

On certain disregarded defects of development : chiefly in relation to the curves of the spine / by T.W. Nunn.

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Nunn, T. W. 1825-1909.
Royal College of Surgeons of England

Publication/Creation

London : John Bumpus, 1888.

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ON CERTAIN

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DISREGARDED DEFECTS OF DEVELOPMENT

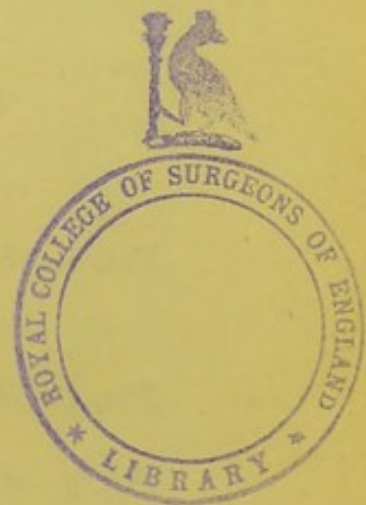
CHIEFLY IN RELATION TO

THE CURVES OF THE SPINE

BY

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*The pamphlet includes a Paper read before the Staffordshire Branch
of the British Medical Association, July 12, 1888*

W. D. SPANTON, ESQ., PRESIDENT

LONDON

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Bookseller by special appointment to H.M. the Queen

1888

DESCRIPTION OF PLATE.

(After BOURGERY and JACOB).

FIG. 1.—Shows the normal curves of the fully developed spinal column.

FIG. 2.—The normal curves of the infantile spinal column.

FIG. 3.—Gives a front view of the spinal column.

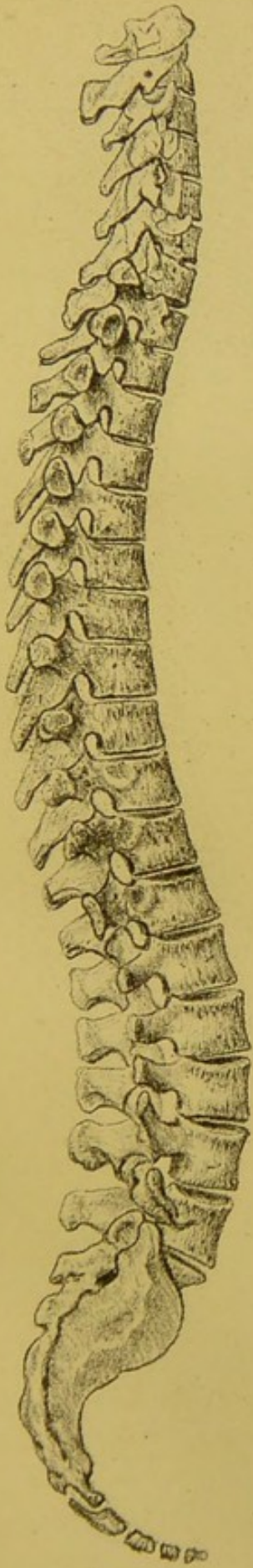


Fig 1.

After Bourgery & Jacob



Fig. 2.

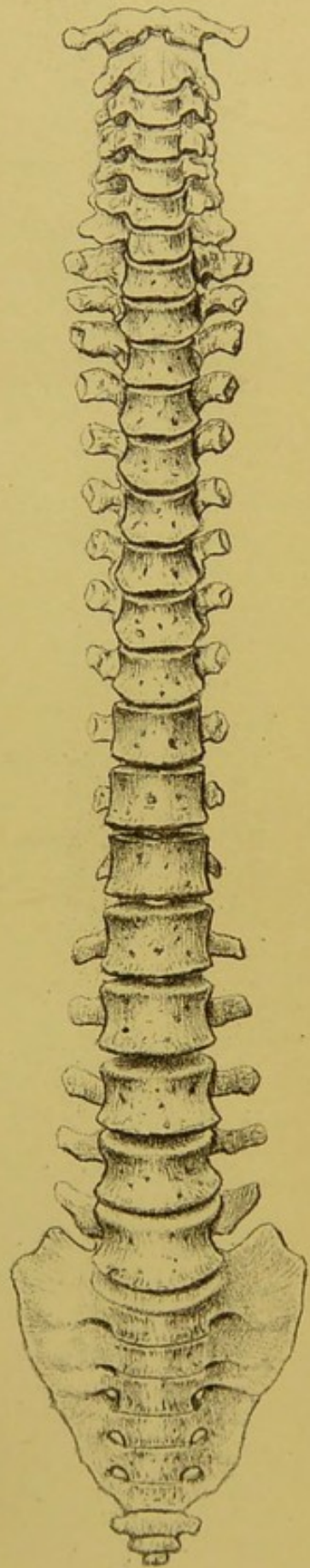
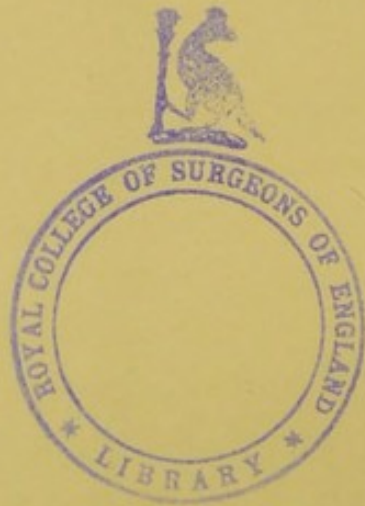


