dura mater. The skull was then photographed by my friend Mr. Marriott (Fig. 1), after which the right side of the calvarium was removed. On cutting open the dura mater, the outer end of the first rod was seen, exactly in the fissure of Rolando (Fig. 11, 2), that of the second rod in the superior temporo-sphenoidal convolution (Fig. 11, 3), as seen in a second photograph. A vertical section of the hemisphere exposing the whole length of the first match was now made, and then a horizontal, exposing the track of the second. When the posterior half of the hemisphere was now lifted off, the points of the two rods of wood were seen to be almost in contact in the space overlying the island of Reil, and touching the latter (Fig. 1V, 2 and 3). The first had passed between the ascending frontal and ascending parietal convolutions (2), the second through the superior temporal convolution (3). Had the collection of fluid been a temporo-sphenoidal abscess, it is quite obvious that it would not have been reached by the first puncture, which evacuated fluid $\frac{1}{4}$ inch from the surface of the cortex, at the junction of the middle and lower third of the fissure of Rolando. Nor would it probably, unless very large and high, have been reached by the second puncture, which met the first and travelled quite above the body of the lobe. It must be remembered, further, that one ounce of fluid among the convolutions over the island of Reil would press the former asunder more or less, and would produce a larger space than that represented in the drawing, so that without actually touching each other, the two needles might easily empty it. I am careful to clear up this point, less as a mere operative question (because of course one would evacuate the pus wherever the needle reached it), but rather as bearing upon the wider question of treatment of septic meningitis by operation, which for some time past I have looked forward to as possible. It would of course be unwise to dogmatise as to the exact limits occupied by the pus in this case, and as to whether it was produced primarily by a leptomeningitis or encephalitis, or, possibly, by the giving way of an abscess. The patient is now alive, and we cannot settle the matter by dissecting his brain; and although I have approached as nearly as possible to proving, by operation on the dead body, what actually was the locality involved, still I wish to put forward the above view only as the most reasonable hypothesis deducible from a careful and anxious clinical study of this and several allied cases for which I have had exceptional opportunities now for many years, and also from numerous pathological data accumulated in the *post-mortem* room.

All those who have given close attention to this whole subject will feel that, in the matter of operative treatment of non-traumatic intracranial suppurations, we are but on the threshold of a new region common to medicine and surgery, and most will be unable to divest themselves of a feeling of dismay at its complexity. It is comforting to us all, however, physicians and surgeons alike, to reflect that already this region has shown itself fruitful, and that one more group of fatal diseases has been brought within the reach of surgical operation.

Note.—I have thought it better to give reduced copies of Dalton's beautiful photographs of sections through an imbedded brain in Figs. III and IV, rather than drawings of my own dissections. Without a large material and special apparatus for embedding and section, it is difficult to make an accurate representation of the relation of parts of the brain, which soon sinks down when the skull is opened and it is cut. I have therefore transferred to Dalton's sections the lines of puncture observed in my own dissections; this leaves as little room for error as possible.

March 30th. The patient returned from the country on the 28th. He still complains of pain in the head, but looks well and eats, I am told, remarkably well. I shall continue to observe him, and report later if anything further of interest should be noted.

THE 105th annual report of the Hull Royal Infirmary shows the number of in-patients for the year to have been 1873, the number of out-patients 10,772—the largest number that has ever passed through the hospital in any one year. The average cost of each in-patient for treatment, nursing, and maintenance was £2 19s. 10d. The estimated cost of each out-patient was nearly 1s. 8½d. The alterations and improvements in the main building have been satisfactorily completed, and it was hoped the south-east block would shortly be available for patients. With a view of providing better accommodation for the nursing staff, it was decided to proceed at once with the conversion of the Watts Wards into a home, and by this means provide the nurses the comfort due to their position and the exhausting nature of their duties.

ON SOME HITHERTO UNDESCRIBED SYMPTOMS IN THE EARLY HISTORY OF OSTEO- ARTHRITIS.

