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SPINAL IRRITATION



WILLIAM A. HAMMOND

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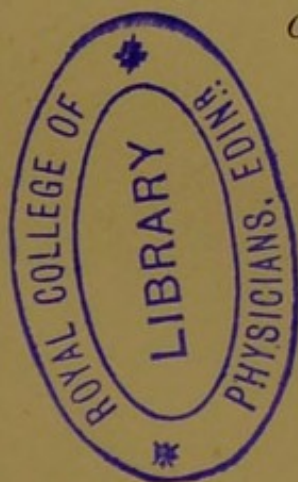
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SPINAL IRRITATION

(POSTERIOR SPINAL ANÆMIA).

By WILLIAM A. HAMMOND, M.D.,

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of the Mind and Nervous System in the New York Post-
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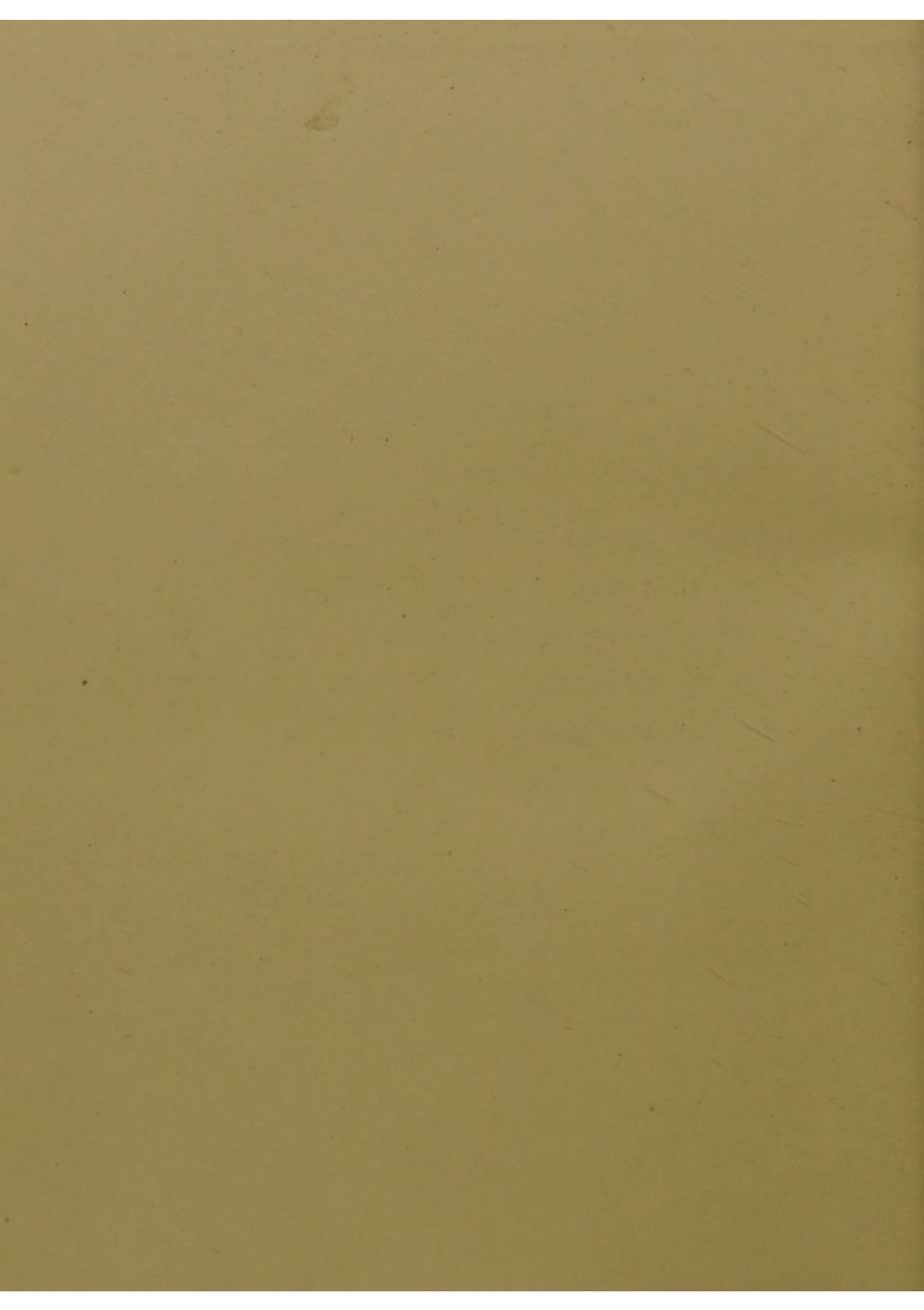


1886.
GEORGE S. DAVIS,
DETROIT, MICH.

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PREFACE.

Spinal Irritation is so common an affection, and the advantages to be derived from its proper treatment are so great, that I hope to be excused for presenting to the medical profession the results of my researches on the subject. The form in which they appear is such as to admit of general circulation, and I am therefore not without the hope that they may prove of use to my brethren and to the patients under their charge.

WILLIAM A. HAMMOND.

43 WEST 54TH STREET,
NEW YORK, July 20th, 1886.

CHAPTER I.

HISTORY.

Under the designation of "Spinal Irritation" * I described over twenty years ago an affection to which Americans, and especially American women, are liable to a greater extent than the people of any other country in the world. Previous to my essay on the subject the disease in question had not received any very thorough and systematic consideration from medical authorities in this country, though it had not been altogether neglected. Abroad, however, it had been the subject of several elaborate treatises. Since my paper was published, spinal irritation has, under the name of neurasthenia, been written upon to an extent scarcely, in the same time, given to any other disease of the nervous system, but, as I think, from an entirely erroneous standpoint. It has also been noticed by English and German authors, each having his own theory in regard to its nature, and each therefore giving it a different name, in accordance with the idea entertained of its pathology. All of these various contributions have at any rate extended our clinical knowledge of the

* "Spinal Irritation," read before the New York County Medical Society, January 20, 1870, and published in the *Journal of Psychological Medicine* for April 1876.

disease, even if they have not added perceptibly to the sciences of pathology and nervous anatomy.

It has been questioned by several distinguished authors whether such an affection as spinal irritation really exists as a distinct disease. Thus Valleix* ascribes the most important of its manifestations to hysteria, and regards the spinal tenderness present as being due to simple intercostal neuralgia; Inman† considers the pain produced by pressure over the spinous processes of the vertebræ as existing in the muscular attachments, and as indicative of what he calls myalgia. Mr. Skey‡ evidently looks upon all cases of spinal irritation as hysterical in their character, and Niemeyer§ speaks incredulously on the subject, without giving any very decided opinion. It would be easy to bring forward other authorities who have expressed similar views, and I may have to allude to some of them more fully hereafter.

My own opinion is, that there is a well-defined disease of the spinal cord, which, if designated by its pathology, may properly be called spinal irritation,

* *Traité des névralgies ou affections douloureuses des nerfs.* Paris, 1841, p. 345.

† *On Myalgia; its Nature, Causes, and Treatment, etc.* Second edition, London, 1860, p. 225, *et seq.*

‡ *Hysteria, etc*, New York, 1867, p. 72. *et seq.*

§ *A Text-Book of Practical Medicine.* American edition, New York, 1863, vol. ii, p. 258.

but which, in a system of nomenclature based upon morbid anatomy, would preferably be named spinal anæmia. In the recently published nomenclature of the Royal College of Physicians,* the affection has no place unless it be included under the head of hysteria.

The first author who distinctly grouped together the symptoms of spinal irritation was J. Frank,† who, under the name of rachialgia, described the disorder with considerable accuracy, and laid the principal stress upon the local pain. He was followed by Stiebel,‡ who, however, contributed little to our knowledge of the subject.

Mr. J. R. Player§ was among the first English physicians, if not the very first, to call attention to the fact that eccentric derangement of function may be the result of irritation of the spinal cord. Thus he says: “Most medical practitioners who have attended to the subject of spinal disease must have observed that its symptoms frequently resemble various and dis-

* The Nomenclature of Diseases drawn up by a Joint Committee appointed by the Royal College of Physicians of London. London, 1869.

† De Rachialgitide in Prax. Med. Univ., P. II., t. i., p. 37.

‡ Ueber Neuralgia Rachitica, Rust's Magazine, t. i., c. xvi., p. 549.

§ Quarterly Journal of Science, vol. xii., p. 428. Quoted by Teale.

similar maladies, and that commonly the function of every organ is impaired whose nerves originate near the seat of disorder. The occurrence of pain in *distant parts* forcibly attracted my attention, and induced frequent examination of the spinal column; and, after some years' attention, I considered myself enabled to state that, in a great number of diseases, morbid symptoms may be discovered about the origins of the nerves which proceed to the affected parts, or of those spinal branches which unite them; and that, if the spine be examined, more or less pain will commonly be felt by the patient on the application of pressure about or between those vertebræ from which such nerves emerge."

