increased stiffness of all joints, from lack of movement and fixation and pain on movement. Pain worse in cold winds, even when sheltered or before rain.

General Condition: Tall, well-built woman. Muscles, other than calf muscles, well preserved. Good general deposit of adipose tissue. General health good till recently, when lack of sleep produced general weakening of "morale". Now is little inclined for food, though appetite is unimpaired. Cardiac condition: heart sounds are soft, but pure; pulse good, relative to lack of exercise. Pulmonary condition: good. Genito-urinary: occasional pain on micturition from acid urine.

Case 6.

Spinster. At home. Age 41.

Living Conditions: Good. Housing conditions ideal, including food, sanitation and general atmosphere and method of life.

Previous Illnesses: Measles and Chicken pox as child.

Family History: One brother had Rheumatic Fever.

Present Illness: Commenced as "muscular rheumatism" while working in canteen in 1917. Pain at night and in damp weather. Walking ultimately impossible as pain on movement too severe.

Joints Involved: Both knees, and ankles and wrists. Wrists flexed, fixed. Right wrist some slight active movement, left wrist none. Knees and ankles, both slightly flexed. Movement more free. Slight effusion present in these joints. Osteophytic outgrowths present round all joints involved. No pain on passive movement. Skin soft, white and oily.

General Condition: Very emaciated. Muscles wasted all over body. Alimentary system: teeth good, tongue clean. No loss of appetite, bowels regular. No digestive symptoms. Cardiac: pulse regular in rate and force, though slightly rapid, 80. Volume good. No arterial change palpable. Heart sounds apparently normal. Respiratory system: nil. Genito-urinary system: menses regular and painless. No discharge. Negative.

Response to Treatment: Spa treatment produced no benefit. Polyvalent Vaccine given over 3 months produced each time reaction of pain and sweating from 36-52 hours. This gave alleviation of all symptoms for 6 months. General muscular tone improving on massage.

Case 7.

Housewife. Married: Age 65.

Conditions of Life: Wife of pack shepherd (retired). Conditions of life have always been comfortable. No domestic worries. Living plain and good. Housing, sanitation, etc. good.

Previous Illness: Two pregnancies, both uneventful. Pleurisy and pneumonia twenty-five years ago. Influenza twelve years ago. Pleurodynia one year ago.

Family History: Father had sciatica. Mother rheumatic fever, only child. Both daughters well.

Present Illness: Immediately following pleurodynia developed Arthritis left wrist and ankle. Fibrositis shoulder muscles.

Joints Involved: Left wrist. Left ankle.

Condition of Joints: Red, swollen, painful on movement and on pressure. Tendon sheaths involved with articular synovial effusion. Muscles spastic, but relieved on passive movement. Pain eased by continued passive movement, thereafter allowing painless active movement.

General Condition: Chronic bronchitis present. Enlargement of cardiac area of dullness. Heart sounds weak with mitral systolic murmur, rather soft in nature. Signs of passive congestion in lungs, with enlargement of liver dullness. Facial vessels showed engorgement. Pulse irregular in rhythm, weak force. No fever.

Response to Treatment: General condition improved on ap-

propriate treatment. Joint condition slow, but considerable improvement on massage and passive movements. Reacted both in general and joint condition favourably to exhibition of iodine. Has had one slight recurrence of Arthritis, controlled by iodine.

Case 8.

Roadman. Married. Age 46.

Conditions of Life: Has been in regular employment since started work. Working conditions are not by any means arduous, but of necessity entail exposure to weather and at times working in water. Home conditions fairly good, but housing is defective, with dampness and primitive sanitation.

Previous Illnesses: Influenza 1921. Supra-patellar bursitis 1929.

Family History: Wife and one son, age 17, both healthy. Father had Arthritis.

Present Illness: Fell from cycle on way from work, striking right shoulder on ground. At that time there was a considerable bruising around joint, but no evidence of fracture or dislocation. One year later began to feel creaking in shoulder while shovelling earth, but not at other times.

Joint Involved: Right shoulder.

Condition of Joint: Crepitus audible and palpable on active and passive movement. Slight impairment of movement

stated to be present in mornings and in wet weather. No pain, no deformity, no local swelling or effusion. X-ray report negative.

General Condition: Well nourished, healthy, not exceedingly active in any movements. No alimentary disturbance. Teeth good. Temporal arteries visible and palpable, but not incompressible. B.P. systolic 150. Accentuation at aortic area of 2nd. sound very slight. Nil else noted abnormal.

Case 9.

Drainer. Married. Age 32.

Conditions of Life: Poor, though in good cottage with excellent siting, drainage and sanitation. Wife too lazy to prepare food properly. Wages uncertain owing to conditions of work. Family live to great extent on poached game and on braxy mutton. Exposed to all weather.

Previous Illnesses: Septic dermatitis of left hand and arm 2 months before symptoms of Arthritis. Nil else.

Family History: Not in any way accurate nor certain.

Present Illness: Following drenching in rain, felt stiffness in joints and back next morning. No previous attacks. Sudden onset.

Joints Involved: Right ankle and hip. Lower lumbar vertebrae.

Condition of Joints: Pain on movement of leg and ankle and also on bending. Present both in active and passive movements. Definite impairment of movement and spasm of muscles. Slight swelling visible and palpable round ankle.

General Condition: Teeth outwardly sound. General condition good. Fair, fat, type, lazy and easy-going. No signs of abnormality in any systems.

Case 10.

Ploughman. Married. Age 51.

Conditions of Life: Hard working, steady living. Wife good cook. He is industrious and keen on work. Exposed to all weathers. Housing conditions good and made the best of. No children.

Previous Illnesses: Children's complaints. None remembered since.

Family History: Negative.

Present Illness: Felt increasing pain and difficulty of movement of left knee when ploughing, but continued at work. Three weeks later felt pain on left side of chest, over lower ribs on pulling with left arm and on turning.

Joints Involved: Left knee. 9th, 10th, 11th thoracic vertebrae.

Condition: Left knee swollen from effusion and periarticular thickening. Pain on active and passive movement, and

on pressure over medial cartilage. Pre-patellar bursa involved. Knee semi-flexed. Wasting of calf muscles. Vertebrae: Pain on pressure over vertebrae. Movement of that part of spine "en blocque". Wasting lower rib muscles and serratus magnus. X-ray report: definite osteo-arthritic change 9-10-11th dorsal vertebrae. Left knee: no bony changes observed.

General Condition: Teeth very bad, almost all carious stumps. General condition emaciated and looks older than years. Appetite is apparently good and beyond complaint of pain in chest and knee, considers himself well. No signs of involvement of other systems, beyond slight senile change in shape of easily palpable hard arteries. Pulse regular in rate, rhythm and force. Cardiac sounds pure. Accentuated at aortic area on exertion.

Case 11.

Housewife. Married. Age 54.

Conditions of Life: Fair. Is industrious and clean. Food simple and apparently well cooked. Housing conditions poor, from damp and lack of air. Sanitation poor.

Previous Illnesses: Two pregnancies uneventful. Measles and chicken-pox as a child. Rheumatic fever 25 years ago. Influenza 12 years ago. Recurrent attacks of lumbago.

Family History: One sister has Arthritis.

Present Illness: Insidious onset. Vague pain over right hip, becoming worse as day goes on. Stiffness on rising, which becomes easier and then worse again when tired. Pain worse on going upstairs.

Joint Involved: Right hip.

Condition: No pain on pressure over trochanter. Crepitus palpable on passive and active movement of joint. No muscle wasting. No shortening. No swelling. No bony deformity.

General Condition: Good. Well nourished. Appetite good. Tendency to stoutness. Tongue furred. Teeth false, previously (5 years ago) carious. Flatulent and costive. Other systems nil.

Case 12.

Charwoman. Single. Age 58.

Conditions of Life: Lives in single apartment with unmarried daughter and latter's son. House dry and good. Sanitation primitive. Very dirty. Work is not hard but she is now totally unfit for it. Lives mainly on bread and tea.

Previous Illnesses: Rheumatic fever 30 years ago. Pott's Disease upper thoracic vertebrae as child. Influenza 1919. Recurrent attacks bronchitis.

Present Illness: Increasing swelling and pain in both

wrists over period of two years. Unable to lift weights or use dusters or brushes for prolonged period.

Joints Involved: Both wrists.

Condition of Joints: Both wrists are maintained in semi flexion. Swelling due to enlargement of bony extremities of both bones of fore-arm. Some swelling from effusion into tendon sheaths. This swelling varies. Tenderness and pain on pressure over sheaths, but not over bones. Active movements very limited and laborious. Passive movements more complete and less painful. Pain worse in wet weather and on continued movement.

General Condition: Poorly nourished, wasted and dirty (bronzed) body. Kyphosis upper dorsal vertebrae. Mitral incompetence, with poor thready rapid pulse. Congestion (passive) of lungs. Tongue furred, teeth carious. Appetite poor. Very flatulent and constipated. Breath foul.

Response to Treatment: Cardiac and pulmonary condition improved on appropriate treatment. On removal of septic teeth, appetite has improved slightly. Joint condition remains as before, but has not advanced nor involved other joints.

Case 13.

Housewife. Married. Age 36

Conditions of Life: Good. Lives well and on good food in excellent type of house. Not exposed in any way. No chil-

dren. No hard work. Good and healthy type of life.

Previous Illnesses: None. Chicken-pox and measles as child.