Fig. 3.

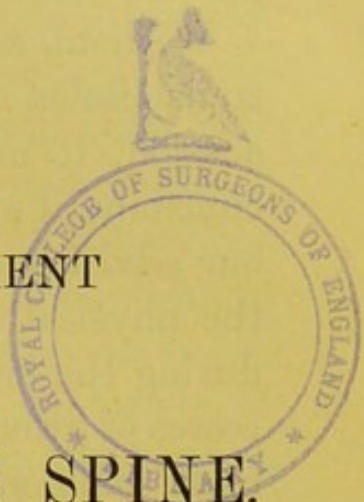
Danielsson & Co., lith.



DEFECTS OF DEVELOPMENT

IN RELATION TO

THE CURVES OF THE SPINE.



—♦—

CONGENITAL deformities and distortions have received a large amount of attention, being at once sufficiently obvious. Acquired deformities and distortions in their early stages, on the other hand, often escape notice; and not until these defects have reached a degree manifestly prejudicial, are attempts made for their correction: thus that which at the outset might have been an inconsiderable affair, in later years may have gradually and insidiously grown into the cause of a disabling lameness; for it must be remembered that acquired deformities have a strong tendency to become aggravated: on this account, alone, deviations, however slight, from normal symmetry should not be disregarded. If, however, it be true, as alleged, that “in the course of two or three generations a morbid peculiarity of the physical system, whatever it may be, which at first was an effect, begins to operate as a cause, and thus the disease by which the change was wrought in the

system is rendered hereditary,"* — there exists another reason of paramount importance for action.

Without saying that the theory of the hereditary transmission of acquired qualities is not open to discussion, it may be urged that there is enough circumstantial evidence of such transmission to justify our advising the exercise of vigilance in respect of the physical training of growing children, and it is during the period of the greatest activity of the processes of growth and development that such troubles most commonly commence.

There are two parts of the body to which I propose especially to refer—the spine with its contents, and the jaws. We see that the spinal column in early life is nearly straight,† and the spinal canal occupied from end to end by the spinal cord; as development proceeds, the spinal column assumes certain curves in the antero-posterior plane,‡ and the cord now reaches no lower than the upper part of the lumbar region; in other words, occupies only the upper two-thirds of the canal. The jaws in childhood, in respect of the alveolar borders, only so far developed as to accommodate twenty teeth, more or less diminutive, have afterwards so to expand as to give room for thirty-two of full size.

Defective development may be positive or negative—that is to say, may consist in the non-growth of what ought to grow, or in the *persistence* of a condition that normally is but temporary.—Some of the results of defective development are direct and mechanical, some reflex and nutritional.

* Vide *Lancet*, May 8, 1886, and Maudsley "On Heredity."

† Vide plate, Fig. 2.

‡ Vide plate, Fig. 1.

The various organs of the body are so interdependent, that defect at one point may injuriously react at a distance, and in a manner perhaps little suspected. I would quote in illustration that remarkably interesting case of vertigo, simulating brain disease, produced by the straining of certain ocular muscles, recorded by Brudenell Carter, in the "Transactions of the Clinical Society of 1874." Mr. Bickerton, in a paper read at the Liverpool Medical Association, in November 1886, records several cases analogous to Brudenell Carter's, which case he rightly speaks of as historical. In a letter received by me from Mr. Brudenell Carter, the writer states that his experience proves that headache is constantly due to errors of refraction operating to produce muscular strain.