(THE SO-CALLED RHEUMATOID ARTHRITIS).¹

By JOHN KENT SPENDER, M.D.LOND.,
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Few things are so apt to cause a feeling of drowsy despair at a medical meeting as the prospect of an academic discussion on the etiology of osteo-arthritis. The fields seem barren; the harvest is small, even after every scrap has been gleaned; one master says one thing, and another master says another; so that the self-styled practical man cries out in his confusion, How have all these speculations helped me? Two wants, he exclaims, I ask to have supplied; such sure notes of a disease that I may, if possible, know it at once when I see it, and trustworthy landmarks to its treatment at a time when treatment is available. The practical man has some ground for his dolorous plaint. It is certain that if scientific questionings about the nature of a disease do not help us to do people good somewhere or somewhere, those questionings will soon lack interest and be forgotten. Three common—but wholly distinct maladies affect the same structures; the patient cannot distinguish his malady, and naturally requests his medical adviser to do so; but he is prone to lose himself in vague generalities, and probably falls back on that old-fashioned, ghostly thing called "suppressed gout." Now, is it not an enormous gain if we can at the earliest moment give a verifiable diagnosis—not merely a fancy or an opinion? When so much depends upon the issue, time is everything. Such is the plea for my paper to-night. It is my aim to strengthen those landmarks which tell of early danger, because they proclaim with unerring precision what the disease is. To be able to identify osteo-arthritis in its very cradle, and to sharpen the lines of boundary between it and all other things which resemble it, is surely worth a little time and trouble.

Bath has been called a museum of living osteo-arthritis; but this conveys no adequate idea of the wealth of our clinical material, which I believe to be without a parallel in its kind. In our Mineral Water Hospital, nearly half the cases belong to the osteo-arthritic group; and a crowd of so-called rheumatoid people flock to our spa from all parts of the country. Among our residential population there is no osteo-arthritis worth speaking of, nor are any of the influences present which would favour its development. But this procession of suffering pilgrims—what a challenge to our therapeutic skill! In the presence of an overwhelming quantity of the same sort of trouble, the tendency of the mind is towards apathy and almost weariness. A ceaseless iteration of the same phenomena dulls the faculties and dims the senses. We see, and yet we do not see; curiosity is dead, for there is nothing to be curious about; what happened yesterday happens again to-day, and (for aught we know) will happen again to-morrow. All interest perishes in the everlasting sameness. In this shroud of mental torpor no man ever discovers anything, because there is no enthusiasm and no inward light.

It has been said by a writer of distinction that there is nothing which may not be found if we start on an inquiry with the intention of finding it. It is sound advice to inquire without expecting, and without even the desire of finding; and it is plain truth when I say that some "hitherto undescribed symptoms" of early osteo-arthritis were so little expected that even when found, after a careful induction of nearly a thousand cases, the feeling of wholesome scepticism was long in clearing away. "Was it not a mere coincidence?" asked the casuist; and his logical appetite suggested that there were a hundred little pitfalls scattered here and there. So it required some hardihood of mind to think at last that certain signs, when present, connote osteo-arthritis in its earliest phase, and demonstrate beyond doubt that the disease cannot be anything else.

I. Dividing roughly all cases of osteo-arthritis into slow and quick forms—the first sometimes occupying decades of years in its chronic ruin, the other maiming and crippling in forced marches—we find that a great number of the latter class are characterised almost from the beginning by an increased velocity and tension of the heart's action. Quoting from cases the history of which was traced from an early date, the pulse may go up at once to between 80 and 90, and remain so for years. But we

seldom see at Bath these twilight beginnings of the disease; people come or are sent when it is developed, and we are startled by counting a steady pulse of much tension, varying from 90 to 110. Beyond this point are the rare cases to which I request special attention. The pulse quickens synchronously with the earliest objective signs of osteo-arthritis; it increases in frequency until 110, 115, or 120 are reached; any variations lie within quite a narrow range. There is no hæmic murmur, and no sign of the heart being in any way affected. In one instance, unique in my experience, a young lady was entrusted to my care (last July) whose pulse was uniformly above 140, and as incompressible as it was rapid. The body is absolutely non-pyrexial, and the icy purple coldness of the hands is often a striking fact. This is not the place to speculate on the cause of this remarkable symptom, nor have I time for doing so. Easy it is to discourse eruditely on the withdrawal of the inhibitory influence of the pneumogastric nerve; but I do not see how this lands us nearer any satisfactory theory of what osteo-arthritis is, or how its complex neural relations are thereby unfolded. And it is strange that the cardiac tumult often does not subside even in those many cases in which the osteo-arthritic phenomena become, so to speak, "tamed down."