Family History: Mother and sister both have fibrositis.

Present Illness: Recurrent attacks of fibrositis of shoulder muscles for 6 months and for 3 months increasing pain and difficulty in brushing hair. Latterly unable to do so.

Joint Involved: Right shoulder.

Condition of Joint: Pain on pressure over deltoid. Pain on active and passive movement. Spasm of muscles overcome by continued passive movement. No wasting, no swelling around joint. In quiescent periods creaking palpable on active and passive movement, but disappears on continuation.

General Condition: Good. Tendency to stoutness. Artificial teeth. Own were "soft" but not "bad". Good appetite. Bowels regular. No dysmenorrhoea, but periods always scanty. Nil else.

Response to Treatment: Local treatment and alkaline stomachics produced alleviation (temporary). Counter-irritation did not relieve.

Case 14.

Sewing and Lady's Maid. Single. Age 48.

Conditions of Life: Excellent. Has been in present em-

ployment for 25 years. Not exposed nor overworked in any way. Good food and quarters.

Previous Illnesses: Five years ago had severe attack of nasal catarrh, followed in three months by very slight digestive upset.

Family History: No history of rheumatics in any form.

Present Illness: Swelling and increasing stiffness and pain on movement and on entering bed, in left knee and both ankles, of one week's duration.

Joints Involved: Distal interphalangeal joint 2nd finger, both hands. Proximal interphalangeal joint 2nd finger, both hands. Metacarpal-phalangeal joint of right thumb. Both ankles. Right knee.

Condition of Joints: (1) Bony nodal swelling with ulnar deviation and complete absence of movement, either active or passive of distal interphalangeal joint of both 2nd fingers. No pain. (2) There was bony enlargement of the proximal interphalangeal joint of both 2nd fingers. Pain present at night and on movement and pressure. (3) Fusiform, hot, tender and red swelling of metacarpo-phalangeal joint of right thumb. Extremely tender to touch and movement. The above changes were found on examination, although no complaint nor history of their involvement was obtainable. (4) The swelling around both ankles was of the peri-articular tissues. (5) Effusion was present in the prepatellar bursa and around the hamstrings. There was marked wasting of the finger mus-

cles. Spasm of thigh and calf muscles. Crepitus was elicited only from the proximal interphalangeal joints.

General Condition: Good. Looks about 10 - 12 years younger than age. Menopause three years ago, without noticeable complications. Is of the thin, pale, type. No signs of tonsillar involvement. Teeth artificial for 20 years: previously had toothache, but no remembrance of pyorrhoea, or marked caries. Slightly nervous, but no signs of abnormality in other systems.

Response to Treatment: Exhibition of iodine produced no results. Intestinal disinfectants produced no results. A course of atophan, followed by radiant heat, produced marked improvement in inflamed joints.

Case 15.

Surfaceman. Married. Age 38.

Conditions of Life: Housing poor, damp, low-lying and ineffectively ventilated, the back wall being below ground level. Sanitation good. Work necessitates exposure to weather, especially in fog and snow.

Previous Illnesses: Dysentery in Palestine, 1917.

Family History: Father has "rheumatism in joints".

Present Illness: Two years ago felt pain in back. This was followed about three months later by pain in left lumbar region and left iliac fossa. When seen, there was marked pain

and tenderness on pressure in left hypochondrium and history of constipation of one week.

One year ago had recurrence of pain in left loin, with feeling of soft lump in left hypochondrium. On examination there was soft swelling present on standing, as complained of, due to wasting of abdominal muscles, most marked in left lumbar and left iliac regions. There was also tenderness along the course of the 12th thoracic nerve.

Joints Involved: 11th and 12th thoracic and 1st and 2nd lumbar vertebrae.

Condition of Joints: No pain on pressure over vertebrae. Marked impairment and pain on movement. Wasting of muscles left side chest and abdomen. X-ray report stated Osteo-Arthritic changes present 11th, 12th dorsal, 1st, 2nd lumbar vertebrae. Bacteriological Report on faeces. B. coli present in large numbers. Nil else pathogenic.

Case 16.

Blacksmith. Married. Age 32.

Conditions of Life: Lives in damp, badly sanitated house. Wife delicate and does not pay much attention to meals. Work incurs sweating in front of fire, followed by cooling outside. Has long distance to travel to work.

Previous Illnesses: Recurrent attacks of tonsillitis as a boy. Measles and scarlet fever.

Family History: Child, boy, aged 5. Tuberculous glands neck. Recurrent tonsillitis. Enlarged adenoids. Otitis.

Present Illness: Increasing stiffness of right shoulder. Worse in mornings and at night, when tired. Pain in both shoulders (fibrositis) and neck in wet weather and after sweating.

Joints Involved: Right shoulder.

Condition of Joint: Creaking and pain on active movement, which is slow and incomplete. Creaking on passive movement, which is only painful when extended too rapidly. No swelling. No pain on pressure over joint. Tenderness on pressure over shoulder muscles. No atrophy of muscles. Slight spasm easily overcome.

General Condition: Good. Is fit for work. Plays football regularly. Good appetite. Bowels regular. Good teeth, apparently. Fair physique. Slight deafness right ear present from boyhood. Other systems apparently normal.

Case 17.

Farm servant. Single. Age 29.

Conditions of Life: Of necessity exposed to weather. House damp and sanitation primitive. Water after rain of doubtful purity. Is lazy and inclined to be sorry for self.

Previous Illnesses: None since childhood and none at that time necessitating medical attention.

Family History: Father, mother and one brother all suffer from muscular rheumatism.

Present Illness: Two years ago had generalised bone pains in arms, legs and body. Teeth at that time very bad. Teeth removed. Six months later developed pain in both sides of chest and left side of neck, also in right and left knee. Two months later developed pain in right iliac fossa. Tenderness was very slight and aperient treatment relieved condition. On recurrence of pain, a sub-acutely inflamed appendix was removed.

Joints Involved: Right and left knee.

Condition of Joints: Pain in both joints worse when warm in bed and while at work. Creaking on active and passive movement of left knee; no swelling. No muscle atrophy. Right knee; fusiform swelling, slight effusion. Gonococcal fixation test was negative.

General Condition: Teeth false. Previously carious and removed to alleviate rheumatic pains. Tongue clean. Appetite poor. Good physique. Nil else.

Response to Treatment: Since removal of appendix and general bowel toillette there has been no recurrence of Arthritis, nor of muscle pains.

Case 18.

Widow. Housewife. Age 92.

Conditions of Life: Good. Has lived in comfortable surroundings all her days. Never has done any but the lightest work.

Previous Illnesses: Rheumatic Fever at early age. Chronic bronchitis for last 20 years.

Family History: All long-lived. No rheumatic history. Four sons, one of whom has attacks of sciatica. All brought up in damp valley.

Present Illness: Duration of joint affection 20 years. Increasing stiffness and pain on movement of knees and ankles, with fibrositis (slight) of leg and back muscles. Has of late had recurrent attacks of albuminuria, which disappeared on cutting down over rich diet.

Joints Involved: Both knees and both ankles.

Condition of Joints: Slight bony enlargement and synovial thickening. No deformity, no effusion. No wasting of muscles. Slight muscular spasm overcome by continued active or passive movement. Slight crepitus right knee on commencing movement. Pain in joint on continued movement. Impaired early movement and easily tired.

General Condition: Well nourished. Rather stout. Teeth: has still most of her own in fair condition. Appetite good, is inclined to over eat. Bowels regular. Chronic bronchitis,

not troublesome. Cardiac condition: mitral incompetence well compensated for all patient is called upon to do. Patient manages to get about very well and is up out of bed on all dry days. No history of any other possible focus of infection.

Case 19.

Nurse. Single. Age 39.

Conditions of Life: Previously District Nurse in mining area. Now Cottage Nurse - that is, she lives in the cottages of farm workers, etc., while attending confinements and general cases. Under these circumstances her life is extremely hard, as apart from any professional worries she has to put up without any home comforts whatever.

Previous Illnesses: Pan-hysterectomy (fibroids and ? Ovarian cysts) 1921.

Family History: No history of Rheumatism of any form in family.

Present Illness: Recurrent attacks of Arthritis, generally in damp weather and after long or trying case, 2 years.

Joints Involved: Right ankle. Right knee.

Condition of Joints: Between attacks no symptoms. During attacks, wakens with feeling of stiffness in right leg, with difficulty and pain on movement. Both joints swollen and painful to touch. Impaired movement. Muscle spasm.

Pain on commencing movement wears off during day. Pain recurs again when in bed.

General Condition: Very stout, following operation 1921. White and thin hair. General condition good. No loss of appetite. Bowels regular. Feels very fit. Teeth own and apparently good. No systems present pathological symptoms.

Case 20.

Domestic Servant. Single. Age 20.

Living Conditions: Comes from very poor home in town slums. Works occasionally, when fit. Present conditions are good, but only temporary. Was "boarded out". Father unknown. Mother bad character.

Previous History: Had "Rheumatism" from age of six.

Family History: Unknown.

Present Illness: Recurrent attacks of "sore throats" and pains in joints since age of six.

Joints Involved: Metacarpal-phalangeal joints of both hands. Both wrists. Both elbows. Both knees. Both ankles.

Condition of Joints: There is no obvious bony change, deformity or swelling present in any joint, but left elbow. Crepitus and pain on active and passive movements are present in all joints involved. Pain is stated to be worse in wet weather, but is more particularly associated with sore throat.