Mr. Bickerton, to show how this cause of headache has been overlooked, says in his paper, after giving the titles of four of the most important and widely known works on Medicine, "that in not one will be found a single line which would suggest refractive errors of the eye as a possible cause of headache;" and along with this list of systematic works on Medicine he mentions a treatise on headache, in which its author has failed to recognize ocular defect as a cause of the disorder in question.

But to return to the spine. I have already stated that the normal curves of the fully developed spinal column are in the antero-posterior plane; perhaps an apology is almost due for venturing to repeat the fact; however, I have to remark that the Editors of the eighth edition of Quain's Anatomy (Sharpey, Allen Thomson, and Schäfer) are responsible for the statement that "in the dorsal region there is

very frequently a slight degree of lateral curvature, the convexity of which, in most cases, *is directed towards the right*" (the italics are mine), "and is probably connected with the greater use made of the right arm." Ward, in his "Osteology," writes to the same effect.

Mr. William Adams ("Lectures on Curvatures of the Spine") has effectually combated this notion by the simple process of careful and wide observation, and has thus exploded the several ingenious theories for explaining the existence of what does not exist.

The antero-posterior curves of the spinal column have doubtless some important relation to the functions of the entire organism. They can have little to do specially with the erect posture of man, since some animals (quadrupeds) have almost similar curves. These curves probably serve for the protection of the delicate spinal cord from shock in the active and *sudden* movements of the body, and of so supporting the cranium as to prevent the transmission of mechanical impact to the cerebral contents. Mr. Mivart, in his "Lessons in Elementary Anatomy," says these curves "give to the vertebral column a strength ten times greater than it would have were it quite vertical;" but he offers no information as to the basis of this calculation. It is questionable whether the curves can add strength to the spine as a *column* of support.

The protection of the spine from sudden strain is one of those provisions in the animal frame against a sudden tax on strength of which there are other analogous examples in the vascular and muscular

systems for instance, a form of compensating adjustment for securing a uniform performance of function under varying conditions. It is not difficult to imagine that the spinal cord would ride more smoothly and, so to speak, comfortably in an undulating canal than in one perfectly straight; besides, the curves or bends permit of the unbending of the trunk under exceptional circumstances.*

I have observed that certain acquired distortions, especially of the lower limbs, are associated with abnormalities of the antero-posterior curves of the spine, and I have been led to conclude that, in some measure, the distortion has been brought about by interference with the due innervation of the muscles. The question is—Would such interference with the nerve-current be attributable to the condition of the spinal canal or to some faulty development of the spinal cord, accentuated by the change in the relative lengths of the spinal cord and the spinal canal, which change takes place during the rapid growth of the body; or are the nerve-trunks themselves to be blamed? Whatever be the cause of the defective development which lies at the root of the distortion, it may affect the whole limb, or groups of its muscles, or single muscles, and even the ligaments and bones. I shall refer later to a possible cause of damage to the cerebro-spinal axis.†

Questionably, from defective *spinal* development, there is one irregularity in growth to which it is necessary to make reference—namely, inequality in

* The pronounced curve of the sacrum must not be forgotten in any interpretation of the spinal curves.

† Vide appendix, p. 20.

the lengths of the lower extremities. This defect of development requires particular mention, as it originates a lateral curvature of the spine, and thus indirectly brings about further troubles of otherwise obscure origin. As far as my own experience goes, this inequality does not declare itself till the age of most active growth.

Writers, generally, on spinal curvature have laid little stress on the inequality in the length of the lower limbs as a cause of lateral curvature of the spine. I must, however, make exception in favour of Mr. Noble Smith, who, in his work on "Curvatures of the Spine," has fairly and fully considered the condition in question, and has called in the evidence of Dr. Garson. In the *Journal of Anatomy and Physiology*, July 1879, Dr. Garson published a communication on this subject. He, it appears, measured seventy skeletons at the Royal College of Surgeons, and in only 10 per cent. were the lower limbs of equal length. The left limb was the longer in 54.3 per cent., the right in 35.7 per cent. The result of this investigation has an important bearing on the question of the alleged existence of a normal lateral curve of the vertebral column.