2. The next point of mark is the disturbance in the chromatogenous function of the skin. This symptom has been of unflinching interest to me for the last three or four years, nor do I understand why it seems to have escaped the attention of so many keen observers. Concentrated in the form of patches more or less large, the pigmentation assumes many hues, and affects many parts of the body. Across the forehead it often runs as a light-bronze smear, always more pronounced over the temporal fossæ; thence it extends under the lower eyelids, deepening the pigmentation of an already pigmented area, and generally shading off into the natural colour on the cheeks and the sides of the face. Sometimes the predominating tint on the face is lemon or orange, and sometimes there are fawn-coloured patches on the cheeks. The yellow tinge is nearly always discernible on the backs of the hands, as yellow circles around the finger-joints, and especially around the matrix of the finger-nail. In people of dark complexion the discolourment of the face and neck may be so swarthy as to call up recollections of suprarenal melasma; and the white luminosity of the eyes stands out in brilliant contrast. But I desire to lay special stress on the occasional deep pigmentation of far advanced osteo-arthritis, representing what has been termed multiple xanthoma. In this extreme form large, dirty-brown blotches appear between the knee and the ankle, connected by longitudinal streaks, which are intensified in colour by paroxysmal pain. Trophic changes in the texture of the skin occur on the soles of the feet and the palms of the hands, which become rough and horny, and bright with the hue of marigolds. Finally, the nails of fingers and toes separate from their respective phalanges, and are torn and twisted from the matrix by an accumulation of dry chalky material. In this condition of things a patient dies sooner or later from some intercurrent malady, probably an extension of the already grave neurosis. I have now drawn the outlines of an actual patient, entrusted to me in 1884 by Dr. Morton, of Guildford, and who was my constant care until her death more than two years afterwards.²

That form of disseminated pigmentation which goes by the common name of "freckles" is a very frequent accompaniment of early osteo-arthritis. A multitude of little yellow specks may now and then be discerned on the foreheads of many light-haired women and not a few men, appearing at the commencement of what they call their "rheumatic gout;" bigger specks come faster and faster, until the whole face may be covered with spots of every size, which extend to the neck and ears, and are often of a blackish-yellow colour. Now look at the hands. Not only on the backs of the hands do the freckles cluster near the knuckles, but they extend far up the arms, along divers nerve-lines; and even to the elbows, if these joints chance to be involved. Patients are much puzzled by these freckles appearing on parts not exposed (as they say) to sun or artificial heat; and why do they come? is a question which I am often asked, but find it difficult to answer.

3. The next noteworthy symptom is the vasomotor disturbance, which causes local perspiration. Taking the hand of a hospital patient, a middle-aged woman, extremely rheumatoidal, I found it so wet that I said, "You have just put your hand into water." "No, sir;

my hands are nearly always like that." There are many degrees of this morbid sudoræa. It may be a mere dampness, scarcely more than that which exists in many chlorotic people whose circulation is feeble, and who always have chilblains during the winter; or the sweating may be only on the palms of the hands, the natural furrows being so many rivulets which drain the parts around. The sweating process is generally intermittent, and there is most moisture when and where there is most pain. A lady sent to me in the autumn of 1886 suffered thus: every morning, at about 2 o'clock, a severe neuralgic attack came on in both lower limbs, and, at the same time, there was such excessive perspiration that the whole bed felt wet, and a thick layer of flannel was put under the thighs and legs to absorb the fluid which streamed from them. Other upsetting of vasomotor properties is shown in erysipelatoid swelling of the hands; in transitory feelings of great heat, as if the hands were "parboiled," said one patient, or being "stung all over with nettles," said another; and a very common sensation in both hands and feet is that of being "scalded," as if the textures all through were submitted to a fiery ordeal.

4. There yet remains the large and subjective phenomenon of pain, which follows the course of certain nerves in such a manner as to deserve the title of essential neuralgia. In the early synovial stage of osteo-arthritis there is pain more or less localised in the affected joints; but the warnings and foreshadowings of which I now speak are altogether different, and are due to a perverted innervation of a large nerve-plexus, or of a large area of nerve-supply. The earliest prophetic note of the coming storm is pain in the muscles of the ball of the thumb, with sharp pangs on the inner side of the wrist, which I venture to call the "ulnar area" of this specific neuralgia. Later on the pain is massive and diffused, and not always to be identified with the chief nerves of a limb. Thus a middle-aged lady had a painful condition of the whole right arm, acute and paroxysmal. Pressure along the course of the ulnar nerve and over the brachial plexus was badly borne. Now what was the meaning of all this neural disturbance? It was a beacon warning of coming evil. Already there were the pathognomonic signs of enlargement of the first and second metacarpophalangeal articulations, and a trivial discolourment of the skin; and it was clear that if our whole therapeutic thought had been addressed to the neuralgia as such, we should have missed the very point of the case. What we imagine to be sciatica pure and simple is now and then a note of osteo-arthritic disease having begun in the tarsal articulations, or perhaps in the knee. But the specific neuralgia of the lower limb which I am now describing is, so to speak, pain in bulk; the sufferer clasps the thigh with a fervid grip, and says that the pain is all round, engaging the anterior crural and obturator nerves, no less than the sciatic. An exhaustive surgical examination of the hip-joint may discover that an osteo-arthritic lesion has already begun in it, justifying the old name of "hip-ache," often applied when it was doubtful whether the joint or the nerve were the more affected. We profess to have more perfect instruments of diagnosis than our forefathers; but it is certain that while we are meditating how to treat a supposed exclusive pain-storm, another and deeper pathological mischief may be creeping on unperceived.³