The term "spinal irritation" appears to have been first used by Dr. C. Brown,* of Glasgow, who, in a very excellent paper, gives a picture of the disorder which cannot fail to be recognized as truthful and exact by those who have witnessed several cases of the affection. He insists upon not confounding the complaint with those organic diseases of the vertebræ and spinal cord which some of its symptoms cause it to resemble, points out the variation of the phenomena according to the seat of the spinal tenderness, and inculcates the employment of rest and counter irritation as the most effectual remedies. His ideas of the

* On Irritation of the Spinal Nerves, Glasgow Medical Journal, No. II., May, 1828.

pathology of the disease are: “That the immediate cause of the pain of the back and breast is spasm of one or the other of the muscles arranged along the spine, altering the position of the vertebræ, or otherwise compressing them as they issue from the spinal marrow.

“That this spasm in many instances is strictly a *local* disease, produced by fatigue, wrong posture, or other causes, and quite unconnected with the state of the brain, spinal marrow, or nervous system in general.

“But that, in other formidable instances, this partial, spasmodic, or wrong action of the muscles is owing to a faulty state, perhaps an enlargement, of the vessels of the brain or spinal marrow. This state of the brain, as in many other diseases, gives rise to spasm or even to convulsion of certain muscles; which partial symptom from its severity attracts the chief attention. This local affection is confined to those portions of the spine where there is the greatest motion, and where, of course, the muscles having the greatest activity are most liable to deranged action or spasm. I imagine that this view of the subject is illustrated and perhaps confirmed by various symptoms which were observed in the different cases, and which without it were very incomprehensible. The partial palsy, the affection of the sight, the giddiness of the head (for I find that this was a prominent symptom in several cases, especially in that of A. S.), all

give some confirmation to the notion that the brain is affected in these severe cases.”

Dr. Darwall,* of Birmingham, describes several features of the affection with accuracy, such as those simulating cardiac and gastric diseases. He is inclined to believe that the morbid condition of the spinal cord depends mainly upon irregularity of the circulation, generally congestion.

But no essay upon the subject of spinal irritation, which had yet appeared, was equal in thoroughness to that of Mr. Teal,† and it is to him that the views now generally held relative to the connection between various eccentric phenomena, such as pain, spasm, and visceral disturbance, and a peculiar condition of the spinal cord, are to be attributed. He, however, committed the great error of regarding the affection as being due to inflammation, and, in what for those days was logical accordance with this theory, he combated it with strong antiphlogistic measures. His book may be studied with advantage, as presenting an admirable account of the many diverse phases which spinal irritation may assume.

* On Some Forms of Cerebral and Spinal Irritation. Midland Medical Reporter, May, 1829.

† A Treatise on Neuralgic Diseases Dependent upon Irritation of the Spinal Marrow and Ganglia of the Sympathetic Nerve. London, 1829.

Mr. Tate,* in his work on hysteria, attributes many of the protean manifestations of this disorder to spinal irritation, limited, however, to the dorsal region. He fails to recognize it as an independent disease. His treatment consists in the application of tartar-emetic ointment along the whole length of the dorsal vertebræ, and strong purgation. He discountenances the use of leeches and blisters.

Mr. W. R. Whatton† insists chiefly upon the liability to mistake spinal irritation for disease of the vertebræ. He gives a very excellent account of the symptoms. The treatment he recommends consists in the abstraction of blood, by leeches or cups, from the parts where the tenderness is felt, repeated every three or four days, and the application of small blisters on each side of the painful spots. Any debility ensuing in consequence of this treatment is to be remedied by the preparations of iron and quinine.

In a clinical lecture delivered in Dublin, Dr. Corrigan‡ relates the particulars of several cases of spinal irritation, successfully treated by local antiphlogistic measures, and the internal use of iron. He does not, however, add anything of importance to our previous knowledge of the subject.

* A Treatise on Hysteria. London, 1830.

† On Spinal and Spino-Ganglial Irritation. North of England Medical and Surgical Journal, No. III., 1831.

‡ Medico-Chirurgical Review, July, 1831, p. 182.

Dr. Isaac Parish,* of Philadelphia, appears to have been the first American author who called attention to the affection in question. He relates the details of several cases, recommends the use of counter-irritants, especially tartar-emetic ointment and concludes:

“First, that tenderness on pressure in some portion of the spinal cord is an attendant on many chronic neuralgic affections, and that, by relieving it in the manner proposed, these complaints are either entirely eradicated or temporarily suspended.

“And secondly, that the precise indications which this circumstance affords are not sufficiently understood at the present time to justify the establishment of any definite pathological principles applicable to the whole class of neuroses.”

Dr. W. Griffin and his brother, Mr. D. Griffin,† of Limerick, were the next to write upon the subject. The joint work of these gentlemen is based upon one hundred and forty-eight cases, all of which are thoroughly analyzed, and from which very definite deductions of pathology and treatment are drawn. The essay is not excelled in importance by any previous con-

*Remarks on Spinal Irritation as Connected with Nervous Diseases, with Cases. American Journal of the Medical Sciences, vol. x., 1832, p. 223.

† Observations on the Functional Affections of the Spinal Cord and Ganglionic Nerves, in which their Identity with Sympathetic, Nervous, and Simulated Diseases is illustrated. London, 1834.

tribution, and constitutes a really valuable study. The conclusions which they draw are so instructive that I do not hesitate (though by no means endorsing them all) to transfer them without abbreviation:

“ 1. That tenderness at one or more points of the spine is an attendant on almost all hysterical complaints, on numerous cases of functional disorder when the hysteric disposition is not so obvious, and in many nervous or neuralgic affections.

“ 2. That many of the symptoms of these affections evidently depend upon a peculiar state of certain nerves, probably at their origin, may be reproduced at any moment by pressure, and are often relieved by remedies applied there.

“ 3. That, in all cases of tenderness of the cervical and upper dorsal spine, there was nausea, or vomiting, or pain of stomach, or affections of the upper extremities; but no pain of the abdomen, dysury, ischury, hysteralgia, or affections of the lower extremities.

“ 4. That, in all cases of dorsal tenderness, pains affecting the abdomen, bladder, uterus, testes, or lower extremities, were usual symptoms; while nausea, vomiting, or affections of the upper extremities, were never complained of.

“ 5. That nausea and vomiting appeared to have more relation to tenderness of the cervical spine, pain of stomach to tenderness of dorsal; but that, when there was soreness of both, nausea or vomiting was

still more frequent, and pain of the stomach scarcely ever absent.

“ 6. That, when several points or a great extent of the spinal column is painful and tender on pressure, local remedies are generally less effectual, and there is a strong disposition to transference of the disordered action from one organ to another; the pain or tenderness in all such cases of transference, shifting its place to a corresponding part of the spinal column, leaving the original point free, or with a very diminished degree of tenderness.

“ 7. That spinal tenderness is seldom or never met with in cases of pure inflammation, except when these accidentally occur in persons previously suffering from irritation of the cord; and that, when appearances of inflammation present themselves in any organ accompanied by a corresponding spinal tenderness, they cannot commonly be removed by the remedies applicable to inflammatory cases, and are often rendered worse by them.

“ 8. That there does not appear to be a complaint to which the human frame is liable, whether inflammatory or otherwise, which may not be occasionally irritated in disturbed states of the cord; and hence that this disturbed state is one vast source of those complaints called hysterical or nervous.

“ 9. That those functional disorders connected with spinal tenderness are very often attended by some disturbance of the functions of the uterus, but

that they are by no means always so, since they occur in those who are regular in this respect: in girls long before the menstrual period of life, in women after it has passed, and, lastly, in men of nervous susceptible habits, and in boys.

“ 10. That in fact they are not necessarily dependent upon any one organ; since they are found indifferently coexisting with disturbance of the digestive organs solely, or the uterus solely, or of the circulatory or respiratory system.

“ 11. That from the cases detailed we have reason to suppose spinal tenderness may arise from uterine disorders, from dyspepsia, from worms in the alimentary passages, from affections of the liver, from mental emotions, from the poison of typhus, from marsh miasmata, from erysipelatous, rheumatic, and eruptive fevers, and from the irritation arising from local injury.

“ 12. That it is almost invariably found in connection with gastric or abdominal tenderness, in fever; and this tenderness is probably like the soreness of scalp, pains in the limbs, etc., dependent on morbid state of the cord.

“ 13. That, whether in fever or in other complaints, it is met with in the situation of the eighth or ninth dorsal vertebra much more frequently than at any other part of the spine.

“ 14. That affections attended by spinal tenderness are seldom fatal; that, even in those cases of

intense irritation of the cord under which patients suffer extremity of pain for years, the event is generally favorable.

“15. That they frequently, as well as hysteria, occur with all the appearances of a primary affection of the nervous system.

“16. That affections are occasionally met with presenting all the marks of the hysteric character, and perfectly resembling cases described as those of spinal irritation, but unattended by spinal tenderness or any other direct indication of a morbid state of the cord.”

The treatment recommended consists in the removal of the cause if this still continues in action, purgatives, the application of blisters and leeches to the skin, the internal administration of hyoscyamus and belladonna, to lessen the nervous irritability, alum in cases of gastric derangement, and change of air and scene.

In a subsequent work, the Messrs. Griffin* again discuss the subject, but bring forward no additional facts.