Thus,—of course, where a lateral curvature does depend on an inequality in the length of the lower limbs, the convexity of the curve will be towards the side of the shorter leg. The Editors of Quain's *Anatomy* and Mr. Ward have stated that this alleged natural curve is towards the right side in most cases; according to Dr. Garson's measurements such would necessarily obtain, as the left leg, or rather

the left lower limb, is most often the longest, and therefore curvature of the spine, with convexity towards the right, is exactly what should be expected in the majority of instances under the circumstances.

Whether Dr. Garson's statistics hold good in general or not, I am quite certain that inequality in the length of the lower limb is exceedingly common, and notably so in the female sex. The amount of inequality I have found to be usually between three-eighths and half an inch; and the most certain and ready method of measurement is to test the level of the crests of the ilia while the patient stands upright, the feet being together, ascertaining to what extent the short leg has to be raised so as to bring the crests level, by placing under the foot plates of wood or other substance of graduated thicknesses.

In a publication of recent date on spinal curvature is a well-drawn figure of a child apparently of about twelve or thirteen years of age. It is an admirable delineation of the posture resulting from inequality in the length of the lower limbs, the left limb in this case being the longer one; but the letterpress description of the drawing is as follows:—"Fig. * is a sketch of the changes which deform the body in the third stage of general musculo-nervous curvature, and shows the lateral curving of the spine, the enlargement of one side of the body by rotation of the ribs, and the rising of the shoulder-blade on the same side." I do not hesitate to say that every one of these symptoms would immediately disappear on simply raising the heel half an inch.

A consequence of the tilting up of one side of the

pelvis by the inequality referred to, is the throwing the head out of the line of the centre of gravity. To restore the head to that line the spinal muscles (chiefly) must on the side of the longer limb be called into action, and thus there is an inordinate unilateral demand on muscular force.

One often finds, under such conditions, that the patients—generally growing girls and women—complain of weakness referred to the back, of atony, hebetude, and incapacity for ordinary avocations, and of being quickly fatigued. It is probable that the morbid state is analogous to that neurosis met with in the upper extremity, known as writer's cramp, which is in most instances produced by the excessive employment of certain groups of muscles, not overlooking the fact that such affection is often associated with a neurotic diathesis.

With regard to the antero-posterior curves, there is an abnormality which belongs to the list of imperfect developments—namely, an absence of the proper backward curve in the *upper dorsal region*, the spine retaining its infantile perpendicularity. This causes the shoulder-blades to appear to project, and there is between them found a deep hollow corresponding to the line of the vertebral column, in place of a level or somewhat convex superficies. The want of due curve takes off from the capacity of the chest by diminishing its antero-posterior diameter, and thus the heart is held, so to speak, too much against the front wall of the chest, as shown by the extreme distinctness of its pulsations to the touch.

Moreover, I have found the perpendicular condition of the dorsal segment of the spine coincident

with imperfect development of the muscles of the leg. It may be useful here to mention that an opposite condition in the lumbar region—namely, an exaggeration of the lumbar curve also appears to affect the nutrition of the muscles of the leg.

The imperfect development of the muscles of the leg is shown in their being shorter than is natural ; consequently the movements of the ankle-joint are impeded, and the front of the foot is subjected to various degrees of distortion—a condition that interferes with the act of locomotion. *Thus, awkward walking may be a symptom—something more than an ungainliness.*

The movement of the foot in walking on level ground (not in climbing a flight of stairs or a steep road), is a rolling motion from the heel to the tips of the toes, especially to the tip of the great toe, in a somewhat curved line. It may be best demonstrated by reversing the movement—that is to say, by stepping backwards ; in this movement the great toe first touches the ground, and the rolling action goes on by the outer side of the foot to the heel until the foot becomes firmly planted on the ground. Pettigrew, in his work on Animal Locomotion, says the heel first reaches, and first leaves, the ground ; when the heel is elevated the weight of the body falls more and more on the centre of the foot and toes, the latter spreading out to seize the ground. He adds, the spreading action of the toes is seen to perfection in children. It is, he says, more or less destroyed in adults, from a faulty principle in shoe-making, &c. My own view of this matter is, that the loss of the spreading of the toes is not so much caused

by malfaisance of the shoemaker as by insufficient development of the muscles, as the body emerges from childhood to youth.

