The Harveian Lecture

ON

THE VARIOUS FORMS OF FIBROSITIS AND THEIR TREATMENT.

DELIVERED BEFORE THE HARVEIAN SOCIETY OF LONDON ON
APRIL 10TH, 1913,

By ARTHUR P. LUFF, M.D., B.Sc.LOND.,
F.R.C.P.LOND.,

PHYSICIAN TO ST. MARY'S HOSPITAL.

ALLOW me to express my gratitude to the President and Council of this society for the honour conferred in asking me to deliver this lecture. I feel that some excuse is perhaps necessary in selecting for my subject one of the minor maladies, but it is one that has a very appreciable influence on the comfort and enjoyment of life, is very prevalent, especially in this country, and, in my opinion, is well worthy of more attention than it has hitherto received at the hands of the medical profession.

It happens to be a disease in the treatment of which I have had considerable experience for many years, and I therefore thought that the present would be a fitting occasion to lay before you the results of that experience in the treatment of this common and painful malady.

The affections that I am dealing with in this lecture are the more or less chronic affections which are generally labelled "rheumatic," but which undoubtedly are not the sequelae of acute rheumatism, and which are in no sense connected with that disease. Whereas acute rheumatism is more common in the first half of life, the various forms of chronic rheumatism are much more common in the second.

PATHOLOGY.

In the great majority of the cases of so-called chronic rheumatism, the pathological change is in the white fibrous tissue in various parts of the body, and to this condition the term "fibrositis" has been very aptly applied.

The essential pathological change in fibrositis is an inflammatory hyperplasia of the white fibrous tissue in various parts of the body, associated with exudation and proliferation of the connective tissue elements leading to swelling and thickening of the affected fibrous tissues. This condition may undergo absorption and so completely disappear, or, if not suitably treated, it may pass on to organization with the formation of nodules and patches of thickening.

The articular structures proper—synovial membrane, cartilage, and bone—are not primarily affected, but the parts implicated are the fibrous tissues of the joints, muscles, and bones, especially the aponeuroses and insertions of the muscles, the muscle sheaths in which the muscle spindles lie, the bursae, fasciae, the fibrous ligaments and capsules of the joints, and the periosteum. Such affections cause pain and stiffness in these structures, are especially apt to recur, and are commonly referred to as rheumatic or even gouty in their origin. This inflammatory hyperplasia of the fibrous tissues occurs in patches, and is started by exposure to wet or cold, by injury, or by some irritant, microbic or toxic, conveyed in the blood. The inflamed and swollen fibrous tissue is tender, painful on pressure or on movement, and can frequently be felt on palpation, or is evident by the consequent elevation of the skin. Sudden movement of the affected muscles generally causes excruciating pain, while the local pain on pressure is one of the most diagnostic features of these cases.

The indurations may be widespread, but generally are well defined, and vary in size from an eighth of an inch to one inch in diameter. They may be situated in the subcutaneous tissue, the muscles, tendons, aponeuroses, the capsules and ligaments of the joints, the bursae, the sheaths of the nerves, and periosteum. The pain is especially aggravated by any sudden movement of the muscles which compresses or stretches the affected fibrous tissues and the sensory nerve filaments.

The microbic causation of fibrositis is probably a rare

occurrence, but Ware¹ has been able to demonstrate the presence of gonococci in the inflamed muscles of the posterior axillary fold secondary to a gonococcal arthritis of the shoulder-joint. In the great majority of cases the inflammatory hyperplasia is due to a toxæmia, exposure to cold, strains, etc.

A. Schmidt² has endeavoured to explain the pathology of muscular rheumatism by the assumption of a neuralgia of the sensitive muscle nerves due to a lesion of the posterior spinal roots, but he admits that in the only case in which he had the opportunity of examining the spinal cord the minutest microscopical examination failed to reveal any anatomical changes in the roots. Moreover, it is obvious from his paper that he confuses cases of acute or subacute rheumatism with fibrositis.

ETIOLOGY.