Dr. John Marshall † is confident that many vis-

* Medical and Physiological Problems, being chiefly Researches for Correct Principles of Treatment in Disputed Points of Medical Practice. London, 1845.

† Practical Observations on Diseases of the Heart, Lungs, Stomach, Liver, etc., Occasioned by Spinal Irritation, and on the Nervous System in General as a Source of Organic Disease London, 1835.

ceral affections, such as heart-diseases, asthma, phthisis, dyspepsia, diabetes, chorea, and even phlegmasia dolens, are frequently really produced or simulated by spinal irritation. Some of his cases of supposed functional disorder of the spinal cord are, however, obviously organic, consisting of congestion, inflammation, or softening of the organ.

In his classical work, Ollivier* devotes considerable space to what he calls "*an Affection described under the name of Spinal Irritation.*" He considers the pathological condition to be one of congestion of the meninges of the cord, and bases this opinion in great part on the success which according to him, ensues on the use of leeches, blisters, and counter-irritant ointments. In addition, he favors the administration of opium, digitalis, hyoscyamus, belladonna, and subcarbonate of iron.

Türck † regards the phenomena of spinal irritation as being due, first, to disorder of other organs, whereby a morbid impression is propagated along the incident excitor nerves to the spinal cord, or, second, to derangement of the capillary circulation of the cord. That is, the disease may be either of eccentric or centric origin. He does not advance our knowledge beyond the point reached by previous authors.

* *Traité des maladies de la Moelle Épinière.* Troisième édition. Paris, 1837, t. seconde, p. 209.

† *Abhandlung über spinal Irritation.* u. s. w. Wien. 1843.

Coming again to our own country, we find that in 1844 a very valuable paper was published by the late Prof. Austin Flint,* based upon fifty-eight cases of functional disorder connected with an abnormal condition of the spinal cord. In this memoir, without going into any discussion relative to the pathology of the affection, Dr. Flint considers the disorder as giving rise to tenderness over the vertebral column, causing alterations of sensibility, as affecting the muscular system, as producing abnormal mental manifestations, as affecting the digestive organs, the genito-urinary organs, the heart and circulation, and as causing paroxysms of sinking. He then considers the physical habits of the patients, the results of medical treatment, the probable remote causes, and then, at some length, the remedial measures which he has found most successful. Under this head, Dr. Flint advises the use of counter-irritants to the spine, especially cupping, and generally without scarification. Issues he found inapplicable, death ensuing in the one case in which he used them. There is no doubt, however, that in this instance he had an organic disease to deal with, and that the issues had nothing to do with the fatal result. Tonics, especially iron, he found to be of great advantage.

In a very full analysis of the medical reports of

* Observations on the Pathological Relations of the Medulla Spinalis. American Journal of the Medical Sciences, April, 1844, p. 269.

the Stockholm Hospital, by Dr. Magnus Huss,* the subject of spinal irritation receives due consideration. Dr. Huss classes the symptoms of the disorder as follows:

1. Pain of various parts of the vertebral column, existing either idiopathically or developed by pressure.

2. Cramps, either of a clonic or tonic nature, in those parts subjected to the influence of the spinal cord.

3. Loss of power in the same portions of the body, ranging from simple stiffness and weakness to complete paralysis.

4. Altered sensibility, either by excess or by great diminution of sensation.

It will be observed that in this enumeration the author confines his specification of morbid phenomena to those which relate to sensation and the power of motion.

The treatment is fully and philosophically considered. Of external remedies he prefers counter-irritants, using the milder forms first, and then the severer, such as the moxa and the actual cautery, should the first fail. Venesection, either general or local, should be cautiously employed, and is not generally indicated. He is the first, so far as my re-

* British and Foreign Medical Review, October, 1846, p. 463.

searches extend, to mention electricity, a means which he thinks may be employed with advantage in chronic and debilitated cases. Potash-baths are also recommended.

Of internal remedies he specifies iron, opium, strychnia, phosphorus, and valerian, as being preëminently useful.

Axenfeld* devotes a considerable portion of his treatise to spinal irritation. He regards it as being produced either by a trouble of innervation or congestion. In the treatment, leeches occupy the first place, and in light cases blisters, sinapisms, dry cups, and stimulating frictions, are useful. Internally he recommends nothing but quinine and iron.

Dr. Radcliffe† writes very sensibly on the subject of spinal irritation, and gives a typical case which is quite instructive. He incidentally expresses the opinion that the pathological condition is one of anæmia, and he consequently discourages the use of leeches, relying mainly on blisters and tonics.

By still later writers upon affections of the nervous system, spinal irritation has been either entirely ignored or else included as one of the symptoms of that very comprehensive and accommodating disorder, "neurasthenia."

In 1870, as already stated, I read a communica-

* Des Névroses, Paris, 1863, p. 284.

† Reynolds' System of Medicine, London, 1868, Vol. II, page 640.

tion on spinal irritation before the New York County Medical Society, basing my remarks on 112 cases that had occurred in my private practice, and giving it as my opinion that the essential pathological feature was anæmia of the spinal cord. This paper attracted a good deal of attention at the time, and several communications on the subject appeared in the medical journals of the day in which the views I had enunciated were discussed. Since the publication of the monograph in question there has been no work issued on the subject of spinal irritation, though the views I had expressed in 1870 were with amplification embodied in the several editions of my "Treatise on the Diseases of the Nervous System," (1871-1886).

Leyden* also devotes considerable space to the affection in his treatise on diseases of the spinal cord. He declines, however, to assign any distinct morbid anatomical condition as the pathological basis of the disease, rejecting as in his opinion unproven both the congestion and anæmia hypothesis. Under its proper head I shall enter at length into the consideration of this division of the subject.

Erb† distinctly recognizes the existence of an affection of the spinal cord not to be confounded with

* Klinik des Rückenmarks—Krankheiten Zweiter Band S. 3. Berlin 1875.

† "Spinal Irritation." Ziemssens Hand Book. Elfter Band Zweite Hälfte. S, 357.

hysteria or with ordinary spinal diseases with well-known morbid anatomical bases. He repudiates the idea that because we are not certain in regard to the actual lesion of the cord we are bound to refuse a place in our nosology to the category of symptoms which represent a distinct pathological entity—symptoms that are very different from those of any other spinal disorder. As well, he says, exclude tetany, epilepsy, hysterical paralysis and other diseases, the pathological anatomy of which is not known to us.

Ross* devotes less than four pages of his voluminous work to the subject of spinal irritation. It would be difficult to find in any description of the disease a greater number of uncertain or ambiguous statements than are contained in this meagre account of one of the most important of all the spinal disorders. Discussing the essential nature of the affection, he says:

“Nothing is known with regard to the morbid anatomy of spinal irritation. It is probably a functional disturbance of the cord, accompanied by alternating conditions of hyperæmia and anæmia.”

I have thus cited the principal authorities upon spinal irritation, without, however, by any means, exhausting the bibliography of the subject. Notwithstanding the eminence of many of those who have contended for the existence of a definite affection of

* A Treatise on the Diseases of the Nervous System. London, 1881. Vol. II, p. 332.

the spinal cord, characterized by tenderness on pressure over one or more of the vertebræ, and certain eccentric disorders involving sensibility, the power of motion, and functional derangement of many of the viscera, it must be admitted that there are not wanting those who refuse to believe in the existence of such a disorder. Such persons must necessarily belong to one or the other of the following categories: Their experience must have been very limited, and therefore they cannot see; or they must have been endowed either with restricted powers of observation or with minds so constituted as to cause them wilfully to close their eyes to the facts that they did not care to see.

At the same time it is only fair to state that the attempts that have been made to include under the names of spinal irritation, nervous exhaustion, or neurasthenia, certain affections which are not primarily disorders of the nervous system, have had much to do with causing a feeling of scepticism to exist in regard to cases which certainly are due to spinal derangement. The names in question, especially that of neurasthenia, have been applied to explain conditions that they could not logically be made to cover. Thus many cases of disease or disorder of the heart, due to organic difficulties of that organ, or excited by disease of other viscera through the sympathetic system, have been attributed to spinal irritation. The same is true also of the uterus, stomach, liver and other organs, and even of the spinal cord itself, which often, when the seat of

organic diseases, such as congestion, meningitis, inflammation, tumors, etc., has been regarded as simply in a state of irritation. It is very certain, also, that numberless cases of hysteria have been attributed to irritation of the spinal cord, which should not properly have been so considered. For while it is quite true that spinal irritation often gives rise to hysteroid symptoms, it is equally the fact that hysteria and the disorder under consideration are two essentially distinct affections.

CHAPTER II.

CAUSES.

The most powerful predisposing cause of spinal irritation is *sex*. Of the 1,000 cases on which this monograph is based, 852 occurred in females. The like predominance has been noticed by other authors. Thus the Messrs. Griffin,* of 158 cases, found that 112 cases were in women or girls, and Erb† declares that the predisposition to the disease is particularly great in the female sex, though men are not exempt from it. Indeed, this influence of sex is one of the best settled points connected with the affection.

