Thus it would appear that the beta oxybutyric acid and the aceto-acetic acid produced in the course of the disease are intermediate products leading ultimately to acetone, providing the conditions are favourable. This conclusion is supported by the observations on the fermentation, where it is noted that the end of the reaction is determined by the fall in the acidity of the mash.

The fact that the alcohols produced in the fermentation are not detected in the excreta of diabetic patients can be explained to some extent by their absorption and possible oxidation in the liver to products which would not be easily detected. Stepp⁷ claims that he has detected aldehydes (or substances which react in every way like aldehydes) in the blood of diabetic patients. Aldehydes would be the first products of the oxidation of normal alcohols, and complete oxidation would lead to CO₂ and water. In endeavouring to obtain good yields of acetone the inhibitory effects of certain bacteria came to be recognized. Thus Thaysen states that the organism which causes most damage to a fermentation is the *B. volutans*. Others have described the *B. acidi lactici*, and we have found the presence of a diplococcus and of a large thick bacillus, of unknown identity as yet, to be responsible for much inhibition. It appears probable that these facts, combined with a diet so composed as to allow digestion and absorption by the patient of foods which the bacteria cannot assimilate, will prove an important part of treatment, combined with the administration of certain antiseptics. In this respect the authors⁸ would call attention to their work on the subject of antiseptic action amongst the coal-tar dyestuffs, which gives useful data as to the relative value of dyes as antiseptics in regard to different organisms.

SUMMARY.

1. From the stools of diabetics a new organism (*B. amyloclasticus intestinalis*) has been isolated which splits up starchy foods, forming oxybutyric acid, diacetic acid, butyl alcohol, and acetone. Sugar is also formed during this fermentation.

2. Acetone has been found in quantities capable of estimation in the stools of diabetics.

3. In diabetes carbohydrate fermentation occurs in the alimentary canal, forming abnormal products which probably so affect the glycogenic function of the liver as to lead to improper storage therein of the glucose from the alimentary canal during digestion.

4. Definite lines of treatment include elimination or suppression of this organism.

We wish to express our indebtedness for access to diabetic cases to Dr. J. Gray Clegg, Dr. Wm. Stirling, and Dr. Langley; and to Mr. A. Gill, B.Sc., for his technical assistance with the various processes herein detailed.

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FRAGILITAS OSSIIUM ASSOCIATED WITH BLUE SCLEROTICS IN FOUR GENERATIONS.

BY

J. BROWNING ALEXANDER, M.D., M.R.C.P.LOND.,
PHYSICIAN WITH CHARGE OF OUT-PATIENTS, PRINCE OF WALES'S
GENERAL HOSPITAL, AND CITY OF LONDON HOSPITAL
FOR DISEASES OF THE CHEST.

INSTANCES of fragilitas ossium associated with blue sclerotics have from time to time appeared in medical literature, and as recently as December 24th, 1921, Blegvad and Haxthausen of Copenhagen reported in the BRITISH MEDICAL JOURNAL cases showing, not only blue sclerotics and brittle bones, but also associated with macular atrophy of the skin and zonular cataract. Such cases are, however, sufficiently rare to warrant putting on record the following history:

The patient, F. F., aged 7½ years, presented himself at my out-patient department about a year ago. The history was that he suffered from repeated fractures—the most recent having been one of the lower end of the right tibia. Some deformity was present in the right leg and the right thigh, and it was ascertained that both the tibia and the femur had been previously fractured—the latter having occurred at birth. In addition a history was obtained of past fractures of the left humerus and the tibia and fibula of the left leg. These had healed with apparent perfect union and minimal