Local fibrositis may result from several causes, of which the following are the commonest:

1. *Cold, Damp, and Wet.*—In a very large number of cases the only assignable cause of the fibrositis is a history of exposure to cold and wet. Sometimes the attack comes on acutely a few hours after the exposure, as in many cases of lumbago, stiff neck, intercostal "rheumatism," and other forms of so-called muscular "rheumatism." At other times stiffness gradually develops after the exposure, and passes on to the condition of chronic fibrositis. The exposure may be due to draughts, remaining in wet clothes, lying or sitting on damp ground or some cold substance, or the simple advent of damp or cold weather. Sleeping in basement rooms to which ground air gains access is a common cause, and is entirely obviated by the building of houses on beds of concrete. A very common cause of lumbago from exposure to a local draught is sitting on a draughty privy or water-closet; this, no doubt, accounts for the prevalence of that affection in rural districts, combined with the constant strain of the lumbar muscles amongst so many agricultural labourers. Many persons are readily affected by the approach of rain and by a lowering of the barometric pressure. Longstreth states that the painful symptoms do not correspond to rain but to the fall of barometric pressure, and Stockman suggests that possibly the atmospheric changes may increase or lessen the lymph pressure in the body, and so increase or lessen the tension in the affected fibrous tissues.

2. *Extremes of Heat and Cold.*—Sudden and considerable variations in temperature constitute by no means an uncommon cause of a generalized fibrositis, which takes the form of so-called "muscular rheumatism," following on the resulting chill.

3. *Local Injuries.*—These are responsible for a large number of cases of local fibrositis. Traumatic fibrositis is a definite form, and is induced by sudden and severe strain on tendinous and ligamentous structures. Such a form may persist for a lengthened period, for whereas the slighter forms of muscular fibrositis, such as "stiff-neck" and mild forms of lumbago, are usually of brief duration, that which affects the tendinous and ligamentous structures may persist for weeks and even months. Golf produces a number of such injuries, the fibrous tissues of the muscles and their attachments to the arms and back being specially affected in this game. "Tennis elbow" is another instance of traumatic fibrositis.

4. *Absorption of Irritating Toxins from the Alimentary Tract.*—It has long been recognized that disorders of the alimentary tract may give rise to "rheumatic" pains. Oral sepsis is undoubtedly responsible for the development of some forms of chronic rheumatism, as likewise are flatulent dyspepsia, chronic constipation, colitis, etc. The aching in the joints and the lumbar region that occasionally occurs the day after a lengthy dinner, especially if several wines have been indulged in, is due to irritation of the fibrous tissues by the toxins absorbed from the intestinal tract, and which have been produced there by abnormal fermentation. This pain, whether in the joints or the lumbar region, which follows excessive indulgence at the table, is generally attributed to gout, and, as a rule, the champagne, claret, or port is blamed for it. I am convinced, however, that this articular or muscular pain has, in the great majority of cases, no relation whatever to gout, and that it is due to a

self-generated systemic poison owing to the inability of the gastro-intestinal tract to deal properly with the various articles introduced into it.

5. *Tonsillitis and Pharyngitis*.—The aching pains that occur in various parts of the body in connexion with these affections are well known, and are doubtless due to toxic absorption and consequent irritation of the fibrous tissues.

6. *Influenza*.—Many individuals are personally acquainted with the aches and even severe pains in the muscles, joints, and bones which accompany this disease. These are in all probability due to the fibrositis set up by the specific microbe or its toxin. It is not uncommon to find fibrous nodules and thickenings left as sequelae of this disease.

7. *Febricula*.—A "feverish cold" is generally accompanied by aching pains in the muscles, joints, and bones. The attack, which is sometimes described as a "rheumatic cold" or an "influenzal cold," is microbic in its origin, and the pains are no doubt due to irritation of the fibrous tissues by the microbe or its toxin.

VARIOUS FORMS OF FIBROSITIS.

The white fibrous tissues in practically any part of the body may be affected, but the liability is greater in certain situations, which will now be dealt with.

Muscular Rheumatism.

This affection is always a fibrositis. Any of the muscles may be affected. Affection of the muscles of the lumbar region constitutes one of the forms of lumbago; affection of the muscles of the neck constitutes stiff-neck; affection of the deltoid muscle constitutes "deltoid rheumatism"; affection of the intercostal muscles constitutes "intercostal rheumatism." The abdominal muscles may be affected, and such nodular fibrositis in these muscles may cause either continuous pain, or severe paroxysmal pain. Undoubtedly such cases have been mistaken for appendicitis, renal or biliary colic, abdominal adhesions, gastric ulcer, etc., and this I believe is the explanation of many laparotomies that have been performed with a negative result. The so-called "growing pains" of children are, in my opinion, due to fibrositis, since the healthy growth of a child should not be painful.