Age is likewise influential in determining to the production of spinal irritation. Of the 1,000 cases of which I have notes, 580 were between the ages of 16 and 25; 226 between 25 and 30; 93 were under 15, and 101 over 35. The period of life between 15 and 25 is thus seen to be that at which spinal irritation is most apt to occur, and the period between 25 and 35 the next in order. About four-fifths of all the cases occurred between the extremes of 15 and 35.

In women the *civil state* as regards marriage and celibacy is of some importance as a predisposing

* Op cit. p. 184, et seq.

† Ziemssen's Handbuch, Elfter Band. Zewite Halfte; p. 359. (Art spinal irritation).

cause. Of the 862 cases occurring in women, 301 were married, 43 were widows, and 518 were unmarried. It would therefore appear that the affection is more apt to occur in women who are not or never have been married than in widows and those living in marital relations, though there is, of course, some degree of uncertainty in arriving at exact conclusions from such statistics.

Hereditary Influence is another factor in regard to which it is almost impossible to obtain any definite information. Probably the majority of the persons who suffer from spinal irritation have had one or more ancestors who have been similarly affected according to the traditions existing in the family; but such accounts are to be treated with great caution as the symptoms existing may have been due to any one of a dozen or more diseases other than spinal irritation, and even if the disease in question had appeared in a succession of ancestors, I doubt much if that fact would be evidence of its heredity. I have observed repeated instances of mother and daughter having suffered from the symptoms of spinal irritation, but I no more thought of attributing the relation to hereditary influence than if they had been affected with inflammation of the bowels. In one case, however, the mother, who had suffered for many years with symptoms indicating spinal irritation of the whole length of the spinal cord, had three daughters, of 12, 14, and 17 years old respectively, each of whom was similarly affected.

The Exciting Cause of spinal irritation is not always easy to ascertain. In 202 cases, I could not by the most careful inquiry find any circumstances likely to have given it origin. In 206 it was manifestly produced by blows, falls, strains or excessive muscular labor; in 180 it was obviously and admittedly caused by sexual excesses, and in 57 by masturbation. In 21 it was apparently due to anxiety, grief, or other depressing emotion; in 15 to excessive mental application, in 15 to insufficient physical exercise, in 69 to unnutritious and insufficient food, in 17 to over-indulgence in the use of alcoholic liquors, in 1 to the excessive use of tobacco, and in 1 to the opium habit. In the remaining 208 cases it followed exhausting diseases, such as typhoid, scarlet, intermittent and remittent fevers, dysentery, diphtheria, cystitis, gonorrhœa, leucorrhœa, erysipelas, etc. I have never been able to satisfy myself of its ever resulting directly from syphilis. The syphilitic affections of the cord are of quite a different character.

In general terms it may be said that any cause capable of reducing the powers of the system may produce spinal irritation.

Sometimes the exciting cause acts slowly, but at others with great rapidity. This latter seems to be especially the case with all mental influences. As illustrations I cite the following instances.

Case 1.—Mrs. S., of good general health and about thirty years of age, was suddenly informed of

the loss of a large sum of money belonging to her. She immediately experienced a sharp pain in the middle dorsal region, was affected with nausea and in a few minutes vomited the dinner she had just eaten. The spine was then so tender that she could not bear the pressure of her clothing upon it, and after this was removed, the slightest touch was unendurable. For several months thereafter she was affected with many of the symptoms indicating irritation of the middle and upper dorsal region of the spinal cord; was unable to endure the most moderate physical exertion without great suffering and exhaustion, and was invariably subjected to an exacerbation of all her symptoms after any emotional excitement or mental exertions. I have rarely seen a more intense instance of spinal irritation than this, and yet it arose almost instantaneously and had reached its height in less than half an hour.

Case 2.—Mrs. P., while walking on the street of a neighboring city, received a sudden mental shock by a brick falling with great force at her feet from a building in front of which she was passing. The escape from death was a narrow one, and she was for several minutes greatly agitated. She was confident that at the very instant of her fright she experienced a sharp painful sensation in the middle of her back and at once became sensible of the fact that the pressure of her clothing hurt her at that spot. So distinct were these feelings that she at first thought a piece of

the brick had struck her on the spine, but examination showed that there had been no direct injury at that or any other part of her body. She called a carriage and was at once driven home, suffering very greatly with her back, and her physician was immediately summoned. A more thorough examination was made with the result of showing conclusively that she had not been struck, but there was already a tender spot over the third and fourth dorsal vertebræ. In the course of a few days the whole spine became tender to the least touch and gradually many other symptoms of spinal irritation were developed.

Case 3.—Miss C., was greatly frightened by her horse running away on the approach of a railway train. The coachman was thrown from the box and seriously hurt, but the carriage was not overturned and the horses were stopped before other injury was inflicted. But the nervous shock to the lady was very severe, and that night she suffered greatly from pain along the whole course of the spine; the suffering being markedly aggravated by the slightest touch. She continued for several years to exhibit symptoms of spinal irritation in a severe form, passing most of her time in bed, and being treated for neuralgia, womb disease, dyspepsia, and so-called "neurasthenia," according to the most predominant condition for the time being but without the slightest benefit. It was not until the true character of her disease was recognized and treatment adopted which experience had shown to be

most beneficial in such cases that permanent relief was finally obtained.

Case 4.—Mrs. K., while lying on a lounge in her bed-room at a watering-place hotel was suddenly startled by the fall of a large quantity of plaster from the ceiling. None of the débris struck her but she nevertheless felt as though she had received a sharp blow in the middle of the back and at the same time experienced severe nausea followed shortly by vomiting. A physician saw her that evening and regarding the disorder as being entirely gastric treated her with ice and effervescing drinks, without, however, giving her the slightest relief. The distress continued all that night and by the morning she was greatly prostrated, both in mind and body. She insisted that an examination of her spine should be made, and when this was done a tender spot was discovered over the fourth dorsal vertebra. Strong pressure on the place at once brought on an attack of nausea and vomiting, and induced severe pain under the mammæ. A blister was at once applied over the affected spot, and rest in the recumbent position enjoined, with the result of stopping all the symptoms in the course of a few hours. There was no relapse.

Case 5.—Mrs. S. had for several years lived unhappily in her domestic relations without any very notable derangement of her nervous system. One morning, however, after a dispute with her husband of more than usual heat and acrimony she suddenly

felt a severe pain in the dorsal region of the spine and was seized with a fit of nausea and vomiting. She had only a short time previously eaten a light breakfast. Almost simultaneously intense infra-mammary pain was developed on both sides. She at once undressed and went to bed, and I saw her that afternoon. On examining the spine I discovered a region of excessive tenderness extending from the second to the sixth dorsal vertebra. Even moderate pressure over this part was sufficient to induce nausea and retching and to add greatly to the pain in the breast. A few hours after my visit a severe paroxysm of palpitation of the heart intervened, attended with difficulty of breathing and nausea and vomiting. I again saw her and discovered a new centre of tenderness higher up in the middle and upper cervical regions, which certainly had not existed at my previous visit.

This case was one of long duration, the patient being for several months unable to walk and almost entirely confined to her bed. There was no paralysis, but the muscular effort of standing or even getting up was certain to cause an increase of the local pain in the spine and to bring on paroxysms of cardiac and gastric disturbances. Finally a complete recovery ensued, and she is at this time free from any evidences of spinal disorder.

It would be easy to adduce other examples of the rapidity with which an exciting cause, especially if of an emotional character, can act so as to induce

spinal irritation, but the foregoing are probably sufficient to establish the point in question, and I therefore pass to the consideration of the symptoms.

CHAPTER III.

SYMPTOMS.

The symptoms of spinal irritation, though numerous, admit of very exact classification and recognition, but it would be too much to expect that in this, or, in fact, any other disease each patient should exhibit in his or her person the whole category of morbid phenomena which go to make up the pathological entity called spinal irritation. The spinal cord is a long organ, and while one part may be the seat of anæmia of the posterior columns, the others may be comparatively healthy. It will be shown, however, that the differences in the symptoms as manifested in the various cases which come under notice, are in the main such as result from the fact that different sections of the posterior columns of the cord are the seats of the lesion.

The symptoms of anæmia of the posterior columns of the cord, or of spinal irritation, as I shall generally call it in this memoir, are *centric* and *eccentric*. The centric symptoms are those which are exhibited by the diseased part of the cord or its immediately contiguous structures. The eccentric those which are developed in the remote parts of the body. It may be advisable to consider these two groups of symptoms separately.

CENTRIC SYMPTOMS.—I. *Tenderness at some one*

or more Points over the Spinal Column, increased by Pressure.—This is the essential symptom of spinal irritation, though varying in intensity from the slight degree of pain experienced upon strong pressure to the acute hyperæsthesia which does not allow of even the contact of the clothing without the production of great suffering. It is generally complained of by the patient, though occasionally it has to be sought for by the physician. The brothers Griffin found this symptom present in all but five out of one hundred and forty-eight cases, and it is very probable that these five were not cases of spinal irritation, a supposition which the authors themselves evidently entertain. Certainly the details of the cases do not support the view which would ascribe their phenomena to any affection of the spinal cord. Most of the other authors I have cited refer to this tenderness as a prominent feature. Parish thinks it alone is to be relied upon as indicating irritation; Mr. Whatton declares that it is never wanting; Axenfeld regards it as the dominant and characteristic symptom; and Radcliffe, while admitting that it is not equally well marked in every case, states the rule to be that spinal tenderness and spinal irritation go together.