The left elbow is semiflexed and supination by active movement is very laborious and painful, as is also extension. This extreme difficulty in movement is not so marked in other joints. All muscles are extremely wasted and slight spasm is present in calf muscles and in flexors of elbow joints.

General Condition: Patient is extremely small for age. Looks more like 15 than 20. There is anaemia present, secondary in nature. Mentality is slow and patient is very apathetic about her own condition. Emaciated. Has good appetite. Bowels regular. Teeth good, except upper left molars, which are carious. Tonsils removed six months previously. No abnormal abdominal phenomena. Cardiac system - no enlargement of area of cardiac dullness. No murmurs at any area. Pulmonary system - nil. Genito-urinary system - periods have been scanty and irregular since puberty at age of 16. No pain.

Response to Treatment: Joint pains disappeared, but signs remain after general tonic and fresh air with good food. Teeth removed. Anaemia less marked. There was no other improvement by increase of weight or general growth, patient remaining stationary physically and mentally.

Case 21.

Caretaker. Single. Age 66.

Conditions of Life: Good. Previously cook. Retired on good pension. Now supervises cleaning, etc., of small hall. Work purely nominal. Lives in good type of cottage.

Previous Illnesses: Influenza 1919. Has never had any other illness to her knowledge.

Family History: Mother had "rheumatism". One sister has sciatica.

Present Illness: For last six years had had increasing difficulty in moving legs in mornings, with pain in both hip joints. This disappears on continued movement. For last two years has been developing a limp, not noticed personally, for long, but came insidiously.

Joints Involved: Both hip joints.

Condition of Joints: No pain on pressure over trochanters. No bony or synovial swelling around joints. Distinct flattening over left hip joint. Crepitus on movement active and passive. Pain on early active movement. Some spasm of thigh muscles left leg. ¼ inch real shortening left femur. X-ray report states complete absorption of elements of head left femur. Some disorganisation of acetabulum.

General Condition: Very good. Teeth false. Own removed 15 years ago. State unknown. Has always enjoyed good health. No obvious septic focus. No signs of disease in any system, beyond slight hardening of arteries, which are palpable, but compressible.

Case 22.

Widow. Housewife. Age 67.

Condition of Life. Fairly comfortable now but must have been severe in earlier life as she was an outworker at age of twelve, then cook, latterly charwoman. House is damp and sanitation primitive.

Previous Illnesses: Five pregnancies, all uneventful. Recurrent attacks of asthma and bronchitis.

Family History: Father, mother and two daughters all have had 'fibrositis'.

Present Illness: Insidious onset no date. Occasional attacks lumbago and fibrositis of shoulder muscles with creaking in joints on movement. Attacks commence when warm in bed - difficulty in keeping still from feeling of pins and needles in feet and hands with neuralgic pain side of head. This is generally eased by sitting in chair.

Joints Involved: Left shoulder joint. Right first metacarpal-trapezium joint. Left second metacarpal-phalangeal joint. Both knees.

Condition of Joints: Left shoulder and both knee joints are occasionally stiff in mornings. No abnormal signs. Slight pain on movement, both active and passive, when involved. Right first metacarpal-trapezial joint during attacks is swollen and tender to pressure and painful on movement. Swelling from synovial elements with effusion. No bony change.

Left second metacarpo-phalangeal joint is not now involved

but has slight ulnar deviation. There is no pain nor tenderness. Swelling is due to bony enlargement and lipping around joint.

General Condition: Well preserved. Good appetite. Cheerful outlook on life.

Teeth that remain are good. No history of caries. Bowels regular. No alimentary disturbance.

Cardiac System. Enlargement of superficial cardiac dullness. Soft double murmur at mitral area. Pulse regular in rate, rhythm and force, low tension, moderate in force.

Pulmonary System. Signs of chronic bronchitis always present.

Genito-Urinary System. Slight albuminuria during attacks.

Case 23.

Cattleman. Married. Age 62.

Living Conditions: Life very trying and arduous. Is hard worker and industrious. Was brought up in "Black House" in Lewis and has since occupied poor damp type of cottage allotted to agricultural workers. Present house very poor, water is not potable after rain. Exposed to all weathers. Wife good cook, careful and industrious.

Previous Illnesses: Until 1922 never had a day's illness. 1922. Lumbago. 1924. Enteritis. 1922-25-27. Bronchitis.

Family History: Not known.

Present Illness: Has had two attacks during past winter of Arthritis with fibrositis in shoulder muscles.

Joints involved: Both shoulder joints; both wrist joints; both knee joints, and small joints of fingers, both hands.

Condition: All joints were painful on movement which was slightly impaired. Swelling round all joints, fusiform. Thickening of peri-articular elements. No bursitis nor synovitis. Pain and tenderness on pressure and passive movement. Spasm of muscles overcome by continued passive movement. No wasting of muscles. Temperature was raised at commencement of each attack which only lasted three to four days. Accompanying pulse rate. No signs or symptoms between attacks.

General Condition: Well nourished, strong muscularly, well built. Looks nearer seventy than sixty. Has very bad carious teeth. Suffers from flatulence. Appetite good. Bowels regular. Other systems healthy.

Case 24.

Housewife. Married. Age 40.

Conditions of Life: Always have been good. Husband in good position. Has no financial or other worries. Good house. Good sanitation.

Previous Illnesses: None known until six years ago, when third child born. Continuous slight P.V. discharge since. Treatment for this condition apparently refused.

Present Illness: Commenced following childbirth with acute polyarthritis which ultimately cleared up, leaving ankle joints

always and joints of hands occasionally affected.

Joints affected: Both ankles. Second and third metacarpal-phalangeal joints of both hands. First interphalangeal joint, second and third fingers both hands.

Condition of Joints: Pain and swelling always present in ankles. Pain worse in damp weather and on first movement, passes off on continued movement to return when tired.

Swelling fusiform and when most marked pits on pressure. Occasional effusion when over-tired. There is distinct impairment of active movement. Passive movements are of fuller range. Crepitus present only when symptoms least marked. There is now no muscle atrophy which was present in early stages. The joints of hands involved show no signs when quiescent but when involved show similar signs.

General Condition: Good, well nourished, cheerful and hopeful.

Alimentary System: Teeth false. Previously removed for apical abscesses. Constipated.

Genito-Urinary System: Continuous slight P.V. discharge. Joints of fingers generally tighten up during menses which are normal. Slight endo-cervicitis. Other systems apparently normal.

Response to Treatment: Teeth removed for apical abscesses four years ago. Results negative. Spa treatment for last three summers. Improvement each time in general and local condition.

Case 25.

Dairywoman. Wife of Case 23. Age 66.

Conditions of Life: Good from a domestic point of view, but housing conditions are very poor. Hard worker. Good cook and caterer. Good mixed diet.

Past Illnesses: Had tonsillitis many years ago. Was free from any trouble till came to present house.

Family History: Mother had fibrositis, also two brothers.

Present Illness: Commenced with pains in both wrists; worst after milking. Ankles later involved. Fibrositis in arm muscles.

Joints Involved: Both wrists. Both ankles.

Condition of Joints: Fusiform swelling round wrist joints. Painful on movement active, less so on passive movement. No crepitus. Spasm of fore-arm muscles present during attacks. No muscle atrophy.

Synovial effusion, wrists and ankles. Tendon sheaths slightly involved with redness, swelling, and warm to touch - tender on touch. Otherwise, as wrists, pain worse in bed and after continued work.

General Condition: Good. Healthy, well-nourished, well-built woman. Teeth removed fifteen years ago - stated to be good but loose. No abnormal signs or symptoms detected or given in any system. No obvious septic focus.

Case 26.

Tailoress. Single. Age 43.

Conditions of Life: Daughter of case 25 by first husband. For last four years has lived in unhygienic surroundings. Previously, and when Arthritis commenced, was working as sewing matron at Hostel for Unmarried Mothers, connected with Lock Hospital. Of serious disposition and would no doubt take work seriously and untiringly.

Previous Illnesses: 1922 Nasal Catarrh. 1923 Pharyngitis. Previously none known.

Family History: Mother, case 25, has Arthritis.

Present Illness: Commenced in 1924 in small joints of hand. In 1925 she shewed secondary anaemia, the wrists and ankles showed swelling and ankles were stiff and painful on walking. Appetite was apparently good. A small purulent lesion was found in right basal lobe of lung, from which vaccine was prepared. This reduced acuteness of pains, but did not improve condition otherwise. Peptone injections were then given, which at first benefitted, but later exacerbated condition. There were no signs nor symptoms of pulmonary tuberculosis. Later in this year Spa treatment was tried with benefit to hands, but not other joints.

In 1926 fingers, wrists, ankles and knees were still affected. She walked with great difficulty and was refused admission to hospital at this time as incurable, on account of home conditions. A contemplated trip to Western America

had to be given up, as refused passport.

In 1927 and 1928 the condition of hands and feet became worse, but greatest difficulty was due to muscular atrophy and weakness. In later part of year went to Arizona.

In 1929, while in Arizona, relapsed badly, after improvement, in hot weather. On return the right knee and ankle showed bony thickening and these joints, along with metacarpal-phalangeal joints, and wrist joints, were painful on sustained movement. All possible sources were examined for focus, a post-nasal discharge was complained of, the posterior ends of the inferior turbinates were found to be enlarged. These were removed by operation and sinuses cleared out. Following this slow improvement in general health followed and under massage and exercises muscle tone improved. The right knee, which shows bony enlargement, is a little troublesome from this deformity. Five months after operation on turbinals, patient resumed work, after being crippled for five years.