Muscular fibrositis of the shoulder and upper arm muscles is at times a very distressing malady, and so severe is the pain in the affected muscles that any attempt at passive movement causes an involuntary contraction in them, which contraction in its turn considerably augments the pain. The result is that under such conditions the shoulder-joint appears to be fixed, and gives the impression of the presence of firm adhesions within the joint. In some of these cases of brachial fibrositis the interference with sleep on account of a difficulty of securing an easy posture in bed, as well as the pain produced by each movement of the arm, are extremely trying to the patient.

In severe cases of brachial fibrositis the inflammatory condition may spread to the adjacent nerve sheaths, and so cause a secondary brachial neuritis. It is not uncommon for the tendinous attachments of the muscles to be especially affected, and I have seen several cases in which the fibrositis has been limited to the insertion of the deltoid, so that the pain has been entirely confined to that locality.

Fibrositis of the occipital and pericranial aponeuroses is a common form of headache, and one which is frequently overlooked. The indurations are most apt to occur in the retrocolic muscles, especially the trapezius, and in the temporal and other cranial aponeuroses. The attacks of headache are always associated with painful stiffness in the affected muscles. This form of fibrositis is especially due to the exposure to draughts through lack of covering to which this part of the body is necessarily subjected. I am frequently meeting with such cases of headache and fibrositis among those motorists who persist in riding in an open car with the front wind screen up, so that the neck and back of the head get the powerful back draught. I always advise such that it is far preferable in an open car to have the upper part of the wind screen raised or open, so as to face the wind and avoid the exposure of so vulnerable a part as the back of the neck and head to draught.

Lumbago.

This is a very typical form of fibrositis. It may be an affection of the fibrous elements of the lumbar muscles, but more commonly it starts as a localized affection of the insertions of the muscles in the vicinity of one or both of the sacro-iliac joints, since the fibrous attachments of the muscles to the back of the sacrum are especially liable to overstrain. It spreads by continuity of the fibrous tissue, as is manifested by its affecting the tendinous attachments of the neighbouring muscles, by its affecting the sacro-iliac joint itself, and by its often spreading through the joint and reaching the sheath of the sciatic nerve. This explains the very frequent association of some degree of sciatica with an attack of lumbago. In many cases of lumbago the extension of the inflammation to the sacro-iliac joint causes that synchondrosis to become loose, and so to be acutely painful on movement. The production of the pain of lumbago is usually sudden, the patient frequently ascribing it to a sudden strain or wrick, especially on rising in the morning; but although the production of the pain is generally sudden, yet the condition on which it depends has been gradually developed. A violent strain on the spinal ligaments following railway accidents and other injuries may set up a fibrositis with long-continued susceptibility to pain on any tension, a condition which I think is not infrequently ascribed to malingering.

Dupuytren's Contraction.

This is a localized fibrositis caused by habitual postural use of the hand. It is frequently ascribed to gout, but, according to my experience, the condition has no connexion with that disease. Certainly, I have never seen any gouty deposits in the thickened tissues, nor is the affection commoner amongst gouty subjects.

Fibrositis of the Plantar Fascia.

A fairly common form of localized fibrositis is that which affects the plantar fascia. This causes pain in the sole of the foot when the weight of the body is on it, and if not arrested is liable to lead to the development of flat-foot. The fibrositis is sometimes localized to the attachment of the fascia to the inner tubercle of the os calcis, and then constitutes one of the commonest forms of painful heel. If the inflammation persists at this point it is liable to cause a local periostitis and osteitis, resulting in the formation of a bony spur, which, if not removed, constitutes a permanently painful heel.

Fibrositis of Bursae.

A chronic fibrositis of bursae is fairly common, and especially occurs in connexion with the subacromial bursa. This condition, which explains the frequency of stiff and painful shoulders, is very apt to be mistaken for arthritis or fibrous ankylosis of the shoulder-joint, or for brachial neuritis. Severe pain as regards abduction and rotation are the chief symptoms, and the pain may be so severe as to prevent restful sleep. The pain is often felt at the insertion of the deltoid, and I believe that many cases of so-called dislodgement of the biceps tendon from its groove are cases of subacromial bursitis. Küster³ in 1902 gave the first clear explanation of the mechanical importance of this bursa, which is the same as the so-called subdeltoid bursa. The other bursae which exist about the shoulder-joint are relatively unimportant, as inflammation in them is of but little mechanical importance.