amount of callus. The most striking feature which one observed when the boy entered the consulting room was the marked blueness of both sclerotics. The child was somewhat pale and debilitated, the forehead more prominent than normal, but no evidence of rickets was apparent. In other respects the mother stated that the boy had always been healthy. The mother, to whom the boy bore a strong resemblance, showed very deep blue sclerotics. She had, however, no fractures. Her hearing was defective, and she informed me that she had suffered from deafness for many years. The patient's two sisters, whom I saw later, also presented blue sclerotics, with, however, no history of fractures. On inquiring further into the history of the family I found that the aunt of the patient (the patient's mother's sister) had sustained altogether seven fractures during her life and had, as in the other members of the family, deep blue sclerotics. The grandmother and great-grandmother had both been the subjects of fragile bones and blue sclerotics. No further history of these phenomena was forthcoming in previous generations to the ones already mentioned; it is quite possible, however, that a careful study of this family's genealogy would have revealed the same condition in former generations.

This remarkable association of brittle bones and blue sclerotics was first described by Eddowes in 1900, who suggested that "the transparency of the sclerotics indicated a want of quantity or quality of fibrous tissue forming the framework of the various organs of the body, and probably explained the want of spring or toughness in the bones of these individuals." The importance of heredity in these cases was most clearly indicated by Stephenson and Harman in 1910, who published accounts of the same family of blue sclerotics—altogether 55 individuals in five generations, 31 of whom showed typical sclerotics. No mention was then made of fragile bones; but in 1915 Stephenson showed at the London Ophthalmological Society a mother and two daughters with fractures, belonging to this family. Rolleston, in 1911, reported 4 cases of blue sclerotics in three generations, with fragile bones occurring only in the third generation. Peters, in 1908, published the account of blue sclerotics in a family during three generations, and five years later further reported the occurrence of fractures in these cases. The interesting case reported by Ostheimer in the *Journal of the American Medical Association* of December, 1914, had blue sclerotics and nine fractures between the ages of 1½ and 4 years. In this case there was no history of the condition occurring in other members of the family. The literature of the subject is further enhanced by the publication of similar cases by Burrows, in 1911 (a family of 29 individuals—13 with blue sclerotics, and 9 of the 13 with brittle bones); Poynton, in 1913 (1 case); Hoffmann, in 1915 (3 cases); E. Bronson, in 1917 (description of two families); and Olaf Blegvad and Holger Haxthausen, *BRITISH MEDICAL JOURNAL*, December 24th, 1921.

There seems to be little doubt that the blueness of the sclerotics is due to the increased transmission of the colour of the choroidal pigment and not to any inherent colouring of the sclerotics themselves. Some think, however, that there is an actual thinning of the sclerotics. Fridenberg has suggested that the blue sclerotics are due to a transparency depending upon the absence of lime salts in the connective tissue of the sclera. The long-standing deafness in the case of the mother described is worthy of notice, and might possibly be explained, as Bronson suggested, by a deposition of calcium salts in the middle ear, relating to the abnormal osteogenetic process.

THE RECOGNITION AND TREATMENT OF MINOR DEGREES OF FIBROSITIS.

BY

THOMAS MARLIN, M.D., D.P.H., D.M.R.E.,
ASSISTANT ELECTRO- AND PHYSIO-THERAPEUTIST TO THE MIDDLESEX
HOSPITAL.

KNOWING the danger of missing an internal lesion which may be associated with superficial pain we naturally in such cases look for some objective sign. Failure to realize that the cause of many pains can be definitely detected in the soft tissues may explain why their examination is neglected. A patient who complains of pain in the region of the right scapula may be taken as an example. There may be some tenderness on pressure over a particular area, but otherwise nothing definite is noted; there is no swelling, no grating in the joints, and the lungs and heart are normal. The teeth may be surveyed and search made for some source of infection or irritation, without finding anything to confirm the patient's statement. If, however, we now devote a little

more time to the soft tissues where the pain appears to be, comparing if necessary with the other side, we may note some resistance in a part of the muscle, and the patient will tell us we are exactly on the offending spot; on continuing the examination we may presently discover that the resistance is due to a definite fibrous thickening. Further useful information may be obtained by working from the patient's point of view. When we palpate the tissues and try to define the indurations, we are carrying out the ideal massage for this condition, and the sufferer will know at once that to continue those manipulations would do good. In this we have the key to the treatment—namely, massage, which is not merely superficial rubbing, but is really a repetition of the manipulations carried out during our examination. Changes can actually be felt to take place in the fibrous tissue under the influence of massage.