Case 27.

Housewife. Widow. Age 48. (Crippled).

Conditions of Life: Good. All comforts available. Husband sea captain lost at sea during War. Family of four all healthy.

Family History: Her own family are extremely neurotic.

One brother (salmon fisher) crippled by neuritis.

Previous Illnesses: Only children's diseases. No puerperal complications.

Present Illness: Commenced 5 years ago with swelling and pains of metacarpal phalangeal joints of both hands and wrist joints. Rapid spread upwards to elbow and involvement of ankles and knees. Shoulders only slightly affected. Periodic remissions and exacerbations, but no further advance for last 2 years.

Joints Involved: Metacarpal phalangeal joints all fingers both hands. Interphalangeal joints all fingers. Both wrist joints. Both elbow joints. Both shoulder joints. Both knee joints. Both ankle joints. Metatarsal phalangeal joints.

Condition of Joints: Ulnar deviation of fingers with impaired movement at metacarpal-phalangeal joints. Interphalangeal joints more free in movement, but flexed slightly into palm. Muscles atrophied. Wrist joint flexed, swollen and painful on movement. Muscle spasm and impairment of movement. Extremely painful at night. Elbow joints semi-flexed. Spasm of muscle difficult to overcome with passive movement. The movement of rotation and supination is very painful and renders act of feeding slow and uncertain. Shoulder joints - only apparent sign is crepitus on movement. There is no swelling and only slight pain on occasions. The foot is but slightly affected. Pain is complained of in metatarso-phalangeal joints on pressure of foot against anything.

The ankle joints show slight plantar flexion. Pain is present on movement. No swelling. The knee joints show swelling of bony extremities and lipping at edges. Active movement is impossible. Passive movement is possible, but extremely painful from firm contracture of flexors and ? adhesions.

General Condition: Poor. There is emaciation and extreme muscular wasting all over body. Appetite extremely poor and sleep bad. Must be tempted to eat, but what is taken gives rise to no disturbance. Natural teeth removed 20 years ago. Heart sounds are weak, but pure, the heart muscle no doubt being involved in general loss of muscle tone. A search for a possible focus was unsuccessful, other systems showing no abnormality.

Response to Treatment: Spa and general tonic treatment, has so far produced no beneficial result.

Case 28.

Dairymaid. Single. Age 42.

Conditions of Life: Fairly comfortable, apart from usual unhygienic cottage. Has spent last twelve years of life nursing invalid relatives, in addition to usual duties.

Previous Illnesses: Subject to recurrent urticarial rash. Twice developed transient squint during period of strain. Otherwise nil.

Family History: Father, mother and uncle had Rheumatic Fever. Niece of case 31.

Present Illness: Recurrent attacks of pain and stiffness in both ankles. Has often been kicked or stood on by cows. Occasional occupational teno-synovitis of wrists with synovial effusion into wrist joints.

Joints Involved: Both ankles) These do not occur together and wrist condition is rather occupational.
Both wrists)

Condition of Joints: Ankles show swelling peri-articular with spasm of muscle, stiffness on movement, and pain on movement and during night when warm in bed. Crepitus present on passive movement, which is less painful than active. Crepitus disappears on continued movement. From time to time effusion is present, varying in quantity.

Wrist joints: this is rather a synovitis accompanying teno-synovitis from much or difficult milking. At these times any joint condition present is masked by tendon inflammatory changes. In quiescent periods, however, bony enlargement can be detected.

General Condition: Good generally, but when relatives require night nursing gets rapidly tired. At normal times no system shows pathological changes.

Case 29.

Housewife. Widow. Age 70.

Conditions of Life: Lives in extremely damp cottage with little ventilation and small window space. Has always lived in similar type of house. In younger days was farm outworker, exposed to all weathers. Family of five sons all healthy.

Previous Illnesses: Influenza 1918. Lumbago 1922.

Family History: Unknown.

Present Illness: Commenced in 1922, following lumbago, with swelling and pain in both wrists and in left 2nd metacarpal-phalangeal joint. Recurrences were very frequent until 1928, since when a general improvement in health. A move into a rented house occurred at this time. Previously lived in farm cottages, tenure of which was extremely uncertain. Before this move occurred she was extremely nervous and suffered from tachycardia without obvious cause.

Joints Affected: Both wrist joints. 2nd metacarpal phalangeal joint left hand.

Condition of Joints: 2nd metacarpal phalangeal joint shows bony enlargement at metacarpal extremity at all times. Slight ulnar deviation. Crepitus on movement. During quiet periods wrist joints show no changes beyond occasional pain at nights in bed. In attacks, all three joints become swollen (no effusion). Pain on pressure over joint and on movement, either active or passive. Muscle spasm is then present.

No muscle atrophy.

General Condition: Very good for age. Is stout and now cheerful person. Hard-working. Looks many years younger than age.

Teeth; upper set false, previously carious. Remaining teeth (8), lower jaw one carious, no pyorrhoea. Tongue clean, no tonsillar enlargement. Occasional flatulence. Bowels regular. Cardiac area of dullness very slightly enlarged. Heart sounds soft but pure. Pulse regular in rate, rhythm and force. Moderate tension. Small volume. Other systems present no pathological signs or symptoms.

Case 30.

Outworker and Dairymaid. Married. Age 30.

Conditions of Life: Fair. Lives in dry cottage, but without proper sanitation. Clean and industrious woman. No family.

Previous Illnesses: Influenza 1924.

Family History: Father, mother and 2 sisters all have had "rheumatics".

Present Illness: Following influenza, she had muscle pains in back, arms and legs. In 1927 the left wrist became painful and swollen and as it seemed to improve, the elbow became affected. Since then recurrences, never severe, have occurred generally in damp weather or after milking a "tough" cow.

Joints Involved: Left wrist. Left elbow.

Condition of Joints: In quiet periods slight creaking can be elicited from wrist joint on active movement.

During attack, the tissue surrounding joint becomes swollen. Joint is painful, while in bed and on movement. Movement is impaired from spasm of muscle. Elbow is held in semi-flexed and pronated position. Supination by active movement is painful, but is bearable on passive movement. Wrist joint is kept semi-flexed, but movement is more free.

General Condition: Good. Patient is well-built, healthy country woman. Teeth false, previously (5 years ago) removed for "toothache". Condition unknown. Slightly constipated, but appetite good and no indigestion. Dysmenorrhoea pre-menstrual. Other systems show no apparent abnormality.

Case 31.

No Occupation. Previously Nurse. Single. Age 65.

Conditions of Life: Now very comfortable, though house is dampish. Previously private nursing, with little actual comfort and a good deal of strain. Eventually broke down while nursing last case seven years ago.

Previous Illnesses: 1918 Influenza. 1927 Bronchitis and Appendicitis. 1928 Pleurisy.

Family History: Mother and one sister and one brother had fibrositis and father Arthritis.

Present Illness: Following appendicitis in 1927 felt

pain and difficulty on movement of left hip joint. Since then recurrences have been common on wet and cold weather.

Joint Involved: Left hip joint.

Condition of Joint: No bony swelling palpable or visible. Crepitus on active and passive movement palpable and audible. Recurrences of pain, during which there is distinct impairment of movement and spasm of muscle.

General Condition: Teeth: upper set false, lower has nine apparently sound teeth. Pharyngeal engorgement periodic. Flatulence common. Bowels regular. Signs of pleural thickening right superior lobe anteriorly, and right inferior lobe posteriorly. Superficial area cardiac dullness enlarged. Systolic murmur present at mitral area, conducted to axilla. Slight engorgement of vessels of face. Sounds of moderate strength, accentuated at aortic and pulmonic areas. Pulse regular in rate, rhythm and force, of moderate tension and fair volume. Enjoys moderate degree of health and does not require to exert herself in any way.

Case 32.

Dairymaid. Married. Age 55.

Condition of Life: Lives in poor type of cottages. Apparently belongs to poor stock, as family moves from farm to farm each year. Husband is much older than wife and does housework while wife works out and in dairy. Not clean.

Previous Illnesses: 1921 Haemorrhoids. 1922 Sciatica. 1925 Influenza.

Present Illness: Recurrent attacks of Arthritis, following influenza in 1925. Generally occur in spring time, during period of recurring thaws and frosts.

Joints Affected: 2nd, 3rd metacarpal-phalangeal joints, right hand. Right wrist. Right knee.

Condition of Joints: Metacarpal-phalangeal joints show bony enlargement, with lipping and osteophytic outgrowth. Slight ulnar deviation. Movement impaired. During attacks, pain is present on movement, which is more impaired. Soft synovial enlargement palpable at these times.

Right wrist, only sign present during quiescent periods is crepitus. Not always obtainable. During attacks, pain, muscular spasm and effusion occur, accompanied by tenosynovitis. Right knee is less affected. Pain is present when tired and on continued movement. Pain on pressure over medial cartilage. During attacks, muscular spasm and impairment of movement occur.

General Condition: 8 carious teeth, 3 in lower jaw only stumps. Pyorrhoea. Tongue furred. Appetite capricious. Flatulence common. Bowels require constant watching. Heart sounds are pure, but weak. Area of cardiac dullness not enlarged. Pulse regular in rate and rhythm, weak in force.