On the other hand, Flint does not regard tenderness as an invariable and essential element of the affection under consideration. He found it absent or indistinct in five of his fifty-eight cases, while the

other attendant circumstances furnished unequivocal evidence that the diagnosis was correct.

Mr. Teale asserts that tenderness in the portion of the vertebral column which corresponds to the origins of the affected nerves, is generally evinced in a striking and unequivocal manner by pressure applied over the spinous processes. In some instances he declares the tenderness is so great that even the slightest pressure cannot be borne, and will often cause pain to radiate from the spine to the situation of any spasm or neuralgia that may be present.

Erb states that in the majority of cases the patient complains of pain in the back, and that sometimes the hyperæsthesia is so great that the least touch is sufficient to call forth exclamations of suffering, and that even the weight of the clothing is insupportable. These views of Teale and Erb are such as are generally expressed by the most experienced writers on the subject, and are entirely in accord with the facts that have come under my own observations.

In fact my own experience leads me to consider no case as one of spinal irritation in which abnormal tenderness on pressure over one or more of the vertebræ is absent. Of the one thousand cases on which this treatise is based this symptom was present at some time or other in every one without exception.

*Art. Spinal Irritation Ziemssen's, Handbuch Elfter Band S. 360.

There were times at which it was temporarily absent, either from a sudden remission of the violence of the disease or from the fact that it was not sought for in the right way. And, again, it may disappear early in the treatment before any of the other symptoms have vanished. But, such a thing as a case of spinal irritation running its entire course without abnormal spinal tenderness has certainly never come under my notice. There are diseases of the spinal cord, of course, which produced derangements of other organs of the body similar in some respects to those caused by the affection in question, and which are not characterized by vertebral tenderness, but these are far more serious diseases than is spinal irritation and of altogether different pathology and morbid anatomy.

The seat of tenderness is generally in the dorsal region of the spine. The Griffins found cervical tenderness in twenty-three cases, cervical and dorsal tenderness in forty-six, dorsal alone in twenty-three, dorsal and lumbar in fifteen, lumbar in thirteen, and the whole spine tender in twenty-three. Of one hundred and forty-eight cases, therefore, one hundred and seven exhibited tenderness in the dorsal region.

Dr. Flint found cervical and dorsal tenderness in three cases, lumbar and dorsal in ten, and dorsal alone in twenty-one cases.

Of the thousand cases referred to in this monograph one hundred and seventy-two had cervical tenderness only, two hundred and eighty-one cervical

and dorsal, two hundred and fifty-two dorsal only, eighty dorsal and lumbar, ninety-one lumbar only, and in one hundred and twenty-four the whole spine was tender. Six hundred and thirty-seven cases therefore of the whole number were characterized by dorsal tenderness, and in two hundred and fifty two it was limited to this region.

The degree and character of the tenderness are subject to great variation. In some cases strong pressure is required to develop it, while in others the least touch is insupportable. Sometimes there are shooting pains, which radiate from the tender spot, while at others the hyperæsthesia is quite circumscribed. In a gentleman now under my care with well-marked spinal irritation, and who has a tender spot over the third lumbar vertebra, pressure not only causes intense suffering at that point, but develops pain along the whole course of the crural nerves and their branches as far as their terminations on the inner sides of the feet. Another, a lady, who has spinal tenderness over the eighth cervical and first dorsal vertebræ, experiences, from pressure, intense pain along the course of the first intercostal, the internal anterior thoracic, and all the nerves of the left upper extremity. Why in these and other cases particular nerves should be affected, is a question which will be more fully considered hereafter.

The pain developed by pressure is not always of the same character. Sometimes it is dull and aching,

and at others sharp and lancinating. I have not noticed that any very definite relation exists between the character of the pain and the severity of the other symptoms, though as regards the degree of pain of each kind, there is a marked connection. By this I mean that a dull, aching sensation may indicate as profound a pathological condition, and be accompanied by as intense eccentric phenomena, as a sharp and lancinating pain, though a severe aching pain and a severe lancinating pain always indicate more serious disorder than when these sensations are not so emphatic.

The character of the pain varies in accordance with the tissue in which it is felt. The dull aching sensation is only developed by strong pressure, and is seated in the muscular, tendinous, or cartilaginous structures about the vertebræ. The sharp, piercing twinges excited by slight pressure arise from the skin, and subcutaneous cellular tissue. With these species of sensations, the æsthesiometer always shows increased sensibility of the skin, over and in the vicinity of the painful centres.

To ascertain whether or not the tissues outside of the spinal canal are in a state of hyperæsthesia, the pressure should be made with gradually-increasing force, by means of the thumbs applied to the spinous processes and the intervertebral spaces, as recommended by Flint. The examination should be thorough, and extend throughout the whole extent of

the vertebral column. The fact that the patient denies the existence of tenderness should have no weight with the physician. Thus, a young lady consulted me for severe infra-mammary pain, headache, and nausea. I at once suspected spinal irritation, but she declared, in answer to my inquiries, that there was no sign of tenderness anywhere over the spinal column. I insisted, however, on a manual examination, and to her great surprise found three spots that were exceedingly painful to slight pressure. This young lady had been treated for dyspepsia for several years, without deriving any benefit from the measures used, but was cured by the treatment which I shall presently fully consider. In another case the young lady suffered from obstinate vomiting after the ingestion of food, no matter of how bland a character. She had been treated for gastric catarrh, chronic gastritis, dilatation of the stomach, and cancer, but in spite of all the measures employed, the condition remained unchanged. When she came under my observation I at once suspected the existence of spinal irritation, although there were no centric symptoms that she had noticed. She demurred to my examining her back, but finally consenting, was surprised to find that nearly the whole dorsal region exhibited tenderness on slight pressure. This patient was also promptly relieved by the treatment employed in her case.

Occasionally it happens that the tenderness is not perceived for some time after the pressure is made.

In a recent case I found the interval to be over a minute, and then acute pain developed in the part and following the course of the nerves radiating therefrom was experienced. I am not prepared to offer an explanation of this phenomenon; it is, doubtless, different in import from that condition sometimes met with in locomotor ataxia, in which there is a still more remarkable retardation of the conduction of tactile sensory impressions.

2. *Pain in the Spinal Cord.*—The tenderness just noticed is seated primarily externally to the vertebral canal, and is developed by pressure. That which is now to be considered is located in the spinal cord, and is therefore incapable of being produced by pressure upon non-tender spots. It is a very common symptom, having been present in eight hundred and ninety-three of my cases. Generally it is confounded with spinal tenderness, from which, however, it is quite distinct. It is aggravated by motion of the spinal column, by action of the muscles which have their attachments to the spinous and transverse processes, by percussion, and sometimes by the erect posture. In the case of a gentleman of this city, it was so great when he stood up, that he was forced to keep the recumbent position nearly the whole time. When I first saw him he was wearing an apparatus designed to keep the weight of the head from the vertebral column, and to prevent the vertebræ pressing upon each other, under the idea that he had disease

of the intervertebral substance. I removed the instrument, and, treating him for spinal irritation, he recovered his health in a few weeks.

This local pain can also be developed by mental disturbance, especially that of an emotional character. The cases that I have already cited in detail in the immediately foregoing chapter, are sufficiently illustrative of this fact, though many others might be adduced in its support.

Pain in the spinal cord, in the disorder under consideration, is usually seated near the point of external tenderness, though it is often at a distance, and sometimes is felt throughout the whole extent of the cord. The eccentric phenomena bear a distinct anatomical and physiological relation to it, as do those which are connected with spinal tenderness. There is likewise a similar connection existing between the pain in the cord and the vertebral tenderness.

To ascertain the existence of spinal pain, when it is not spontaneously felt or superinduced by muscular exertion, percussion should be practiced. The ends of the fingers will answer for this purpose, though I prefer a little vulcanized india-rubber hammer, and a plessimeter, such as are sometimes used for percussing the chest. Even over spots which exhibit much tenderness, the deep-seated pain in the cord itself can clearly be distinguished.

Another method for discovering the existence of

the condition under consideration is to pass a wet sponge connected with the cathode of a galvanic battery down the spine over the spinous processes. A decided aggravation of the painful sensation produced by the galvanic current will be felt when the seat of the disease is reached.

ECCENTRIC SYMPTOMS.—By far the most important and noticeable symptoms of spinal irritation are to be found in distant parts of the body. These vary in their character and seat, according to the part of the spinal cord affected. Following the example of the Griffins, I shall consider these symptoms as they depend upon the irritation of the several regions of the cord with which they are connected.