The foregoing is typical of the easily recognized condition of fibrositis as seen in muscular rheumatism; more obscure cases may be due to minor degrees of fibrositis which may be difficult to diagnose. Time and patience are necessary, but frank co-operation with the patient will tell us if we are on the right track. The following case is instructive:

A lady, aged 34, had had a fall on the coccyx fifteen years previously, and had since suffered pain round the coccyx and right side of sacrum. The pain was of a vague character, fairly limited in distribution, and, though not always acute, generally gave rise to some feeling of discomfort. Latterly she had become very irritable and a worry to her relatives. The pelvic organs were declared healthy, and a small anal fissure had been operated on, but as no benefit resulted from this further consultations were held. Apparently the advisability of the removal of the coccyx was discussed, though it was pointed out that there might be a large mental element present, as the patient was considered highly neurotic. Had it been possible to guarantee cure, the patient would gladly have undergone the operation, but at this stage she consulted me. The painful area was gently palpated for evidence of fibrositis, yet, even before I had time to make up my mind, the patient exclaimed, "Do you know, I have been waiting for years for someone just to do that to me." This remark was very significant. She had done all she could to obtain relief, had offered herself for examination and treatment by different medical men, and on every occasion had tried to direct attention to the actual seat of pain. Casual examination had shown nothing to account for it, and the search had been carried farther afield without success.

As the examination proceeded the tissues soon relaxed sufficiently to allow certain definite painful fibrous strands to be felt. My mind was now fully made up that here was a case of fibrositis with every reasonable prospect of clearing up. The treatment, which consisted of massage and diathermy, was attended by improvement, and after thirteen visits the patient was quite free from pain. There has been no return of any discomfort since she was last seen over twelve months ago.

It will be observed that we may easily be misled unless we keep before us the possibility of fibrositis. A person with pain in the left side of the chest may have a systolic murmur at the apex, yet the origin of his complaint be entirely in the intercostal muscles. Similarly, people may have pain in the loins arising from the muscles in the back and quite unconnected with the kidneys, even though the urine might show a trace of albumin. In the case just quoted the anal fissure was not to blame, yet had some pelvic disorder been present our minds would have turned to that as the causative agent.

In certain other conditions the cause may be found in a region unsuspected by the patient. Headache is often due to indurations in the upper fibres of the trapezius, and relief quickly follows appropriate treatment of these areas. In several cases of flatulent dyspepsia the condition has been speedily cured by treatment directed to fibrous nodules or strands in the erector spinae muscles.

In one instance a lady who for several months had had headache and sickness, with actual vomiting after dinner, was seen one afternoon during an attack of headache; this disappeared after about ten minutes' massage to the back of the neck, and there was no sickness that evening—the first time for months. Further examination revealed indurations in the erector spinae muscles. These disappeared after massage, and she has now been quite well for over nine months.

The simple headaches may be due to spasm or cramp of the scalp muscles induced by the pathological condition in the trapezii, and the relief can thus be explained; but I hesitate to advance any definite theory as to the disappearance of the dyspepsia. We know, however, that if one muscle or set of muscles is painful on contraction the antagonistic muscles, which do not merely relax but rather pay out, will be awkward in their movement, being more or less on tension all the time to avoid or limit jarring of the painful muscles. If, then, there is trouble in the erector spinae muscles the

abdominal muscles will be correspondingly affected, and thus may react on the normal digestion processes.