There are many collateral facts which show how far-reaching are the disturbances which may be roused by that profound nerve-quake (if I may so term it) which is at the root of the true neural arthritis. I have seen two cases (both middle-aged women) in whom the phenomena of the so-called gastric crises, precisely as in locomotor ataxy, were the earliest signs of rheumatoidal disease.

In another case the battle began with symptoms of asthma; and a long dreary prelude of migraine-headache is very common indeed.

Dr. Johnson, of Tunbridge Wells, sent me, three months ago, a patient who exemplified in a striking form the waves of cerebral sympathy which may be stirred by a progressive osteo-arthritis. A lady, aged 75, has the usual nodular joints in the fingers and knuckles; she has an orange tint on her forehead and face, with red cheeks; the fifth nerve expresses its partnership in sorrow by intense supra-maxillary pain; the equilibrium of the glossopharyngeal nerve is upset, and queer tastes are frequently perceived; there is intense deafness, and now and then visual ver-

² A full account of this case was published in the JOURNAL of March 7th, 1895.

³ I am indebted to my friend Mr. C. T. Griffiths, resident medical officer at our Mineral Water Hospital, for much help in the collection of data for the purposes of this paper. I owe a great deal also to medical men in London and various parts of the country for sending me cases of interest for private treatment.

tigo. And just now another patient, a lady of middle age, having an intensely pigmented face, suffers from inco-ordination of the pharyngeal muscles to such an extent as to suggest to her medical attendant the possibility of glosso-labial paralysis, so great was the difficulty of swallowing.

There are links which bind together osteo-arthritis, tabetic arthropathy, and the arthropathy of hemiplegic limbs. I venture to put forward the theory that the term "osteo-arthritis" will be found to include several kinds of joint lesion. There is what is commonly called the acute type, and there is the chronic type, and in both the anatomical changes are the beginning and end of the whole thing. But I contend that there is a large and hitherto undescribed group in which the pathology of joints is merely one sign of a profound nerve disorder. We call it conventionally an arthritis; but really the arthritis is only one neural symptom among many others, and possibly not the most important. Synthetically we do not build osteo-arthritis out of pulse, pigment, perspiration, or pain; the special morbid anatomy must be there; but one or more of these symptoms may eclipse the arthritis so far as to make it insignificant in any given case. A new name seems to be wanted for a complex state in which the neural and trophic phenomena of the body are so curiously upset and confused; but I do not venture beyond my allotted province of merely recording what I have seen and heard.

To sum up. A patient (male or female) walks into our consulting room with a slightly forward attitude, spare habit of body, and very likely a halting walk from something wrong in the lower limbs. We note the ovoid face, the melasmic tinge around the eyes, or the shining yellow pigment on the forehead; we feel the cold wet hands, and glance at the nodular fingers; and our diagnosis is made—made, I affirm, beyond the possibility of doubt or failure; and if there be besides the hard quick pulse, one more element is added to the diagnosis already assured. Our ancient friend, the practical man, is now certain to be pleased; he can begin his treatment without hesitation and without fear; he knows, or ought to know, that time lost in applying his remedies is time which cannot be recalled.

I have refrained from touching many minor points, and from travelling along some interesting by-paths, because I desire the main outlines of my theme to be vivid and unblurred. Fallacies of observation and induction beset all human inquiries; and with every caution and reserve I offer for the judgment of this veteran Society some material for the elucidation of an obscure and almost malign disease.