This woman is not anaemic, but thin and wasted. Looks older than years. Is not keen on work, but at same time ap-

pears to be easily tired.

Case 33.

Dairymaid. Widow. Age 48.

Conditions of Life: Husband killed during War. Has been supporting young family by own work for past 15 years. Two now earning small wage. Lives in usual unhygienic surroundings, without sanitary conveniences. Since accident four years ago, has lived surrounded by thoughts of compensation.

Previous Illnesses: Influenza 1918 and again 1925. Potts fracture, right leg, 1926.

Family History: No relatives stated to be rheumatic. Has family of six, none of whom are at all robust.

Present Illness: Commenced insidiously, with feeling of gradual stiffness of joints, noticed first in 1922. Has fibrositis in damp weather but was worse when working in steamy dairy. Stiffness and tiredness of limbs is main complaint, although pain is present on much use of joint.

Joints Involved: Both wrist joints. Right hip. Right knee.

Condition of Joints: Wrist Joints: Muscles are weak and somewhat atrophied (the element of disuse might enter here, as she has not milked for four years). Spasm of muscle when tired. Crepitus occasionally present. Bony enlargement

of extremities. An unevenness of movement is present on passive movement.

Right knee joint shows definite lipping at edges and synovial fringes are visible and palpable. Pain on pressure over villi.

Right Hip Joint: crepitus present on movement. No pain on pressure over joint.

It is impossible to assess how much of the muscle spasm and weakness and atrophy in this leg are due to Arthritis, as Potts fracture of this leg was sustained in 1926, and is still a subject of inquiry under Compensation Acts. There also enters the element of disuse and the effect of lack of movement on an already affected joint.

General Condition: Fair. Well built and of moderate stoutness. Condition of teeth apparently good. Has five missing, but all others are her own. Appetite good. Bowels normal. Menses still regular and painless, but decreasing in duration.

Case 34.

Housewife. Married. Age 56.

Conditions of Life: Could hardly be improved apart from climatic conditions. Has led a healthy, fully occupied life, with most athletic sports open to women of her age and time.

Previous Illnesses: Rheumatic Fever as a child.

Family History: Mother has "muscular rheumatism". One brother had Rheumatic Fever.

Present Illness: 5 years' duration. Gradual insidious involvement of all limb joints. The earliest affected showed swelling and peri-articular changes. Later the only symptoms were increasing stiffness, creaking and pain on movement, without obvious swelling, either bony or of fibrous tissues. Even the shaking of floor or bed gave rise to pain. There was a gradual increasing of secondary anaemia and loss of weight, with sleeplessness and loss of appetite. Pyorrhoea was present, involving five teeth. All teeth were removed and abscesses found at the roots of three apparently healthy otherwise. There was an exacerbation of arthritis following removal.

Joints Involved: All joints of arms and legs, feet and hands.

Condition: The joint deformities were typical, although the larger joints, hip, knee, elbow and shoulder were less affected. The tempero-maxillary joint was affected during an early sub-acute attack, causing extreme difficulty in mastication at that time. There was impaired movement of all joints. Muscle wasting was extreme. During this period neuritic pains of legs and head were intermittent.

Possible Focus: In early stage, teeth. Later, bowel.

General Condition: Previously tall, well built, healthy looking woman. Later anaemic and grossly emaciated. Suf-

fered from flatulence and constipation. Complexion muddy. Tongue furred. Other systems apparently normal.

Response to Treatment: Removal of teeth produced exacerbation. Spa treatment produced temporary improvement, but was of too short duration. Attention to bowel condition, with saline baths and general tonic treatment have for the past six months produced good and sustained improvement. Joint condition shows signs of abating and general and muscular condition are now good.

Case 35.

Farmer. Married. Age 56.

Conditions of Life: Extremely hard worker as boy on father's farm as shepherd and as sheep farmer. He never, at any time, considered health. Exposed to severe weather, he would tramp miles without proper meals and for weeks at lambing times would be without rest. The conditions could have been excellent, but work came first.

Previous Illnesses: None.

Family History: Father died at work from Aortic Disease.

Present Illness: Seven years ago, following wetting, felt shivering and taking large quantity of whisky, sat up all night in lambing shed. Next day felt stiffness, but carried on working well into night. On the third day he collapsed with polyarthritis and pyrexia. In one month pyrexia

subsided and inflammation of joints left. At this time he felt stiffness and pain on movement, but after 6 months managed about with two sticks.

Six years ago, to benefit joint condition, a polyvalent vaccine was given. An acute exacerbation of symptoms occurred. He was removed to nursing home, where tenderness over gallbladder and enlarged liver were detected. At this time, he was very emaciated and muscle wasting was extreme. Pain on active or passive movement was excruciating and sleep was almost impossible.

During this and the following year, various forms of treatment were attempted, without improvement. Intermittent attacks continued to occur.

Four years ago appendicitis occurred, but condition of patient negatived interference. After the acute stage passed, an autogenous streptococcal vaccine was prepared from faeces. The 1st - 4th injection produced no reaction. The 5th injection caused reaction both local and general, during which the 6th and final injection was given. An acute polyarthritis, with pyrexia (Temp. 104° F.) occurred. Pyrexia was sustained for twelve days. Since then there have been no recurrences of Arthritis and for past two years general muscular improvement has been noted. The patient was left with extreme myocardial weakness, which by graduated exercise has now been overcome. His morale was on a par with his general weakness and from time to time caused trouble from neurosis.

He is now able to lift himself into chair and to stand on legs for a few minutes.

Case 36.

Dairymaid. Divorced. Age 44.

Conditions of Living: Lives now in good, dry and sanitary cottage, but until 2 years ago, in usual type of rural dwelling. Domestic conditions are good and comfortable. Divorced husband during War. Is of cheerful type, hard working and very clean. Work necessitates exposure to steamy atmosphere in dairy.

Previous Illnesses: 1921; Abscess left axilla. 1925; influenza. Recurrent attacks fibrositis.

Family History: Mother had Rheumatic Fever and now fibrositis.

Present Illness: Commenced insidiously, first symptom being stiffness of right shoulder, increasing and worse in damp weather. Following influenza in 1925, right wrist and elbow were affected.

Joints Involved: Right wrist, elbow and shoulder joints.

Condition of Joints: Right wrist now shows no signs of affection. Right elbow peri-articular swelling. Pain is present on continued movement and when tired. Muscle spasm and impaired movement when tired. Right shoulder very

definite crepitus on movement. Pain in damp weather and fibrositis with muscle pains when warm in bed.

General Condition: Good. Tall, well built and muscularly strong woman. Teeth strong and to outward appearance sound. No system shows any apparent alteration from normal. Menses normal. No leucorrhoeal or other discharge.

Case 37.

Previously Tailoress. Single. Age 73.

Conditions of Life: Have always been fairly good. Not overworked and lived at home in good type of dwelling. Working conditions apparently good.

Previous Illnesses: None remembered.

Family History: Father and two sisters suffered from Arthritis.

Present Illness: Commenced about thirty years ago in joints of hand, progressively involving other joints. Was very insidious, as actual deformity causing difficulty in sewing was first sign attracting notice. Thereafter noticed pain in joints of hand when sewing long. This was never at any time sufficiently severe to prevent working. Gave up thirteen years ago and led very inactive life, since when contracture of legs set in, keeping patient in bed.

Joints Involved: Metacarpal phalangeal joint of both thumbs. Metacarpal-phalangeal joint 2nd, 3rd, finger both

hands. Knee joints, both.

Condition of Joints: Ulnar deviation of metacarpal phalangeal joints. Bony enlargement of metacarpal extremities, with gross lipping and osteophytic outgrowths. Movement either active or passive very slightly painful and extremely impaired, mainly because of deformity. Bony osteophytic outgrowths round both knee joints. Joints extremely disorganised, osteophytes being palpable at all points. Knees kept in semi-flexed position. Contracture of tendons around joint. Little wasting of hand and finger muscles, but extreme in legs.

General Condition: Well nourished. Stout and cheerful. No teeth but natural ones stated to have been good, but loose. Appetite good. Keeps on very light diet. No complaint of ever having had indigestion. Bowels regular. No flatulence. Heart and lungs are apparently normal. Search for possible focus unsuccessful. Menopause about time of commencement of Arthritis.

Case 38.

Housewife. Married. Age 29.

Conditions of Life: Good. Conditions in all ways excellent, excepting house, which is without proper damp-roofing. Previously nurse.

Past Illnesses: Children's diseases. Influenza 1926 (after commencement of Arthritis).

Family History: Mother confined to bed with Arthritis.

Present Illness: Commenced with pains and stiffness in wrists and knees in mornings, October 1926. One month later had severe influenza, following which Arthritis was more severe and effusion occurred in knee joints. Thereafter there was recurrence of joint pains at each monthly period. A further influenzal attack in January 1930 produced exacerbation of joint condition.

Joints Involved: Both wrist joints. Both knee joints.

Condition of Joints: In quiescent periods there are no signs nor symptoms of Arthritis. At menstrual periods wrist joints become painful towards night, when tired and on cold or wet days. During exacerbation there is swelling round joint, not effusional and not bony. Joints are painful on movement either active or passive, and crepitus can generally be elicited at these times. Knee joints have not been involved since second attack. There is no muscle wasting and no deformity.