Fibrositis of Joints.

Chronic fibrositis of the joints is most frequently met with in the knuckle-joints and finger-joints of those engaged in hard manual labour, especially when associated with damp surroundings. Pads upon the finger-joints constitute a chronic form of localized fibrositis, and have been thoroughly described by A. E. Garrod. They form excrescences which are almost confined to the dorsal aspects of the interphalangeal joints of the proximal row, and are only very rarely seen upon the terminal joints of the fingers. They are usually present upon the fingers of both hands, and vary in size from that of a split pea to that of the half of a hazel nut. Sometimes they are quite painless, but more often pain of various degrees of severity is complained of, especially when the fingers are flexed or if the lumps are knocked.

Patients suffering from these pads generally seek medical advice under the apprehension that they are the precursors or accompaniments of rheumatoid arthritis, or that they are due to chronic gout. There does not, however, appear to be any connexion between these pads and either rheumatoid arthritis or gout. There is, however, an intimate connexion between these pads and Dupuytren's contraction of the palmar fascia, and it is fairly common to see the two conditions together.

Fibrositis of the Subcutaneous Tissue.

A form of fibrositis to which Ralph Stockman⁴ has recently drawn attention is a chronic subcutaneous fibrosis, which when it occurs in people with a large amount of subcutaneous fat is identical with the disease known as "adiposis dolorosa" (Dercum's disease). It consists in an irregularly spread, patchy, chronic inflammation of the subcutaneous connective tissue which involves the small peripheral nerves, so that the affected parts are painful on pressure, and are also subject to aching or pain from exercise, weather changes, indigestion, etc. These pains are usually designated as "rheumatic," and the condition is, in fact, one of so-called "chronic rheumatism." In the subjects of subcutaneous fibrosis the fat tends to form in more or less lumpy masses round the hypertrophied fibrous tissue. It is an exaggeration of this condition which constitutes the disease known as "adiposis dolorosa." The abdomen, flanks, hips, thighs, shoulders, and upper arms are in general the parts most affected.

Chronic Villous Synovitis.

Although, according to the strict interpretation of the term, this is not a form of fibrositis, yet it may be conveniently referred to here, as its correct treatment is similar to that of other chronic rheumatic conditions. It is a purely local condition and not a manifestation of a general disease, and is frequently described as "arthritis sicca." It usually occurs in the knee and is characterized by crepitus or creaking on movement and by pain and tenderness on use. The crepitus during movement of the joint is frequently unpleasantly audible to the patient, and is especially caused by going up or down stairs. The capsule and the ligaments of the joint are more or less relaxed and the synovial membrane is passively congested and loose. The crepitation on movement is due to the folds of the flabby congested membrane rubbing together; in other words, it is a true creaking and not a bony grating. If further relaxation of the synovial membrane results, hernial-like projections of the synovial fringe may be produced which are apt to cause a catching or locking of the joint when it is moved. In this class of cases the fluid in the joint is generally quite normal, although, if there be great irritation, some excess of it may form. The condition is very frequently mistaken for rheumatoid arthritis, but there is no erosion of cartilage and no eburnation of the ends of the bones, consequently bony grating can never be produced in such joints.

A valuable aid to the recognition of this condition, and to its differentiation from rheumatoid arthritis, is the careful auscultation of the joint, to which A. E. Garrod⁵ has drawn useful attention. I have for many years practised this method of auscultation, and am thoroughly convinced of its great utility as an aid to diagnosis. The knee-joint should be slowly flexed and extended during the examination, and in this way the peculiar crackle or crepitus that is produced by the thickened and flabby synovial membrane is easily distinguished from the scrunch or grating sound that occurs in cases of rheumatoid arthritis, and which is due to abrasion or erosion of the cartilages.

GENERAL TREATMENT.

A saline aperient should always be given at the onset of an attack of acute fibrositis, and repeated as necessary. If the attack is a severe one, confinement to bed may be necessary, and it is important to recognize the beneficial influence of rest in such cases. For severe attacks of lumbago and intercostal rheumatism firm strapping with the brown-holland strapping plaster secures the necessary local rest of the affected muscles. In all cases of brachial fibrositis the arm should be carried in a sling and should be moved as little as possible during dressing and undressing.

Drugs.