A shortness of the calf muscles induces eversion of the foot and flattening of the instep, as the complete extension of the ankle is prevented; and the line of the rolling of the foot, instead of reaching to the tips of the toes, ends at the inner border of the foot in front of the instep, turning the direction of the foot outwards.*

A similar imperfect development of the extensors and of the interossei combined gives rise to the condition known as hammer-toes, where the first phalanges are retracted—*i.e.*, extended, while the distal phalanges are unduly flexed. A shortness of the extensor longus pollicis only, draws the great toe towards the middle line of the foot, and this lateral displacement establishes bunion. A most characteristic example of the tendency of acquired deformities to become exaggerated, mentioned at the outset of this paper, is offered by bunion. I doubt whether any of us ever—or but very rarely—have seen marked lateral displacement of the great toe in the comparatively young, while we have all seen, in scores of instances, the displacement in old people to such a degree that the great toe lies across the other toes.

Ten years since I exhibited at the Clinical Society the cast of the foot of a female patient in whom

* Mr. Griffith, at one time amateur champion pedestrian, informs me that for pace the foot must move exactly in the line of progression, and that soldiers do not make rapid walkers on account of being drilled to point the foot outward.

these distortions had followed what might be called acute lordosis; the ankle could not be fully extended, there was falling of the instep and hammer-toes. The patient, a lady who had fortunately the means of carrying out a long treatment, has recovered from all but the hammer-toe.

There appears to be some doubt as to the pathology of hammer-toe; my friend, Mr. A. Reeves, in his work on Practical Orthopædics, is evidently disposed towards the neurotic origin of the deformity. I have lately had a conversation with Mr. William Adams regarding this subject, and he also is inclined to attribute the deformity to a neurotic origin. He tells me, I may state, that for remedying the distortion he divides the lateral ligaments connecting the first and second phalanges, some of the fibrous tissues about the flexor tendons, and tenotomizes the extensors. Mr. Shattock's dissections, to which Mr. Adams attaches much weight, show the lateral ligaments to be contracted, and to constitute an important obstacle to the rectification of the malposition of the toes. Mr. Shattock unquestionably proves that the lateral ligaments in hammer-toe are contracted, but contraction of the ligaments can hardly have been the primary morbid change.

The condition of hammer-toes not only exposes the subject of the displacement to the very great inconvenience of the friction of the over-flexed phalangeal joint against the foot covering, but it causes the rolling action of the foot to cease at the heads of the metatarsal bones; the individual walking on the cartilage-covered heads of the metatarsal bones

instead of on the soft-padded tips of the ungual phalanges, the more serious trouble caused by plantar bunion is induced, the bursæ of which may suppurate, and ultimately necessitate amputation of the foot. I have reported one such case. ("Clinical Soc. Trans.," vol. xi.)

These lamenesses have been said to take origin in a rheumatic or gouty diathesis by some writers; on the other hand, Dr. Archibald Garrod, in a paper read last year at the Medico-Chirurgical Society, propounded the theory of the *nervous origin of rheumatoid arthritis*.* He says that the distribution of the lesions is similar to that of certain arthropathies of spinal origin. I here suggest that the myopathies with which I have dealt may also be of spinal origin, neuroses of obscure seat.

This leads me to allude to hip disease. It will be found that patients with the early symptoms of morbus coxarius present a very evident impairment of the nutrition of the whole limb, which want of use simply will not explain. At the Pathological Society, in 1867, I proposed that the disease of the joint itself, was but a particular manifestation of a general affection of the entire limb, and was an incident in the anatomical and physiological relations of the head of the femur. My aim, therefore, always in treating so-called hip disease in its early stages has been to stimulate all the nutritional processes of the limb in addition to the other measures, which need no description.

In respect of defective development in the jaws and teeth, it is within the scope and limit of this

* Dr. Archibald Garrod's paper is a timely outcome of Professor Charcot's brilliant generalizations.

paper to refer only to results that are for the most part reflex. Cartwright, in 1876, drew attention to certain cerebral and cerebro-spinal affections dependent upon the physiological state of the system synchronous with dentition;* in 1877 I contributed a paper on the subject, in which I reported instances of corneal ulcer and other forms of mischief, caused by reflex irritation from delayed dentition. The details of the cases are to be found in the Appendix.