General Condition: There is present pyorrhoea from one tooth. Other teeth outwardly sound. General condition is good. There is no anaemia. Very slight discomfort, not amounting to pain, at periods. Other systems show no possible focus of infection and no apparent abnormality.

Case 39.

Chauffeur. Married. Age 30.

Conditions of Life: Very good. Good domestic conditions. Lives on good mixed diet. Wife clean, tidy, industrious and good cook. House damp. Sanitation good.

Previous Illnesses: Trench fever 1918. Recurrences till 1921. Acute Arthritis 1922. Children's diseases all slight.

Family History: Father has sciatica. Sister has had attacks of Arthritis.

Present History: Recurrent attacks of stiffness and vague pains in right wrist. Also when tired after long run or cold in left (least used) leg. Duration 18 months.

Joint Involved: Right wrist.

Condition of Joint: During attack no swelling, no redness, nil visible. Slight crepitus audible and palpable on active and passive movement. Disappears on continued movement, to be succeeded by pain. Slight spasm of muscles during attack. Nil else.

General Condition: Good. Well nourished. No other complaint. Caries of 1 molar well advanced. No tonsillitis. Tongue furred. Appetite good. Occasional diarrhoea. No albuminuria. Other systems apparently normal.

Case 40.

Shepherd. Married. Age 32.

Conditions of Life: Shepherd in hill "hirsel". Does most of round on pony. Cottage poor and damp. No sanitation. Exposed to all weathers. Food good, but times of taking uncertain, depending on distance from home. Formerly crofter in Shetland. North Sea 1914 - 18.

Previous Illnesses: None, always strong and healthy.

Family History: Negative. 3 children all healthy.

Present Illness: 2 days after attending a ewe with puerperal sepsis at lambing time, developed septic sores around nails of fingers. These spread over arms and body, face and scalp and legs. Whole body covered with multiple superficial abscesses in 10 days. Six weeks from commencement, he developed pains in all joints of body, aggravated by movement.

Joints Involved: Both hips, knees, ankles, shoulders, elbows, wrists, small joints of both hands and feet.

Condition of Joints: There was very slight fusiform swelling round all joints involved. Crepitus was present on passive movement. Active movement at first impossible, owing to pain and muscle weakness. There was strong muscular spasm in early stages. Muscle atrophy occurred early. Pain was present on pressure, even of bed clothes and on slightest movement or shaking.

General Condition: Pulse rate rapid in early stages. Temperature at no time above normal. The patient otherwise was a finely built muscular and even at worst, healthy looking type of country worker. No system showed any abnormality. Teeth to all appearances perfect.

Response to Treatment: Dermatitis was treated with tar applications and after short time healed. He was then left with extreme muscle weakness and impaired movement, with pain only on movement. The small joints recovered first, the hips and knees being last in that order. Massage and passive movement, followed by graduated exercise and general tonic treatment was eminently successful.

Case 41.

Cattleman. Married. Age 34.

Conditions of Life: Work not generally physically arduous, but of necessity of long hours and trying. Lives in good cottage. Wife cheerful and industrious. Good food and home comforts.

Previous Illness: Slight persistent cough for some time, now ceased. Otherwise unknown.

Present Illness: Two months before Summer Term was kicked by bullock on left knee. Extreme synovial swelling occurred. He was seen and certified by County Tuberculosis

Officer for admission. At term changed to another farm in different county. Here arrangements were made for admission to sanatorium. There a small quiescent tuberculous focus was found in apex left lung and after some time and further examination, was stated to be suffering, not from Tuberculous Arthritis, but Chronic Villous Arthritis.

Joint Involved: Left knee.

Condition of Joint: Extreme swelling of left knee. Villi palpable. Knee kept in semi-flexed position. Muscular spasm was present. Pain negligible, except when used to any great extent and then from muscle spasm. Movement impaired, but not painful.

General Condition: Good. Well nourished. Good physique. Teeth previously carious, removed on War service. Good appetite. Bowels regular. No abnormal signs or symptoms in any system, with exception of small quiescent tubercular area in left apex, giving rise to no symptoms.

Response to Treatment: Surgical treatment was alone successful. Now works in mill. Able to stand all day without undue strain, wearing cage splint.

Case 42.

Housewife. Married. Age 30.

Conditions of Life: Good. Home conditions good. House

well drained, but low-lying and near stream. Sanitation and hygienic conditions good.

Previous Illnesses: Scarlet fever as a child. Pneumonia 18 months ago.

Family History: Father has "rheumatics".

Present Illness: Recurrent attacks of pain in right shoulder and both knees over two years, generally at monthly periods; became worse, but rarely clear. Six months ago felt "done" and had vague abdominal uneasiness and occasional sickness. After three weeks developed sudden acute pain low down right iliac fossa. Retro-caecal acutely inflamed appendix, with signs of long standing inflammation, removed.

Joints Involved: Right shoulder and both knees.

Condition of Joints: Pain in joints on going to bed and on movement. Joints painful on passive movement and to touch. Crepitus on movement, active or passive, but disappears on continuation. Very slight swelling from periarticular thickening. No muscle wasting. Very slight muscle spasm overcome by movement.

General Condition: Sallow, thin type. Menstrual discharge lasts for 5 - 6 days, but regular. Tongue furred, breath foul. Some carious teeth now removed. Appetite poor. Tendency to "bilious headache". Other systems show no abnormality.

Response to Treatment: Since removal of appendix periods are of shorter duration and loss less. Appetite and general

condition improved. Has put on weight and so far has been entirely free from joint pains.

Case 43.

Dairywoman. Married. Age 46.

Conditions of Life: Housing conditions good. Wages coming into family are good. Work not arduous. Domestic relations are difficult with drunken husband and two neurotic and lazy daughters. Lives on good food, well cooked. Outdoor life, but no exposure to weather.

Previous Illnesses: 3 pregnancies, all without complication. Influenza 1919 - 27 - 29.

Family History: Mother still living and healthy. Father dead. Had Arthritis of hip joint.

Present Illness: Recurrent attacks of Arthritis of Right wrist and elbow, with intermittent generalised fibrositis. Dated from Influenzal attack in 1927.

Joints Involved: Right wrist. Right elbow.

Condition of Joints: Extreme pain on movement in morning, easier by continued movement, worse when tired. Pain slightly less on passive movement. Swelling none, neither bony nor synovial of joint. On occasions an accompanying teno-synovitis is present at wrist. Old ganglion present. Crepitus palpable on movement. Spasm of muscles overcome by massage and movement.

General Condition: Good. Well nourished. Well built. Rather anxious type. Teeth: has 3 carious teeth. Tongue furred. Constipated and flatulent. Menopause commencing. Menses intermittent, and lessening. Attacks common at periods. Nil else. X-ray report on joints negative.

Conclusion:

To facilitate the consideration of the clinical cases three tables are given:-

Table I, showing age groups in relation to other factors in pathogenesis.

Table II, showing occupational and other personal etiological factors.

Table III, showing metabolic disorders in relation to foci of infection, etc.

Consideration of clinical cases in relation to Pathology.

In this series of cases it was noted that the Rheumatoid and Osteo-Arthritic types were of almost equal frequency, namely seventeen and sixteen respectively, while ten cases showed presence of both types at the same time. With regard to the numbers of Osteo-Arthritic types it was noted that many were found in the early stages of the disease. It may be supposed that when the infection from varying causes becomes of greater relative virulence such cases may through time be classed as Rheumatoid in type. In support of this there are amongst the histories given cases which in quiescent periods could only be classed as Osteo-Arthritic, which following exacerbation showed involvement of peri-articular tissues.

With reference to acuteness of onset, ten out of eleven cases of acute onset showed Rheumatoid change, three of the eleven showed also Osteo-Arthritic changes, while one was a Chronic Villous Arthritis, directly traceable to trauma. The relative acuteness of onset would, therefore, appear to be re-

lated to the type of Arthritis.

Suspected and definite foci of infection were present in eleven Rheumatoid cases, seven Osteo-Arthritic and four of mixed type. No foci were detected in eleven Osteo-Arthritic cases, in five Rheumatoid and five mixed type cases. This would appear to support a theory that less obvious and perhaps less virulent or now absent foci are responsible for that type of case described as Osteo-Arthritic.

From the point of view of age groups there was little to support the theory of Osteo-Arthritis being a senile degenerative change, as only five cases showing purely Osteo-Arthritic changes commenced after the age of fifty.

As regards the monarticular cases, all were Osteo-Arthritic in type, four of these showed presence of a suspected focus, while three had none. All, but one traceable to trauma, were insidious in onset. These monarticular cases were not senile as regards the age groups in which they occurred.

Conclusions in relation to Pathology:

1. That Osteo-Arthritis is not a senile degenerative change.

2. That virulence of infection is related to degree of involvement of joint tissues and, therefore, to type of Arthritis.

3. That what are termed Rheumatoid Arthritis and Osteo-Arthritis are manifestations of one disease.

4. That Rheumatoid Arthritis is the more virulent form.

5. That Osteo-Arthritis is the milder form.

## Consideration of Clinical Cases in relation to Etiological factors.

When one considers the clinical material in relation to the etiological theories and factors previously stated, the following results are obtained.

Age: The main incidence occurred in the age groups thirty to forty and forty to fifty. In these groups eight out of eleven acute cases occur. Rheumatoid and Osteo-Arthritic types were equal in incidence in these groups. The greatest number of both sexes were in these two groups. Half of the cases showing foci of infection fall into these age groups.