In the treatment of the different forms of fibrositis salicylates are of little curative value, as they do not exercise the same specific action as in acute rheumatism. Aspirin is of decided use for the relief of pain in severe cases, but it should only be given with that object. It acts better than sodium salicylate, owing to the fact that the introduction of the acetyl radicle increases the analgesic action of the salicylic acid. It probably also exercises a beneficial effect in cases of abnormal intestinal fermentation. Perhaps the best method of administering this drug for the relief of pain consists in giving 10 grains of aspirin with 6 grains of pyramidon in a cachet every four hours. Potassium iodide is, in my experience, the most valuable drug in the treatment of fibrositis. It seems to exercise a direct effect in removing the hyperplasia and serous exudation in the fibrous tissues. It should always, if possible, be given in full doses of 10 or 12 grains, and should be combined with tonics, such as nuxvomica or the compound glycerophosphate syrup. If the iodide produces severe symptoms of iodism, one of the organic iodine compounds may be tried. Of these I have found iodipin, in the form of tablets, extremely useful.

Fibrolysin.

This is a chemical combination of thiosinamin and sodium salicylate, for which the claim has been put forward that it has a softening effect upon all forms of pathological fibrous tissue. In a former paper⁶ I reported on the use of it in a somewhat limited number of cases of fibrositis, and I then gave a somewhat guarded favourable opinion as to its being of use in properly selected cases. I now propose to lay before you the results of an extended experience of the use of this drug, an experience which, I may at once state, does not support the somewhat favourable opinion that I formerly expressed. I have obtained the results of its use in 83 cases of various forms of fibrositis, some of which I treated throughout, but in the majority of which I am indebted to careful reports furnished me by the various medical men who, on my advice, carried out the treatment. They were all carefully selected as cases likely to be favourably influenced by the use of fibrolysin. In 18 out of the 83 cases the use of the drug had to be discontinued, owing to the injections causing rise of temperature, malaise, nausea, headache, and, in some cases, palpitation, vertigo, tendency to syncope, severe general pains, and a purpuric rash. This leaves 65 cases in which a full course of forty injections of fibrolysin, together with massage of the affected parts, was employed. No good whatever resulted in 46 of the cases; in 11 of the cases there was some improvement, which was permanent in 10 of the cases and transient in 1; in 8 of the cases there was permanent cure. So that the numbers converted into percentages are:

No benefit	...	...	...	71 per cent.
Some improvement	...	...	...	17 "
Cured	...	...	...	12 "

In every one of the cases of rheumatoid arthritis and other forms of infective arthritis in which, after complete arrest of the arthritis, a full course of fibrolysin was used in the endeavour to reduce or remove the fibrous thickenings around the joints no improvement whatever resulted. Similarly in all the cases of Dupuytren's contraction of the palmar fascia that were treated no benefit resulted. The 8 cases that were cured comprised 4 of diffused or localized fibrositis with nodules, 3 of fibrous thickenings and adhesions around a single shoulder-joint, and 1 of severe thrombosis of both femoral and external iliac veins with thickening of the walls of the veins. In this last case complete absorption of the thrombi and of the thickenings of the venous walls resulted, but massage was not resorted to until after complete disappearance of the thrombi.

From these results it appears to me that fibrolysin has a very limited use, and I cannot avoid the inference that the claims that have been put forward for this preparation must be considered extravagant.

LOCAL TREATMENT.

For the complete dispersal of the indurations in most cases of fibrositis, and certainly in the severer cases, local treatment must be adopted. This may best be considered

under the following headings: External Applications, Heat and Electrical Treatment, Massage and Exercises, Surgical Treatment.

External Applications.

In the early stages of an acute fibrositis hot fomentations are useful. Afterwards one of the best external applications in my experience is a mixture of equal parts of chloral hydrate, camphor, and menthol. These three substances form a liquid when well rubbed together. This liquid should be painted over the painful area, and then be gently rubbed in with the fingers. Some patients find the cold sensation produced by the menthol objectionable; in such cases the menthol may be omitted and equal parts of chloral hydrate and camphor employed, which also form a liquid when rubbed together. Another useful external application is to paint the painful area with tincture of iodine, and then to apply a hot linseed poultice or a very hot fomentation. The heat converts the iodine into vapour, which exercises an anodyne effect, and, probably by absorption, directly acts on the affected fibrous tissues. In the later stages the aconite, belladonna, and chloroform liniment applied on lint is frequently most beneficial. In cases of a very localized fibrositis counter-irritation is sometimes of great use, especially in the form of the thermo-cautery.