Delayed dentition may be regarded in those cases where the delay in the appearance of the tooth is caused by resistance to the physiological absorption of the gum, as practically a defective development. Passing over infantile dentition, I would draw attention to those troubles met with during the eruption of the permanent teeth, which commences at the fifth or sixth year.

Three years since I was asked to see a little girl, aged five years, the daughter of a friend. She was suffering from epileptiform seizures to a most alarming extent, some fifteen to twenty during the day. The child had been under treatment by bromides, &c. I found the gum over the six-year molars tense, and incised it; the fits very shortly ceased.

At the twelfth year, when a second molar is due, reflex disturbances of the nervous system occur in the form of choreic symptoms, neuralgia of the frontal branches of the fifth nerve, and ear-ache. The epoch of the eruption of the *dentes sapientiæ* is attended often by severe constitutional disturbance, especially in

* Samuel Cartwright, Esq., the President of the Association of Surgeons practising Dental Surgery (1876), brought before the Association the question of the connection of certain nervous affections with dentition.

women. I have observed in such that there is marked alteration in the tone of the complexion, the hair falls, menstruation becomes irregular, and, in some cases, distressing pain across the head and in the eyes, so that reading, writing, drawing, or working in any way that requires ocular strain, becomes impracticable.

In the *British Journal of Dental Science*, Sept. 1, 1881, Mr. Daniel Corbett communicated a paper on evidence of reflex action in relation to constitutional disturbance induced by second dentition. In the same journal, July 1886, there is reported a case of reflex dental irritation causing blindness, which happily was temporary, and in the following number is a paper by Mr. Gnoner, of Adelaide, on the teeth as aids in general diagnosis.

At the Odontological Society, Dr. Joseph Walker, President, Mr. Henry Power read a paper on the subject of ophthalmic diseases having origin in dental irritation, in which he entered fully into the physiological bearings of dental development. I have thus corroborative evidence of mischief, of which the cause, unless we take into consideration the manifold sources of reflex irritation, may be overlooked.

APPENDIX.

*Abstract of Paper read before the Association of Surgeons
Practising Dental Surgery.*

CASE I.—A middle-aged woman was, at the request of Dr. Ayling, of Great Portland Street, admitted under my care into the Middlesex Hospital. She was suffering from an ulcer of the cornea; in no other respect did she appear to be in ill-health, nevertheless the ulcer defied all my efforts to bring about its healing. After the lapse of some weeks the patient cut an upper bicuspid tooth, after which unexpected event the ulcer of the cornea commenced to cicatrize.

CASE II.—About three years since, I was requested to see a young lady, aged eleven, suffering intensely from supra-orbital neuralgia. She was unable to bear the daylight, and I found her in a darkened room, with her face buried in the pillow, and a compress of some cooling lotion over her brows. I took the requisite steps to ascertain whether there was fever or not, and finding no febrility, I examined the mouth, and, although the gum over the posterior or second molar was not tense nor tender, I asked permission of the parents to incise that membrane. The relief that followed was immediate; in half an hour the young lady was down in the drawing-room, almost in her usual spirits.

CASE III.—Another young lady, of the same age as in the preceding case—namely, eleven years—came under my care with otalgia. It was not constant, but sometimes at night was cruelly severe. The patient was not so strong and forward a child as in Case II., and there was no very palpable evidence of tension of the gum over the second molar of the affected side. I tried

sedatives locally and internally, iodide of potassium, &c. &c., without abiding advantage. At last, I lanced the gum over the posterior molar, and the pain vanished, never to return.

CASE IV.—A little girl was brought to me, suffering from what would ordinarily be called *strumous corneitis*. She had photophobia, injected eyelids, long weeping lashes, and she carried her head bent forward, with contracted brows, so as to shield herself from direct rays of daylight, in the manner so characteristic of patients the subjects of corneitis. I found, on inspecting the mouth, that the upper central incisors were partially cut, the gums being swollen and very vascular. I prescribed, besides local treatment to the eyes, henbane, cinchona, nitric acid, and nitric ether, and confidently gave the assurance that in a short time all would be well; but I impressed upon the friends *that no great improvement was to be anticipated before the teeth then showing were fully erupted*. The patient's recovery was precisely in accordance with the prognosis.