For all age groups, Rheumatoid and Osteo-Arthritic types of case were equal in incidence in that group until onset occurred after sixty, where Osteo-Arthritis is dominant.

Sex: The female sex were affected in thirty-two cases out of forty-three. The greatest incidence occurred in ages from forty to fifty-five.

Three cases were definitely related to menopause and in four cases, menstruation had a considerable influence.

The sexes were proportionate in all age groups and in types of Arthritis.

Other factors incident on sex are dealt with under appropriate heads.

Occupation: Regarding occupational incidence of the

disease, no one particular type of employment was specially susceptible, - occupations which entailed exposure to cold and damp being almost equal in number with those who were sheltered.

Articular stress from occupation would appear to have a marked effect not on incidence of the disease but on the locus of an established disease. This is not obvious from the male cases, where many other factors are in common. It is, however, apparent from the women where other common factors were absent. Thus, dairymaids and tailoresses whose work entails a strain on the wrists complained of increased pain and even exacerbation of the condition when fatigued by milking or sewing.

As an occupational factor, irregular meals were of little importance as was insufficient exercise. Both would conceivably act in individual cases by undermining personal resistance.

Morphological Defects, such as mentioned by Crookshank as occurring in persons prone to Arthritis were found in only one case. Other factors were more prominently present including that of articular strain from work (sewing). Therefore the value of this statement of Crookshank cannot definitely be assessed. It is possible, however, that the deformity already present would add to joint stress and thereby aid in localising the disease in the first instance to these joints.

Trauma was given as directly causative in two cases, one of whom developed a Villous Arthritis. As a factor determining which joint will be affected it would appear to be of importance.

Exposure to Cold and Damp: This was present in twenty-two cases but absent in twenty-one. It is, therefore, of some importance though not a prime factor. It appears to produce an exacerbation of an existing Arthritis and may precipitate the onset of an infection which in itself is the direct cause of the Arthritis.

Bad Hygienic Conditions: These were common to twenty-six cases owing to the class of patient (rural workers) from which the cases were largely drawn. As a determining factor it can, however, hardly be considered as cases were also drawn from directly opposite type of surroundings. No doubt it will act by lowering resistance to infections and by aiding in their spread. It appears a factor of surprisingly little importance even in this regard.

Dietetic Errors were not common as a factor and only in two cases showed any possible resultant in nature of disorders. They would act by lowering personal resistance and, outwith this disease, do appear to increase incidence of disease in families.

Strain Physical and Mental: Taking into account the type of work undertaken by the class of rural workers, physical strain as a factor is of slight importance. On the other hand, mental strain is a severe tax and was, indeed, found to be an important factor. Primary attacks and exacerbations

were found to be more liable to occur in times of mental stress.

Heredity and Familial Rheumatism: A family history of various rheumatic conditions was given in twenty-six cases. The importance or otherwise of this factor can not, however, be estimated as most cases live under exactly similar conditions and in same district, if not same house, as previous generations of relatives.

Previous Infections: A history of previous and possibly related infection was given in twenty-five cases. In only six was it definitely related to an acute attack and in only four to a definite focus of infection. They would, therefore, appear to be an underlying cause though not the precipitating one, as only eight cases showed absence of both foci ~~or~~ and history of infection.

Endocrine Balance:

Thyreoid Gland. Six cases showed existence by hypothyreoidism; of these, four were aged, one post-operative and one a child. Four of the six had Osteo-Arthritis and two Rheumatoid types of Arthritis.

One case of hyperthyreoidism showed Osteo-Arthritic changes in the vertebrae.

Ovarian Dysfunction: Four cases were definitely related in time to menopause. Two were of definite ovarian dystrophic type. One was post-operative and one a child.

Eight cases in all. Four others had a history of increase in pain or exacerbation of existing condition in relation to menstruation.

The numbers of these cases are too small and the exact influence on the disease too slight to make any comment of the influence of endocrines on this series of cases.

Trophic Phenomena were very definitely present in twenty cases. They did not appear to be related to a nervous temperament, only six of that type showing trophic phenomena. These phenomena were more obvious in the Rheumatoid type of case in the form of skin changes possibly from involvement of more superficial structures.

Nervous Temperament appears to have no effect on incidence.

Previous Acute Rheumatism: A definite history of this was obtainable in only five cases - all women. It had no obvious effect on type of Arthritis. Other cases showed cardiac affections but gave no history of this condition.

Physical Type: An attempt was made to relate the type of disease to the physical type described by Goldthwait. The results are not of any value in this regard.

Metabolic Errors: These were present as contributory causes in six cases; as preliminary to the disease in six cases; as definite accompaniments in nineteen cases. Of these,

nineteen cases, fourteen had a related focus of infection and all but one had either a focus or a related infection. In relation to foci the following gastro-intestinal disorders arose:-

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | related | to | focal | infection | of | teeth |
| 2 | " | " | " | " | " | bowel |
| 1 each | " | " | " | " | " | tonsils and cervix. |

The evidence is, therefore, in favour of regarding metabolic errors in Arthritis as possible sources of the causative toxin.

It is also in favour of regarding such errors as arising primarily from infection.

Focal Infection: Foci of infection were definitely causative or suspected in twenty-three cases. Of these, four were definitely related to acute infection; five were definitely related to acute onset and related infection; fifteen gave a history of related infection, and eight gave a history of acute onset.

Of the twenty-three cases with focal infection:-

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| primarily | 13 | were | related | to | focal | infection | from teeth |
| " | 3 | " | " | " | " | " | tonsil and nasopharynx |
| " | 2 | " | " | " | " | " | Bowel and appendix |
| " | 2 | " | " | " | " | " | Skin |
| " | 1 | was | " | " | " | " | Ear |
| " | 1 | " | " | " | " | " | Lung |
| " | 1 | " | " | " | " | " | Cervix. |

Secondary foci were found in appendix and bowel and genito-urinary tract.

Where foci were present:-

| | | | |
|---|---|---|---|
| 11 | Cases were | Rheumatoid | in type |
| 5 | " " | Mixed | " " |
| 6 | " " | Osteo-Arthritic | " " |
| 1 | Case was | Villous | " " |

Foci were not detected in:-

| | |
|---|---|
| 10 | Osteo-Arthritic Cases |
| 6 | Rheumatoid " |
| 4 | Mixed " |

In only eight cases was there no focus of infection or history of previous infection.

| | | | |
|---|---|---|---|
| 4 | were | Rheumatoid | in type |
| 3 | " | Osteo-Arthritic | " " |
| 1 | was | Mixed | " " |

The evidence from this series of cases would, therefore, be in favour of the theory that sub-acute and chronic Arthritis is due to focal infection, followed by general toxaemia.

Conclusions relating to Etiology:

1. That Sub-Acute and Chronic Arthritis is infective in origin.
2. That age influences the incidence of the disease by diminishing personal resistance to long standing infections.
3. That age influences the type of Arthritis by diminishing local vascular reaction.
4. That the female sex is peculiarly liable to this disease.
5. That occupation in certain cases determines the site but not the incidence of the disease.
6. That trauma in certain cases determines the site of the disease and in others precipitates the onset.
7. That exposure to cold and damp does not influence the incidence of Arthritis but may precipitate a causative in-

fection and does produce exacerbations of an existing Arthritis.

8. That bad hygienic surroundings are not in themselves causative of Arthritis but may lower personal resistance.
9. That mental strain and worry are exciting factors in this disease.
10. That previous infections may be the latent cause of an Arthritis.
11. That menstruation produces in some women an exacerbation of Arthritis.
12. That metabolic errors may be the source of the causative toxin.
13. That focal infection is the prime cause of Sub-Acute and Chronic Arthritis.

TABLE I.