Heat and Electrical Treatment.

In localized forms of fibrositis, and especially where fibrous deposits occur—such as in lumbago, thickening of the ligamentous and fibrous structures surrounding or entering into the composition of joints, deposits in muscles, tendons, and tendon sheaths, and in chronic villous synovitis of the knees—the most effective form of local treatment that I am acquainted with is the employment of heat followed by ionization of the affected part. This treatment has a very remarkable effect in causing the absorption of thickened fibrous tissues. Heat increases the supply of arterial blood, and so causes a state of active congestion, stimulates leucocytosis and metabolism, lowers blood pressure, causes diaphoresis, relieves pain, and enhances the effect of the ionization that is to follow. If heat is to be applied to the entire body, the electric light cabinet bath is the most convenient form, but in the treatment of localized forms of fibrositis it is preferable to concentrate the heat on the affected part only, and I am confident that far better results are obtained from the employment of dry radiant heat than from the employment of heat alone. C. F. Bailey⁷ considers that the ideal type of radiant heat should be as nearly as possible like sunlight, and should give a spectrum ranging from the ultra-red to the ultra-violet. This type of spectrum can apparently only be obtained from lamps of a very high candle power, such as the so-called leucodescent radiant heat apparatus, which consists of a single 500-candle power lamp in a funnel-shaped projector lined with a reflecting surface. The method of applying the heat is to sway the lamp slowly backwards and forwards over the affected part for about twenty minutes. It must be applied directly to the skin, and anything like a severe burning sensation should be obviated either by the temporary removal of the lamp or by brushing with the hand that part of the surface which is being treated. When the lamp is switched off, the part feels burning hot to the touch and the surface is red and mottled from vascular dilatation. If such radiant heat alone is used, it very definitely relieves pain, softens fibrous indurations, and causes improvement in joints and their surroundings as regards improved flexibility and reduction in size. These results are, however, considerably enhanced by subsequent ionization.

The exposure to heat should be immediately followed by ionization with iodine ions, which, in my experience, are more effective than other ions on account of their solvent action on fibrous thickenings and deposits. The iodine is introduced into the affected tissues from a 2 per cent. solution of lithium iodide to which sufficient liniment of iodine has been added to give the fluid a sherry colour and so ensure the presence of an excess of iodine. Pads of lint six-fold thick are soaked in the hot solution and applied to the part to be treated. A copper chain-

mail electrode is then spread over the pad and bandaged on, leaving the connexion exposed, which is then attached to the negative pole. The positive pole is similarly connected to another pad soaked in a weak solution of common salt or of lithium carbonate. Another method, though not so efficacious, in my opinion, as the employment of lithium iodide, is to paint the skin of the affected part with iodine liniment and apply a pad soaked in a weak solution of lithium carbonate with the electrode connected with the negative pole, the positive being applied as before. The strength of the current that should be employed varies with individual patients, but should range from 15 to 40 milliampères. The ionization lasts for twenty minutes, and should be repeated daily if the skin will stand the treatment, otherwise it should be used on alternate days. Many cases improve very rapidly from the first, but in severe cases a course of daily applications for four weeks is required. While this ionization treatment is being carried out it is very important that the administration of potassium iodide by the mouth should be continued. As C. F. Bailey has pointed out, any iodine compounds lying in or circulating through the affected tissues are broken up by the current and locked up in the tissues temporarily, instead of being carried through the blood vessels and excreted. In addition nascent iodine ions are much more energetic than when they combine into soluble non-ionized salts; also the general migration of all kinds of ions, which takes place along the course of the current, may produce an effect of commotion in and stimulation of the tissues which is beneficial.

In cases of acute fibrositis, especially in acute lumbago and painful affections of the knees, shoulders, and elbows, it is advisable at the first two or three sittings to employ a 2 per cent. solution of sodium salicylate in place of the lithium iodide, in order to produce immediate relief of the severe pain. The salicyl ion is introduced into the painful region, and it is remarkable how rapidly it will relieve the pain, just as salicyl ionization rapidly relieves the pain of severe neuralgia and some forms of neuritis.

In cases of chronic villous synovitis of the knees this combined heat and ionization treatment is most effective, and in all cases gives the most satisfactory results.