“ My friend, Mr. E. Semple, noted for me the condition of patients at the Moorfields Ophthalmic Hospital suffering from ulcer of the cornea during a few days,* and the following is the result of his observations:—He observed the ages in 38 cases of corneal ulcer. I exclude from consideration 4 cases occurring after the age of 21. We have 34 cases left; of these 10, or nearly one-third, were in children between 1 and 3 years old, 5 in children between 3 and 4 years old, leaving only 19 to be distributed over the ages from 4 to 17, as follows:—

4—5	. . .	2 cases	11—12	. . .	1 cases
5—6	. . .	0 „	13—14	. . .	3 „
6—7	. . .	1 „	14—15	. . .	2 „
7—8	. . .	2 „	16	. . .	1 „
8—9	. . .	3 „	17	. . .	1 „
9—10	. . .	2 „			—
10—11	. . .	1 „			19 „

“ I have referred to some of the manuals of Ophthalmic Surgery of recent date, and I do not find it stated that dental irritation has any relation to ulcer of the cornea; and I have directly put the question, as to dental irritation being a cause of keratitis, to

* Written in 1877.

S.A.
JAN. 2.
1875.

10 Ebury Street

Grosvenor Gardens

S.A.
FEB. 26.
1876.

3 John Street

Berkeley Sq

London

FACSIMILE OF HANDWRITING OF THE
YOUTH REFERRED TO IN CASE V.



the author of one of the latest publications on Ophthalmic Surgery, and he said that there was, in his opinion, no relation between the physiological process of dentition and ophthalmic disorders in question, and in a recent work on 'The Practice of Surgery,' by a deservedly esteemed author, the second edition of which appeared only a year since. The author, in treating of the causation of keratitis and ulcer of the cornea, says not one word on dental irritation, nor of the necessity of inspecting the condition of the gums."

CASE V.—A young gentleman, aged twelve, son of one of my patients, had choreic symptoms; he carried one of his arms in a peculiar manner, owing to spasm of certain of the muscles of the forearm. He had been treated medically, but no immediate influence over the chorea resulted from the treatment. I found that the second molars were in process of eruption, and I expressed my opinion that as soon as these teeth were fully "cut" the choreic symptoms would subside. I have here the handwriting (*vide facsimile*) of the patient, when the chorea existed; and a year or so after. I think, making every allowance for the improvement naturally to be expected after the lapse of a year in any boy's handwriting, the evidence of disturbed nervous function interfering with the *automatic* muscular action is sufficiently obvious in the earlier handwriting, to leave no room for doubt as to there having been a subsidence of nervous irritation when the second specimen of handwriting was given.

"On reference to the fifth edition of Dr. West's classical work on "Diseases of Childhood," I find at page 217 a table showing age and sex of 422 patients brought to the Children's Hospital suffering from chorea between the ages of three months to twelve years: 122 were males, 300 females.

"The males, starting from the fifth year, numbered—

5-6	6-7	7-8	8-9	9-10	11-12
7	...	18	...	17	...
		17	...	23	...
				23	

In the females, starting from the same year—namely, the fifth—the numbers are—

5-6	6-7	7-8	8-9	9-10	11-12
23	...	30	...	34	...
		41	...	57	...
				81	

Or, taking males and females, we have, between the fifth and twelfth year, 363 cases out of 422—considerably over three-quarters of the whole; or, to make the comparison more fair, from birth to the fifth year, 51 cases; from the fifth year to the tenth, 267 cases. I think these figures justify the suspicion that dental irritation had possibly a share in disturbing the functions of the spinal cord in these cases.

“There are cases of an *apparently different* class, which are constantly coming before me—namely, cases in which nerve irritation is not the obvious and prominent symptom (whatever share nervous mischief may have had to do with the ultimate result), the patients presenting some abnormal condition of the lower extremity, most often in the foot.

“The deformity of the toes known by the name of hammer-toes and bunions are really owing to a faulty nutrition of certain muscles of the leg and foot, extensors and interossei, a faulty nutrition well expressed by the French term *amyotrophie*. The muscles become permanently shortened, and, as a consequence, the toes are pulled either upwards or on one side by the so-called contracted tendons.

“I have so repeatedly observed that the deformity of the foot commences synchronously with the dentition of the second molars, that I cannot help nursing the suspicion that economy of the spinal nervous system in such cases has been disturbed by the peripheral irritation attendant on the eruption of these teeth.”