| Number of Case | Sex | Age | Age group at onset | Type of Arthritis | Monarticular or Polyarticular | Onset Acute or Insidious | Related Infection | Focus Suspected or definite | Rheumatic Fever | Familial Rheumatism | Trauma in Direct Relationship |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | M | 29 | | R | P | I | - | + | - | + | - |
| 39 | M | 30 | 20 | O | M | I | - | + | - | + | - |
| 6 | F | 41 | to | O | P | I | - | - | - | + | - |
| 30 | F | 30 | 30 | R | P | I | + | + | - | + | - |
| 38 | F | 29 | | R | P | I | + | + | - | + | - |
| 42 | F | 30 | | R | P | I | + | + | - | + | - |
| 9 | M | 32 | | R + S | P | A | + | + | - | - | - |
| 15 | M | 38 | | S | P | I | + | + | - | + | - |
| 16 | M | 32 | 30 | O | M | I | + | - | - | - | - |
| 40 | M | 32 | | R | P | A | + | + | - | - | - |
| 41 | M | 34 | to | V | M | A | - | + | - | - | + |
| 13 | F | 36 | | R | M | I | - | - | - | + | - |
| 19 | F | 39 | 40 | R | P | I | - | - | - | - | - |
| 24 | F | 40 | | R | P | A | + | + | - | - | - |
| 26 | F | 43 | | R + O | P | A | + | + | - | + | - |
| 28 | F | 42 | | R | P | I | - | - | - | + | - |
| 33 | F | 48 | | O | P | I | + | - | - | - | - |
| 36 | F | 44 | | R + O | P | I | + | - | - | + | - |
| 8 | M | 46 | 40 | O | M | I | + | - | - | + | - |
| 10 | M | 51 | | R + S | P | I | - | + | - | - | - |
| 35 | M | 56 | | R | P | A | - | + | - | - | - |
| 7 | F | 65 | to | R | P | A | + | - | - | + | - |
| 11 | F | 54 | | O | M | I | - | + | + | + | - |
| 14 | F | 48 | | R + O | P | I | + | - | - | - | - |
| 27 | F | 48 | 50 | R + O | P | A | - | - | - | + | - |
| 32 | F | 52 | | R + O | P | I | + | + | - | - | - |
| 34 | F | 56 | | R | P | I | - | + | + | + | - |
| 37 | F | 73 | | O | P | I | - | - | - | + | - |
| 43 | F | 46 | | O | P | I | + | + | - | + | - |
| 3 | F | 65 | | O | P | I | - | - | - | + | - |
| 4 | F | 58 | 50 | R | P | I | + | + | - | + | - |
| 5 | F | 79 | | R | P | A | - | - | - | + | - |
| 12 | F | 58 | to | R + O | P | I | + | + | + | - | - |
| 21 | F | 66 | | O | P | I | + | - | - | + | - |
| 22 | F | 67 | 60 | R + O | P | I | + | - | - | + | - |
| 29 | F | 70 | | R | P | A | + | + | - | - | - |
| 23 | M | 62 | | R | P | A | - | + | - | - | - |
| 1 | F | 74 | over | O | P | I | + | - | + | - | - |
| 2 | F | 70 | | S | P | I | - | - | - | - | - |
| 18 | F | 92 | 60 | O | P | I | + | - | + | + | - |
| 25 | F | 66 | | R | P | I | + | - | - | + | - |
| 31 | F | 65 | | O | M | I | + | + | - | + | - |
| 20 | F | 20 | under 10 | O | P | I | + | + | - | - | - |

R = Rheumatoid Type of Arthritis
O = Osteo-Arthritic Type
S = Spondylitis
V = Chronic Villous Type.

TABLE II

| Case Number | Occupation | Articular Stress from occupation | Irregular meals from occupation | Insufficient exercise from occupation | Defective Hygienic surroundings | Exposure to cold and damp | Strain, mental or physical | Physical Type (Goldthwait) | Personal "Nervous" factor | Trophic phenomena | Type of Arthritis | Articular stress from morphological defects. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | Roadman | - | - | - | + | + | - | F | - | - | O | - |
| 9 | Drainer | + | - | - | + | + | - | F | - | - | R + S | - |
| 10 | Ploughman | + | - | - | - | + | - | N | + | + | R + S | - |
| 15 | Surfaceman | + | - | - | + | + | - | F | - | + | S | - |
| 16 | Blacksmith | + | - | - | + | + | + | F | - | - | O | - |
| 17 | Ploughman | - | - | - | + | + | + | F | + | - | R | - |
| 23 | Cattleman | - | - | - | + | + | + | F | - | - | R | - |
| 35 | Farmer | - | + | - | + | + | + | F | + | + | R | - |
| 39 | Chauffeur | - | - | + | - | - | + | N | - | - | O | - |
| 40 | Shepherd | - | + | - | + | + | - | F | - | + | R | - |
| 41 | Cattleman | + | - | - | + | + | + | N | - | - | V | - |
| 1 | Housewife | - | - | - | - | - | - | F | - | - | O | - |
| 2 | Cook | - | + | + | + | + | - | N | - | + | S | - |
| 3 | Tailoress | + | + | + | + | - | - | F | - | + | O | - |
| 4 | Housewife | - | - | - | + | + | - | F | - | + | R | - |
| 5 | Housewife | - | - | - | + | + | - | F | - | - | R | - |
| 6 | No occupation | - | - | - | - | - | + | N | - | + | O | - |
| 7 | Housewife | - | - | - | - | - | - | F | - | + | R | - |
| 11 | Housewife | - | - | - | + | - | - | F | - | - | O | - |
| 12 | Charwoman | - | - | - | + | + | - | N | + | - | O + R | - |
| 13 | Housewife | - | - | - | - | - | - | F | - | - | O | - |
| 14 | Lady's Maid | + | - | + | - | - | + | N | + | + | O + R | + |
| 18 | Housewife | - | - | + | - | - | + | F | - | - | O | |
| 19 | Nurse | - | - | - | + | + | + | F | - | + | R | |
| 20 | Domestic | - | - | - | + | - | - | N | + | + | O | |
| 21 | Caretaker | - | + | + | - | - | - | N | - | - | O | |
| 22 | Housewife | - | - | - | + | + | - | F | - | + | O + R | |
| 24 | Housewife | - | - | - | - | - | - | F | - | + | R | |
| 25 | Dairymaid | + | - | - | + | + | - | F | - | + | R | |
| 26 | Tailoress | + | + | + | + | - | + | N | - | + | O + R | |
| 27 | Housewife | - | - | - | - | - | - | N | + | + | O + R | |
| 28 | Dairymaid | + | - | - | + | - | + | F | + | - | R | |
| 29 | Housewife | - | - | + | + | + | - | F | + | - | R | |
| 30 | Outworker | + | - | - | + | + | - | N | - | - | R | |
| 31 | Nurse (retired) | - | - | - | - | - | + | F | + | - | O | |
| 32 | Dairymaid | + | - | - | + | + | | N | + | - | O + R | |
| 33 | Dairymaid | + | - | - | + | + | + | F | + | + | O | |
| 34 | Housewife | - | - | - | - | - | + | N | - | + | O | |
| 36 | Dairymaid | + | - | - | + | + | + | F | - | - | O + R | |
| 37 | Tailoress | + | - | + | - | - | - | F | - | + | O | |
| 38 | Housewife | - | - | - | - | - | + | F | - | - | R | |
| 42 | Housewife | - | - | - | - | - | - | N | - | - | R | |
| 43 | Dairymaid | + | - | - | - | - | + | F | + | - | O | |

TABLE III.

| Case Number | Age | Dietetic Errors (Contributory) | Metabolic Disorders: Contributory | Preliminary | Accompanying | Type of Disorder | Focus of Infection | Thyroid Gland | Ovarian Deficiency | Type of Arthritis |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 74 | | | | | | | - | | O |
| 2 | 70 | + | | | | | | + | | S |
| 3 | 65 | + | | | | | | - | - | O |
| 4 | 58 | + | | | + | Acid Urine | Tonsils & Ears | | | R |
| 5 | 79 | | | | + | Acid Urine | | - | | R |
| 6 | 41 | | | | | | | | | O |
| 7 | 65 | | | | | | | | | R |
| 8 | 46 | | | | | | | | | O |
| 9 | 32 | + | | | | | Skin | | | S + R |
| 10 | 51 | | | | | | Teeth | | | S + R |
| 11 | 54 | | + | | + | Gastro-Intestinal | Teeth | | | O |
| 12 | 58 | + | + | + | + | | Teeth | | - | O + R |
| 13 | 36 | | | | | | | | | O |
| 14 | 48 | | | | | | | | - | O + R |
| 15 | 38 | - | | + | + | Gastro-Intestinal | Bowel | | | S |
| 16 | 32 | + | | | | | | | | O |
| 17 | 39 | | | + | + | Gastro-Intestinal | Teeth & Appendix | | | R |
| 18 | 92 | | | | + | Albuminuria | | - | | O |
| 19 | 39 | | | | | | | - | - | R |
| 20 | 20 | | | | + | Albuminuria (during attacks) | Teeth | - | - | O |
| 21 | 66 | + | | | | | | | | O |
| 22 | 67 | | | | | | | | | O + R |
| 23 | 62 | | | | + | Gastro-Intestinal | Teeth | | | R |
| 24 | 40 | | | | + | Gastro-Intestinal Genito-Urinary | Teeth & Cervix | | | R |
| 25 | 66 | | | | | | | | | R |
| 26 | 43 | | | | - | | Naso-Pharynx | | | O + R |
| 27 | 48 | | + | | | Loss of Appetite | | | | O + R |
| 28 | 42 | | | | | | | | | R |
| 29 | 70 | | | | + | Gastro-Intestinal | Teeth & Bowel | | | R |
| 30 | 30 | | | | + | Gastro-Intestinal | ? Genito-Urinary | | - | R |
| 31 | 65 | | | | + | Gastro-Intestinal | Tonsils & Appendix | | | O |
| 32 | 55 | + | | | + | Gastro-Intestinal | Teeth | | | O + R |
| 33 | 48 | | | | | | | | - | O |
| 34 | 56 | | + | + | + | Gastro-Intestinal | Teeth | | | R |
| 35 | 56 | + | | | + | Gastro-Intestinal | Appendix | | | R |
| 36 | 44 | | | | | | | | | O + R |
| 37 | 73 | | | | | | | | - | O |
| 38 | 29 | | | | | | Teeth | | | R |
| 39 | 30 | | + | + | + | Gastro-Intestinal | Teeth | | | O |
| 40 | 32 | + | - | | | | Skin | | | R |
| 41 | 34 | | | | | | ? Lung | | | V |
| 42 | 30 | | + | + | + | Gastro-Intestinal | Teeth & Appendix | | | R |
| 43 | 46 | | | | + | Gastro-Intestinal | Teeth | | | O |

+ Hyper
- Hypo

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