Doubt has sometimes been expressed as to whether actual penetration of ions into the affected tissues occurs during ionization, but the experiments of N. S. Finzi⁸ conclusively prove that certain ions penetrate into the tissues of joints and the subcutaneous tissues. In addition it has been shown that strychnine applied at the positive pole, or potassium cyanide at the negative, rapidly kill an animal under experiment with all the characteristic symptoms of the respective toxic substances. Moreover, it is quite easy to demonstrate the presence of iodine or lithium in the urine after respective ionization with those substances.

Some observers have stated that the chlorine ion is quite as efficacious as the iodine ion, and is less caustic, but my experience is that the iodine ion is more effective, and I have never met with any bad effects from its causticity.

It is a matter of common experience that the improvement started by a short course of heat and ionization treatment will continue to progress for some days after the treatment is left off. This is probably explained by the ions forming with the colloids of the animal tissues a sort of condenser, which is discharged by degrees. The ions therefore remain for a certain length of time at the place of their introduction, so that this region remains for several days as a kind of local medicated bath the therapeutic power of which is considerable. It may therefore be claimed that ionic medication is founded on a truly scientific basis, in that the ions exert a direct therapeutic effect, that they are for a time localized in the affected tissues, and that they are afterwards slowly and gradually liberated.

In cases of lumbago the static wave current may be substituted for ionization. F. H. Humphris⁹ records excellent results with this form of treatment. It produces a local vibratory effect, and muscular contraction takes place, so that the wave current tends to remove the infiltration by squeezing out the serous exudation from the affected tissues, and thereby relieving the pain. From my experience of a number of cases that I have had successfully treated, I can thoroughly recommend the

employment of local heat followed by the use of the static wave current.

Massage and Exercises.

Massage is very useful in the later stages, but it should only be employed when it causes no pain. The manipulations should be very gentle at first, so as to promote removal of exudation and to relieve the tension. Afterwards more vigorous massage is most efficacious in dispersing the indurations and fibrous thickenings, and in removing the stiffness of the affected parts. General massage should not be employed, but the tender and affected areas should be carefully marked out for treatment. Massage should not be used to affected joints, but only around them, so as to improve the circulation in their neighbourhood. I have frequently seen the most disastrous results to joints from their over-zealous manipulation by masseurs and masseuses, as such treatment only increases the inflammation and bruises the synovial fringes. The same remarks apply with equal force to acute affections of the bursae and tendon sheaths, and to fibrositis of nerve sheaths until the acute affection has entirely subsided.

During the very painful stage of muscular rheumatism as complete rest as possible of the affected muscles must be enforced, but later on exercises of the muscles are of great benefit. Either light dumb-bells or Indian clubs, of from 1 lb. to 2 lb. in weight, should be employed, and such movements are to be performed as will bring the affected muscles into action. The exercises should be performed on rising in the morning, and should not occupy more than from ten to fifteen minutes. After the exercises a cold or tepid bath should be taken, and the skin be briskly rubbed with a rough towel.

In cases of chronic subcutaneous fibrosis in very fat people (adiposis dolorosa) massage is quite ineffective, and often unbearably painful. In such cases it is essential, first of all, to get rid of the superabundant fat by means of a strict diet, and by the administration of thyroid gland.

Surgical Treatment.

In a few cases, generally of long standing, where the fibrous nodules do not yield to the measures above mentioned, and where by implication of, or pressure upon, nerves they cause persistent pain, excision may be necessary.

Adhesions in the subacromial bursa have sometimes been treated by breaking them down under an anaesthetic, but the procedure is a dangerous one, as the normal joint structures are more easily torn than the dense adhesions in the bursa, and the brachial plexus and axillary vein are liable to be damaged. Another objection is that when the adhesions alone are ruptured there is a tendency for them to re-form.

Spa Treatment.

This is most useful in protracted cases of fibrositis, especially when the waters are strongly radio-active. Undoubtedly the radio-active emanations of such waters are powerful adjuncts in the dispersion of the thickenings and deposits.

Diet.

Unlike gout, no special dieting is required in these affections. Moderation should be the keynote of all prone to the various forms of fibrositis, and especially should they avoid foods which their experience has taught them to be apt to produce gastro-intestinal fermentation. It has become of late years a fashionable craze to attribute many of these forms of "chronic rheumatism" to uric acid, but I am firmly convinced that that harmless by-product of the human economy plays no part whatever in the development of the various forms of chronic rheumatism or fibrositis.