The possibility of eye-strain and other sources of irritation or infection must of course be borne in mind, and as superficial pain may be due to, or an accompaniment of, deep-seated lesions, masseurs must have some guide to help them. This they may obtain from the patient. A patient with reflex spasm in the abdominal muscles set up by an inflamed appendix or an enlarged spleen draws away from the examining hand. On the contrary, the person with fibrositis feels at once that the manipulations are going to the seat of his trouble, and asks for prolongation of the treatment as it is so comforting. This guide eliminates the chance of doing damage in obscure cases, and has also enabled me at different times to attack confidently various pains associated with definite organic disease, but which nevertheless appeared to be due in part to local conditions. To quote two examples:

A man consulted me with regard to pains shooting from the back beneath the ribs, round towards the front of the body. I came to the conclusion that he had hereditary syphilis, and refused to treat him until he had submitted to examination and treatment by someone else. When he had started on a course of salvarsan I treated his back, with much benefit.

The other case, a lady, aged 22, who had definite evidence of intracranial pressure, asked me to treat her for violent headaches. I specifically warned the mother that at the most we were only dealing with a symptom, and no matter how much improvement might ensue, she must be prepared to go on with the operative measures which had been arranged to take place later. Massage to the trapezii, which were tight and contracted, gave such pronounced relief that, in spite of my previous warning, the mother began to doubt the diagnosis already made, and only with difficulty was she persuaded that trephining was still necessary.

A CASE OF OSTEITIS DEFORMANS (PAGET'S DISEASE).

BY

J. LINDSAY, M.D., M.R.C.P.,

PHYSICIAN TO THE ROYAL MINERAL WATER HOSPITAL, BATH;
AND

R. G. GORDON, M.D., M.R.C.P.ED.,

PHYSICIAN TO THE ROYAL MINERAL WATER HOSPITAL, BATH.

Cases of Paget's disease are of sufficient rarity to make it desirable to put on record such a striking case as the present one.

W., aged 54, was always well in childhood, and at the age of 22 joined the army. He served for nineteen years, fourteen of which were spent in South Africa, Egypt, India, and Burma. He only went sick six times during his service; he had malaria three times, twice in India and once in Burma, with one month's sick leave each time. He had dengue fever in Madras and influenza twice. At the outbreak of war he volunteered for service and was sent to Canada on special work. He spent five years in the service and never missed a day's duty for sickness. He has suffered from piles and a certain amount of constipation ever since he was 30 years of age.

Family History.—His mother died of Bright's disease at an advanced age. His father died at the age of 88 after suffering considerably from arthritis in both hips. Two paternal uncles also suffered very much from the same trouble.

History of Present Illness.—The first time he ever noticed any trouble with his locomotor system was after a bad attack of sciatica in Burma fifteen years ago. He was coming down the river a distance of 1,000 miles, returning to Rangoon, and the sciatica came on five days after leaving his station. He attributes the onset to getting thoroughly wet while snipe shooting. He was never quite the same since this attack, but there was no serious trouble until 1915, and even then the stiffness did not trouble him to any great extent. In January, 1915, he was in Halifax and got worse every year, having very bad colds. Six months after the armistice he applied for a medical board and was sent to Harrogate. In the winter he had chronic nasal catarrh, which left him deaf. In 1918 he began to notice enlargement of his bones, more particularly of his head, as he constantly required new hats, and finally had to have these made for him as nothing was kept in stock which would fit him. He had for the last four or five years suffered from a good deal of pain and stiffness in the left hip, which had been relieved temporarily by ionization, otherwise he had suffered no pain. There was no history of trauma at any time that he could remember.

The patient appeared in very fair general health, but the enlargement of the head gave him a peculiar aspect. He walked slowly and stiffly, owing to limitation of movement in the left hip, and required the help of a stick, but at his own pace could cover up to half a mile without undue fatigue. The following bones were found to be affected by the osteitis: The whole of the cranium was markedly enlarged, with considerable outgrowth of the frontal bones. The facial bones were practically unaffected. The cervical vertebrae were not noticeably enlarged, but there was a good deal of osteitis in the lower dorsal region. The ribs were not affected. The lumbar vertebrae were not involved to the extent of the dorsal.