A. The Cervical Region.—Of the cases upon which this paper is based, in 172 the irritation existed in the cervical region only of the spinal cord, in 281 the cervical tenderness was conjoined with dorsal tenderness, and in 124 with tenderness of the whole spine. Taking the uncomplicated cases as presenting the clearest features, the following would appear to be the more prominent symptoms of cervical spinal irritation:

Vertigo was an accompaniment in 101 cases, and *headache* in 157; *noises in the ears* in 61 and *disturbance of vision* in 53; *fulness* and a *sense of constriction across the forehead* were complained of in a majority of cases as was also *tenderness of the scalp*. In addition the *mind* was more or less affected in every case, and in

83 the aberration was of such a character as to almost amount to insanity. Thus:

Case 6.—Mrs. J., married, æt. 30, had suffered from tenderness of the cervical portion of the spinal column for several years. The eccentric symptoms were mainly referable to the head, and consisted of tenderness of the scalp; headache and paroxysms of maniacal excitement occurring every day. During these exacerbations she was so violent that it was necessary to subject her to physical restraint, in order to prevent her injuring herself or others, or destroying the various valuable objects by which she was surrounded. She had a special proclivity to injuring books, tearing the leaves and engravings from them and rolling them up into balls, and throwing them at the persons who approached her. These seizures lasted but a few minutes each time, and were not accompanied by a loss of consciousness. They were, therefore, not epileptic in character. In the intervals she was perfectly rational and at times even at the height of her excitement was able to control herself by a strong mental effort.

Case 7.—Miss C., age twenty-three, had been the subject of cervical spinal irritation for nearly a year before any symptoms of mental derangement were exhibited. One day her brother accidentally struck her on the back of her neck with an Indian club that he was swinging around his head. The pain caused by the blow was so intense that she fainted, and on regaining consciousness became violent, endeavoring

to pull out her hair, scratch her face, tear up her clothing, and to injure those about her. It was necessary to restrain her by having her held by two strong nurses. The paroxysm lasted for nearly an hour when she became calm, declaring that she was fully conscious of every act that she had committed during the period of excitement. She had several other seizures of like character, but was finally cured by treatment addressed to the spinal cord, consisting in the main of blisters repeated in quick succession.

Case 8.—Miss W., age thirty-four, had suffered almost ever since leaving school at the age of eighteen, with pain in the cervical region of the spinal cord, of both the kinds which have been considered. Among the symptoms which had been of late development, was an intense melancholy, unaccompanied by delusions, and for which there was no cause due to her surroundings. For several hours each day she paced the floor, wringing her hands and sobbing, and unable to allege any reason for the emotional disturbance. A remarkable feature connected with the case was that these paroxysms could be induced by pressure applied to the cervical region of the spinal column. In fact she could herself bring them on by pressing strongly on the skin over the fifth and sixth cervical vertebræ. I frequently saw her during her paroxysms, and am well assured that the mental disturbance was the direct consequence of the derangement of the spinal cord. The relation was so obviously one of

cause and effect that no competent observer could have failed to recognize it.

Such cases as the foregoing are of comparatively rare occurrence, but instances of a less degree of mental disturbance are by no means uncommon when the cervical region of the cord is the seat of the disorder. Thus there may be changes of disposition or even of character, hallucinations and illusions of various kinds, principally affecting the senses of sight or hearing which, however, make no very strong impression upon the mind, rarely being accepted for realities, and varying from time to time in their characteristics.

Sleep was deranged in every case, generally in the form of insomnia, though in some cases there was a decided tendency to somnolence. Very generally there were dreams of an unpleasant character. In six instances there was night-mare and in two somnambulism.

Neuralgic pains were present in one hundred and sixty-eight of the uncomplicated cases and in nearly all the others in which cervical tenderness was conjoined with tenderness of other regions of the cord. If the upper part of the cervical region was the seat of the irritation these pains were experienced in the scalp and face; if the lower, they were seated in the neck, shoulders, superior part of the chest and the upper extremities.

Sometimes the pain was of a dull burning character and was then generally seated in the muscles of

the neck. Muscular efforts always increased the suffering.

In accordance with Teale's experience it several times occurred that the neuralgia was intermittent, the paroxysms coming on at about sundown and lasting through the night. In none of these cases was there anæsthesia.

Motility was deranged in one hundred and sixty-one cases. Sometimes there were *fibrillary twitchings*, in others *clonic spasms* of the muscles of the face and neck, *general chorea*, *contractions* of the flexors of the arms on one or both sides, so that the elbows were rigidly bent, while in others the contractions were in the flexors of the hand and fingers. In five cases there was complete loss of power over the hand. In seventeen aphonia, and in three almost constant hic-cough while the patient was awake.

Spasmodic stricture of the œsophagus was met with in four cases, though in no one of these did it last more than a day at a time. While it was present, however, it was severe in character, it being impossible for the patient to swallow, or for a bougie to be passed without much difficulty. In three cases there was *asthma*, but in none of the others was there any derangement of the process of respiration.

Nausea was present more or less in more than half the cases, and in several part of everything taken into the stomach was immediately rejected.

B. The dorsal region.—As already stated, I found

the dorsal region of the spine tender in six hundred and thirty-seven cases of the one thousand constituting the basis of this memoir, and in two hundred and fifty-two it was limited to this section.

The most prominent symptoms of these cases were connected with the viscera, the stomach being the organ commonly involved; thus gastralgia was prominent in every case; nausea and vomiting in one hundred and fifty-three; pyrosis in forty, gastric flatulence in sixty-four, and acidity, as evidenced by eructations and heart-burn in two hundred and sixty.

Next in order came the heart. There were palpitations in two hundred and one cases, fits of oppression during which the heart beat with irregularity as regarded force and rhythm in sixty-six cases and attacks of syncope in forty-nine.

There were difficulty of breathing and cough in about one half the number of cases.

Intercostal neuralgia existed in forty-two cases, and inflammatory pain in two hundred and sixty-six cases. These statistics refer only to the uncomplicated cases of irritation existing in the dorsal region of the cord. In those instances in which dorsal tenderness was conjoined with the like condition of other regions the symptoms were more or less intermingled, as was naturally to have been expected.

C. The Lumbar Region.—This portion of the spine exhibited tenderness in two hundred and ninety-five cases. In eighty of these it was accompanied by dor-

sal tenderness, in one hundred and twenty-four the whole spine was affected, and in ninety-one the tenderness was confined to the lumbar region. Of these latter, all were characterized by neuralgic pains in the lower extremities, and in twenty-seven of them there were similar pains in the muscles of the back and abdomen. In eighteen there was spasm of the neck of the bladder accompanied by severe pains, and causing great difficulty in urinating; in eleven there was incontinence of urine; in thirteen pain in the uterus and ovaries; and in eight neuralgia of the rectum.

Derangements of the sexual apparatus were met with in about two-thirds of all the cases in men and women in which the lumbar region of the cord was involved. Sometimes there was an increase of the sexual appetite, and at others this was either greatly diminished or else entirely abolished.

Motility was affected in eighty-two cases. In some of these there were strong tonic contractions of the muscles of the lower extremities, and in others very great weakness or complete paralysis. In all these, there were occasional clonic spasms simulating chorea.

Of the 80 cases in which there was also dorsal tenderness, the symptoms were in general those characteristic of spinal irritation of both regions.

D. The whole spine was tender in 124 cases, and so extensive was the hyperæsthesia that it was scarcely

possible to press upon the most limited spot without producing pain. *Neuralgic Pains*, either in the scalp, face, neck, chest, upper extremities, abdomen, pelvis, and lower extremities, were present in every case according to the part most affected for the time being. *Epileptic convulsions* occurred in seven cases; in three *paralysis*, sometimes of the upper and sometimes of the lower extremities, and in 24 *contractions* of the limbs. The heart was disordered in 34 cases; the stomach in 119; in 41 there was *difficulty of swallowing*, from paralysis of the muscles of the larynx, and in three *aphonia*.

In many of these cases there was derangement of the genito-urinary system, similar in character to that previously referred to.

It is a somewhat remarkable fact that there are no marked disturbances of the intestinal digestive system that can be attributed to spinal irritation. Occasionally constipation is met with, and again there is diarrhœa. Probably the first of these conditions is due more to the rest which the patient is so generally forced to take, than to any direct influence of the spinal disorder. Neither it nor the diarrhœa appear to be more common than like states are in persons who pass for being in good general health. I have not thought it advisable to give detailed accounts of the cases of spinal irritation under the several heads of the cervical, lumbar, and dorsal regions of the cord. Nothing would be gained by such specific descriptions

in addition to the brief references to which I have thought it best to confine myself. In their general features these cases are very much alike, and it would have been tedious both to the reader and to myself to have cited them at length.

CHAPTER IV.

DIAGNOSIS.

Recollecting that no case is to be regarded as one of spinal irritation which is not characterized by spinal tenderness, we have our diagnostic inquiries limited to the distinguishing of spinal irritation from other spinal affections. It is certainly true that the distinction has often been overlooked, and at times there is a real difficulty in forming a correct judgment. Nevertheless, by carefully estimating all the circumstances, permanent errors of diagnosis are not likely to occur.

There are three diseases of the spinal cord which may in their earlier stages be confounded with simple spinal irritation. These are chronic myelitis, meningitis, and congestion. As the treatment of these affections is in many respects the exact reverse of that proper for spinal irritation, and as they are of far more serious character, it is important to make as early and as correct a discrimination as possible.

In both spinal irritation and myelitis there is tenderness over some part of the vertebral column, which tenderness is increased by pressure, but this tenderness is never due to hyperæsthesia of the skin, whereas in spinal irritation it often is.