Underclothing.

With regard to the underclothing that should be worn by rheumatic individuals, I must confess that I am a convert to the view that porous linen underwear is the most suitable. It allows of the free evaporation of perspiration, and so prevents a more or less sodden garment from remaining in contact with the skin, which so frequently happens with those who wear woollen underclothing. I am convinced that in the latter case such sodden garments are a frequent cause of many of the

forms of fibrositis. Some individuals find that in winter linen underwear is too cold, and in such cases a thin silk vest may be worn over the linen. This will be found to constitute a thoroughly warm, comfortable, and safe form of underwear.

Residence.

The most suitable soil is gravel, sandstone, or rock, at a fair elevation, and with good subsoil drainage. Houses should be built on a bed of concrete, so as to prevent entirely the entrance of ground air. Residence on a clay soil should be avoided if possible, but in my experience the worst soil of all is a shallow gravel soil in a cup or depression of clay, which allows the subsoil water to accumulate and frequently to reach close to the surface. Many of the gravel sites lauded by house agents are veritable traps for the development of fibrositis.

REFERENCES.

- ¹ Ware, *Amer. Journ. Med. Sci.*, July, 1901. ² Schmidt, *Med. Klinik*, 1910, vi, pp. 731-735. ³ Küster, *Archiv f. klin. Chir.*, vol. lxxvii, p. 1013, 1902. ⁴ Stockman, *BRITISH MEDICAL JOURNAL*, 1911, vol. i, pp. 352-355. ⁵ Garrod, *Proc. Roy. Soc. Med.*, January 24th, 1911. ⁶ Luff, *Lancet*, March 12th, 1910. ⁷ Bailey, *BRITISH MEDICAL JOURNAL*, 1910, pp. 518, 519. ⁸ Finzi, *Lancet*, March 13th, 1909, pp. 756-758. ⁹ Humphris, *Proc. Roy. Soc. Med.*, March, 1910.

A STUDY OF THE TYPES OF ORGANISM IN A SERIES OF BONE AND JOINT TUBERCULOSIS OF CHILDREN.

By JOHN FRASER, M.D., CH.M., F.R.C.S.E.,

ASSISTANT SURGEON, SICK CHILDREN'S HOSPITAL, EDINBURGH.

(From the Royal College of Physicians' Laboratory, Edinburgh.)

THE British Royal Commission justified its existence when it showed, beyond all manner of doubt, that human tuberculosis was in a certain proportion of cases due to infection with the bovine bacillus. It has remained for individual observers to investigate local groups of tuberculosis, and to expose the relative types of bacilli present.

I wish to record some investigations of a study of 70 cases of bone and joint tubercle.

Technique.

The preliminary necessity was to obtain in pure culture the actual organism which produced the lesion of an individual case; as it is exceedingly difficult, and in the majority of cases impossible, to cultivate the tubercle bacillus directly from an active lesion, guinea-pigs were used as intermediaries. The diseased tissue, obtained in each case by operation, was inoculated into the animal subcutaneously or in bulk. For a period of six weeks the animal was permitted to live; at the end of that time the disease was extensive in the glands and the internal organs, and from them the organism was easily cultivated.

There are various suitable media, and of such Dorset's³ egg medium is undoubtedly the best; it is a preparation of egg-yolk and water, sloped, and inspissated in tubes. Upon the surface of the medium portions of the diseased organs are rubbed, and it is of advantage sometimes to actually wound the surface of the medium. The inoculated tubes, sealed with paraffin to prevent evaporation and infection, are incubated. In fourteen days a growth is apparent.

With the growth of the organism the first step is completed. The second stage consists in identifying the organism, and this identification is at once proceeded with. There can be no doubt that it is possible to distinguish absolutely between the human and bovine types of the bacilli. Cultural and morphological tests are uncertain in their interpretation.

A bacillus which grows rapidly and profusely upon egg medium is in all probability human, yet there exists a margin of doubt, which deprives the test of any absolute value, and the same applies to morphological distinctions. A short, squat bacillus staining uniformly suggests a bovine origin, but occasionally human bacilli possess identical characters.

1. There are three tests which give trustworthy evidence of the type of bacilli. In 1905 Theobald Smith⁹ formulated a test, which depended upon the changes produced in glycerine bouillon by the growth of the tubercle bacillus. The glycerine bouillon is rendered faintly acid, and the