ON SOME POINTS CONNECTED WITH CONCOMITANT CONVERGENT SQUINT.¹

By W. ADAMS FROST, F.R.C.S.,

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IN man, and probably also in other animals whose eyes command a common visual field, the two eyes are intimately associated in the act of vision; not merely in the sense of doubling the intensity of a visual impression, but, the two retinæ transmitting to the sensorium impressions which differ from each other much as the two sides of a stereoscopic slide, the mind is enabled to fuse these into a single mental picture, from which impressions of solidity, depth, and distance are obtained with much greater certainty than could be obtained from a single retinal image. Perhaps the simplest way of demonstrating the advantage of stereoscopic, or, as I shall hereafter call it, "binocular" vision, is by means of Hering's test. A horizontal string is held at the level of the eyes at a distance of about two feet, and small bodies such as beans are dropped from a height of a few inches either on the proximal or distal side of the string, and close to it. With both eyes open there is not the slightest difficulty in seeing on which side of the string the object falls, but with one eye alone it will be found impossible, even with the closest attention, to be certain.

Binocular vision cannot, however, be obtained of all points in the visual field simultaneously, but only of such as fall upon certain parts of the two retinæ, which are for that reason said to be "corresponding areas." The yellow spots correspond, and if the retinæ be divided into quarters by lines meeting at this point, the right upper, left upper, right lower and left lower sections in

one eye would correspond with those of the same name in the other. The result of this is that when the visual axes are directed to any point (so that its image falls on the fovea in each eye), images of other objects in the same vertical transverse plane as the object fall on corresponding areas, while those which are at a greater or less distance have their images on non-corresponding areas. In the latter case double vision, or "diplopia" results if the mind takes cognisance of both images. The impressions, however, produced by retinal images at a distance from the fovea do not force themselves on the consciousness; and although, by a little practice, most people can convince themselves that this diplopia really exists, we are as a rule as unconscious of it as of the existence of the blind spot. If, on the contrary, the object to which the attention is directed has its image on the fovea in one eye and on some other part of the retina in the other, then diplopia is produced.

The whole function of the ocular muscles is to direct the visual axes to the object on which our attention is fixed. Partly, no doubt, from the anatomical fact that the centres which govern accommodation and convergence are in close connection, and partly from the physiological fact that the accommodation and convergence have from the first dawn of vision been associated in action in order to obtain binocular vision, both in the individual and through an innumerable succession of generations, it comes to pass that on accommodating for a given distance, the visual axes are converged to meet at that distance, instinctively and without conscious effort. But the power of adaptation to environment is a characteristic of organised beings, and if from any cause the conditions are so altered that binocular vision can only be maintained by an alteration in the normal relation between convergence and accommodation, that alteration may be made unconsciously if it does not exceed certain limits. This may be illustrated by placing prisms or lenses before the eyes.

Within certain limits, then, the desire for binocular vision will lead to binocular fixation. It remains for us to consider under what conditions continuous binocular fixation either demands a conscious effort or becomes impossible.

Now, in the first place, having regard to the variations in the conformation of the face, in the shape and size of the orbits, and the degree of prominence of the eyeballs, it is not to be expected that the range of the ocular movements should be the same in all cases. The admirable investigations of Motais have shown that the limitation of movement of the eyes depends on the parts of Tenon's capsule which form the check ligaments, and that these are called into play not merely when the limit of movement is reached, but that they exert a continuous and increasing control during the whole range of movement. It would seem probable, therefore, that the variations in the power of moving the globes depend less upon actual differences in the power of the muscles than upon the anatomical connection of the ligamentous processes, although, of course, when there is feeble muscular tone, an impediment would be noticed which might otherwise be unimportant.

For much of our knowledge of the variations that exist in the relative amount of convergence and divergence we are indebted to Landolt. Adopting the metrical notation, and taking parallelism as zero, we may say that the normal condition is a power of divergence (negative convergence) which would cause the visual axes to meet at a point one metre behind the base-line connecting the centres of rotation (that is, one metrical angle — 1 M a); and of convergence (positive) to a point distant one-ninth of a metre (+ 9 M a), the range of convergence being thus ten metrical angles. Now it is evident that this may vary in many ways. The range may remain unaltered, but it may be displaced towards the positive or negative side, or it may be shortened at the expense of either positive or negative end, or of both. A consideration of these varieties would be beyond our present purpose, and I must refer those of you who are interested in it to Professor Landolt's paper, of which an excellent translation by our late clinical assistant, Dr. Law, appeared in the *Ophthalmological Review*, July and August, 1886.

It is evident that any great departure from the normal condition will render binocular fixation difficult or impossible, according to its degree. In the former, the use of the eyes upon near objects for long periods will cause the symptoms classed under the term "asthenopia" with which you are familiar in hypermetropia, a symptom which has been well defined as "a strike for less work or better tools." In the higher degrees of abnormality binocular fixation may be impossible, and then we get a squint

¹ An abstract of two lectures delivered February 14th and 21st at the Royal Westminster Ophthalmic Hospital.