In spinal irritation there is never, so far as my

experience goes, anæsthesia, whereas this is a constant accompaniment of myelitis.

The contractions which take place in some cases of spinal irritation are painless, while those due to myelitis are attended with great suffering.

In myelitis there is a sensation as if a tight cord were tied around the body at the upper limit of the paralysis, a sensation which is always absent in spinal irritation. It is true that Mr. Teale has described several cases which he classed as spinal irritation and in which the sensation of constriction was present, but careful examination of the histories leaves scarcely a doubt that they were really cases of myelitis.

The bladder is rarely ever paralyzed in spinal irritation, whereas in myelitis, it generally is, if the inflammation be located in the lower dorsal region of the cord. The same is true of the sphincter ani. Myelitis is always productive of paralysis, and there is always more or less atrophy of the paralyzed muscles. Spinal irritation seldom gives rise to paralysis, which, when it does result, is always complete, and is never productive of atrophy.

The progress of myelitis is generally, unless arrested by appropriate treatment, toward a worse condition, whereas no such tendency is manifested by spinal irritation.

From spinal meningitis, spinal irritation is distinguished by the circumstances that in the former disease there are constant painful spasms of the muscles of

the back, pain in the cord, and no spinal tenderness increased by pressure.

From congestion of the spinal cord and its membranes, spinal irritation is sufficiently distinguished by the facts that there is little or no pain in the cord in the first-named affection, and no spinal tenderness. In congestion, likewise, the paralysis and other symptoms are always worse after the patient has been lying down, while in spinal irritation the recumbent position always alleviates the condition.

Another means which in doubtful cases will invariably lead to a correct diagnosis is afforded by the known effects of certain medicines. Thus spinal irritation is, as I have several times ascertained, made worse by the administration of ergot, while each one of the other diseases I have named is alleviated. The reverse is true of strychnia, which in all cases aggravates the symptoms of myelitis, meningitis, or congestion. A hypodermic injection of the thirtieth of a grain is sufficient to settle the matter in cases where the diagnosis is of difficult formation.

In many cases of excessive nocturnal emissions and of prostaticorrhœa there is a coexistent pain in the spine, but in these instances there is no tenderness on pressure, and the pathological condition is probably congestion rather than anæmia. Sleeping on the back, as is well known, aggravates the symptoms from which the patient suffers, as does also strychnine unless it is given in small doses after the morbid state

has been in a great measure cured by other means. These consist of agents calculated to lessen the amount of blood in the cord, and chief among them are ergot and the bromides.

The flatulence, eructations, and vomiting, are very symptomatic of spinal irritation, while they are rarely phenomena of either of the other affections.

One other disease is liable to be confounded with spinal irritation, and that is angular curvature, in which there is spinal tenderness increased by pressure. The facts, however, that strumous disease of the vertebræ generally occurs in children, that the scrofulous diathesis is always present, that an angular prominence can be detected by careful examination, that the paralysis progressively becomes more profound, that the constitutional effects are more severe, are sufficient, even in doubtful cases, to guide to a correct diagnosis.

CHAPTER V.

PROGNOSIS.

The prognosis in cases of spinal irritation is generally favorable. In fact, so far as my experience extends I have never seen a case which entirely resisted treatment, and very few in which a cure was not ultimately effected. When remedies suitable for the disease do not prove successful, it is usually because the patient does not steadfastly persevere in their use.

The cases which are most likely to prove unamenable to remedial measures are those in which the disease has lasted for several years, and during the greater part of which period the patient has been confined to bed. In such instances it not infrequently happens that the tenderness of the spine and the more severe of the other symptoms disappear under the treatment adopted, and yet the patient remains bed-ridden—here the influence of habit comes in to antagonize the physician's efforts. The patient has been so long in the recumbent posture that it has become a second nature with her. I say with *her*, for it is almost invariably the case that such patients are women. They do not wish to get out of the bed, and it is often the case that liking the sympathy and the notoriety which their disease gives them they do not wish to be cured. They are the opprobria of our art, and they require moral suasion, or strong mental co-

ercive treatment more than they do strictly medicinal agents. It is, of course, our duty to employ these, but their consideration falls more appropriately under another division of the subject.

CHAPTER VI.

PATHOLOGY.

I have already stated it as my opinion that the essential condition of spinal irritation is anæmia of the cord. Other writers have ascribed it to inflammation, congestion, hysteria, and numerous other factors. The reasons which have induced me to arrive at this conclusion are briefly as follows: Owing to the fact that spinal irritation is not *per se* a fatal disease, we rarely have the opportunity to verify any views we may hold in regard to its pathology. In the few cases in which post-mortem examinations were made nothing abnormal was found, a circumstance, however, far more compatible with the idea I have expressed than with any other.

In all cases in which the patho-anatomy of a disease cannot be positively ascertained, we are warranted in constructing a hypothesis of its real nature from such data as is at our command. It is better to do this, even if the view we enunciate is not absolutely sufficient to account for all the observed phenomena, than to shut up our opinions in our own minds, or, worse still, form none whatever. An erroneous doctrine or theory is better than that silence of mental hebetude which neither excites discussion nor prompts to further investigation. The drones and the dullards sit quietly with folded hands waiting for "something to

turn up," till some one bolder and more searching than they pitches a hand-grenade, in the shape of a new theory, into their midst, when sad indeed is their condition if they do not at least unite in an attack on the assailant. From the resulting contest only ultimate good can come. The theory is sifted, its pretensions are confirmed or exposed, new facts are adduced, and in the end there is a positive advance of science. As to the personal abuse that may pass between the combatants, that is a small matter. A man is probably neither better nor worse for holding any view he chooses relative to the pathology of spinal irritation.

In another place* I have given full details relative to the views of other authorities on the subject of the pathology of the disease in question. As there stated, my own opinion is, that it is due to anæmia of the posterior columns of the spinal cord; but as this hypothesis has been called in question, it is, perhaps, only proper that I should state the reasons for the belief somewhat more at length than heretofore.

1. It is said that the spinal cord is not liable to be rendered anæmic unless the whole system is in a like condition. This position is put forth by, among others, my friend Dr. Bauduy,† of St. Louis, in his very excellent volume on diseases of the nervous sys-

* A Treatise on the Diseases of the Nervous System, eighth edition. 1886.

† Lecture on Diseases of the Nervous System, 1876, p. 308.

tem, and by certain anonymous writers. "I must confess," says Dr. Bauduy, "that I cannot understand these limited conditions of anæmia, any more than I can those momentary congestions of the brain which play so great a part in the diagnoses of many physicians." But does Dr. Bauduy, or anyone else, understand why a congestion should at times be limited to the mucous membrane of the fauces, or the conjunctiva of the eye? Do we understand why the emotion of shame should produce congestion of the skin of the face—blushing—or why fear, instead of making the whole body anæmic, should have its effect also limited to the face, producing a death-like pallor of that part of the cutaneous surface? Is there any more reason why disease should be restricted to the stomach, or intestines, or to one lung, or kidney, than to the spinal cord? These, and hundreds of other instances, are for the present ultimate facts. When they are explained it will be time enough to ask why the spinal cord should be the seat of a special anæmia.

That general derangement of the health accompanies most cases of spinal irritation is certainly true. We have seen how the brain, the heart, the lungs, and the digestive system are liable to be involved. Such disorders are, however, the consequences, not the causes, of the spinal trouble, and when the latter is cured they disappear.

2. Again, it is alleged that the spinal cord is of such small dimensions throughout its whole length

that it is impossible for the posterior columns to be anæmic without all the rest of the thickness of the organ being similarly affected. Now, the spinal cord is like the brain, a compound organ. It has various functions, as it has various distinct anatomical parts. There are seven of these divisions in each lateral half of the cord, and each posterior column is in reality composed of two anatomically, physiologically, and pathologically separate parts. Recent investigations have shown us that a disease, the existence of which will probably not be questioned—locomotor ataxia—is essentially located in one of these parts, and that the others may remain unaffected. Locomotor ataxia is due to an organic change in the nerve tissue, and this change is detectable by microscopic examination after death. In one such case, investigated very thoroughly by Pierret, the posterior root-zones, the more external of the two divisions of the posterior columns, were found to be diseased, while the columns of Goll, the more internal divisions, were unaffected. It has also been shown by Pierret that the columns of Goll may also be the exclusive seat of disease.

Now, if these things are true—as they certainly are—of the separate parts of the posterior columns, why may they not be true of the whole columns? Locomotor ataxia is a terrible disease, and yet it may be restricted in its location to a portion of the spinal cord less than one-tenth of its entire thickness.

Again, we have diseases of the cord restricted to the antero-lateral columns, to the anterior horns of gray matter, yes, even to a single group of cells of one horn, all the rest of the cord remaining healthy, so far as the phenomena observed during life and the most minute post-mortem examinations are capable of teaching us.

And what is true of the spinal cord is true of other organs of the body. There is not one which may not be the seat of a morbid process in some exceedingly limited part, while the remainder of its tissue presents no evidence of disease. Indeed, the reverse is the exceptional condition.

In view of these facts, it strikes me that those who assert—and it is mere assertion—that anæmia cannot be limited to the posterior columns of the cord forget some very obvious analogies with which they ought to be familiar.

3. The symptoms of spinal irritation are more certainly referable to anæmia than to any other condition. Irritation, or an undue susceptibility to be impressed, is the best evidence we have of weakness, and weakness means defective nutrition, or, what is the same thing, a deficient supply of healthy blood. Thus, an anæmic retina cannot bear the full light of day; an anæmic heart beats with great rapidity; a weak stomach rejects the food which enters it; an anæmic brain aches, and the pain is relieved by stimulants; weak muscles tremble on the

slightest physical exertion, and an exhausted generative system is brought into an unnatural state of erethism by excitations which in health would be unfelt. Even the irritable mind is more frequently the result of an exhausted or badly nourished brain than of any other cause. It is, therefore, strictly within the bounds of analogy that an irritable spinal cord should be the seat of pain, and that organs in anatomical relation, through their nerves, with such a cord should exhibit indications of morbid sensibility.

As regards this latter point, we have additional proof in the fact that pressure made upon the painful spot will frequently produce pain, motor derangements, or visceral disturbance in those parts or organs deriving their nervous supply from that part of the cord. In a young lady, who was the subject of spinal irritation at the level of the sixth dorsal vertebra, pressure on that spot always induced nausea and vomiting. In another, in whom the disease was similarly situated, pressure over the painful part excited intense pain under both mammæ.

4. Upon the principle of exclusion we are justified in assuming the patho-anatomical feature to be anæmia. There is no other known condition which could give rise to the phenomena. The symptoms of other affections of the spinal cord are well known, and are for the most part exceedingly definite in their indications. The alterations in the nerve structure, to which they are due, are easily detectable after

death, and hence groups of symptoms are readily associated with well-known lesions.

5. The suddenness with which spinal tenderness may be developed indicates with great positiveness a disturbance due to vascular derangement of some kind. The brothers Griffin* refer to cases of spinal tenderness suddenly induced by alarming news or other emotional cause, and accompanied in one instance by spasm of the stomach, in another by menorrhagia, in a third by ischuria, etc.; and I have already cited a similar case among others occurring in my own experience. Now, I think it is more reasonable to ascribe the cause of the pain in the cord and the visceral troubles to anæmia, suddenly induced by vaso-motor spasms of the spinal vessels, than to attribute it to any other factor. The only other possible one is congestion, and this, if limited to the posterior columns, would induce anæsthesia, not pain, just as we see it does in the very earliest stage of locomotor ataxia.

We frequently see cases in which sudden emotional disturbance has produced headache. The pallor of the face and the facts that the recumbent position and some cardiac stimulant, as a glass or two of wine, afford speedy relief, very clearly show us that the intracranial condition is anæmia. The pain in the spinal cord and the accompanying phenomena are equally effectually cured by similar means.

* Op. et loc. cit.

6. The actions of certain medicinal agents, when administered in cases of spinal irritation, point out to us the nature of the spinal disorder. Thus, those medicines, such as strychnia, phosphorus, and picrotoxine, which increase the amount of blood in the cord, are the remedies which are most effectual in combating the disease; while others, such as ergot and belladonna, the action of which is to diminish the amount of intra-spinal blood, invariably aggravate the symptoms. The fact just alluded to, relative to the relief which, in cases of spinal irritation, follows on the assumption of the recumbent position, points in the same direction. Such patients are always better after they have been lying down. On the other hand, an individual affected with congestion or inflammation of the cord always experiences an increase in the intensity of the phenomena while lying down for a time after rising.

7. The promptness with which certain functional derangements disappear, when local applications are made to the affected region of the cord, indicates that this latter is the primary seat of the disease. In an interesting lecture, forming one of the present series, my friend, Dr. Jewell, takes the view that the spinal trouble, even when located in very limited regions of the cord, is the result, not the cause, of the functional derangements of other organs so generally observed as accompaniments. But, according to my experience and that of others who have studied the subject, the

very reverse is the case, and upon no other hypothesis can we explain the immediate relief which follows in many cases the application of counter-irritants to the skin over the affected region of the cord. Thus, a short time ago, I was requested to go to New Jersey, in consultation with Dr. E. W. Lambert, of this city, to see a young lady who, for several weeks, had been vomiting incessantly, till at last her life was despaired of. I found her reduced almost to the last extremity, for, to all appearance, she had not many hours to live. Everything taken into the stomach was at once ejected, the skin was cold and clammy, the pulse a mere thread; she could scarcely speak, even in a whisper, and I thought she would sink through the exhaustion induced by the movements of the body necessary to enable me to make the requisite examination of her spine. Tenderness was discovered at the very uppermost part of the cervical region. I applied the actual cautery freely to this part, gave morphia hypodermically, and alcohol stimulants by the rectum. The vomiting ceased at once, and the next day Dr. Lambert found that her stomach was capable of retaining small quantities of warm stimulating drinks. Recovery was rapid and complete.

In another case, that of a young lady from the British province of New Brunswick, no means sufficed to stop the almost constant vomiting, till a large blister was applied to the tender region of the spine, and then the relief was prompt and complete.

Now if, in such instances, the gastric disease had been the first trouble, by what reasoning could we explain the fact that it was cured by counter-irritation to the spine? Clearly, such cases, if they teach us anything, go to show that the primary disorder is in the spinal cord. Dr. Jewell expresses doubts as to this condition being anæmia, and ascribes it in part to "defective nutritive supply." But in what respect this differs from anæmia I do not know. To my mind they are one and the same thing.

8. Now, supposing that the disease is situated in the spinal cord, and that it is anæmia, what warrant have we for going further, and placing it mainly, if not altogether, in the posterior columns?

To answer this question we must, in the first place, consider the normal physiology of the posterior columns, and in the next, the bearing of the phenomena which are manifested in cases of spinal irritation.

The posterior columns consist of the white matter in each lateral half of the cord lying between the posterior median fissure and the posterior horn of gray matter. They are divided into two parts; the columns of Goll lying on each side of the posterior median fissure, and the posterior root-zones, the external boundary of which is on each side the posterior horn of gray matter.

As regards the physiology of these columns, experiments performed on living animals uniformly go

to show their intimate relationship with sensibility. In regard to this point, I cannot do better than quote the remarks of Professor Dalton,* whose work on physiology is before me, though I may quote to the same effect from any other author on that branch of medical science:

“What parts of the spinal cord are sensitive or excitable under the influence of artificial stimulus?”

“When the spinal cord is opened in the living animal, the first portions of the cord which present themselves for examination are the *posterior columns*. The irritation of these columns by artificial stimulus, according to the united testimony of all observers, produces evident signs of sensibility in the animal. It is also found by experimenters generally that this sensibility is most marked in the immediate neighborhood of the attachment of the posterior nerve roots; while at the greatest distance from this point, namely, at the inner edge of the posterior columns, on each side of the median line, their sensibility may be nearly absent. It is evident that the sensibility of the posterior columns is largely due to the presence of fibres of the posterior nerve roots which may be included in the irritation, and many of which traverse the outer portion of the posterior columns horizontally in their passage toward the gray matter. The only discrepancy on this subject is in regard to the question whether the fibres

* Human Physiology, sixth edition, 1875, pp. 449.

of the nerve roots are the only sources of sensibility for the posterior columns, or whether longitudinal columns themselves are also sensitive. According to some authors (Van Deen, Brown-Séguard, Poincaré), the posterior columns have no sensibility of their own, but only what is due to that of the posterior nerve roots; since, if these roots be torn out, irritation of the posterior columns no longer produces any perceptible sensation. In the experiments of Schiff and Vulpian, on the other hand, the posterior columns, after being divided by a transverse section, and then separated from the adjacent parts for a distance of several centimetres in front of the point of section, still indicates the existence of sensibility when subjected to irritation. Irritation of the posterior columns, like that of sensitive tracts generally, produces also movements in various parts; but these movements are reflex in character, and are simply the signs of an irritation communicated to the nervous centres.”

Of course, pathologically it makes no difference whether the pain experienced in the cord, as a consequence of irritation, is due to the presence of the posterior nerve roots or not; for these are in reality, an integral part of the posterior columns—of that portion which we now call the posterior root-zones, or columns of Burdach.

The fact that anæmia of nervous tissues causes pain in them, and is therefore a source of irritation, has already been shown, and will perhaps scarcely be

questioned by any one. It is a law that irritation existing in a nerve centre gives rise to pain in those parts which are supplied by nerves coming from the irritated portion. Now, we have only to reflect that pain is the chief expression of spinal irritation, and we will have no difficulty in understanding the relation existing between the disease in question and anæmia of the posterior columns of the spinal cord. In fact, spinal irritation and anæmia of the posterior columns of the cord are, so far as we can see, the same thing.

It may be, however, that the condition of the spinal cord in cases of spinal irritation is not always the primary derangement. Now that the function of the sympathetic nerve, as regards its action in regulating the calibre of the blood-vessels, is so satisfactorily proven, we can partially understand how local congestions and anæmias may be superinduced. It is probable, therefore, that the original difficulty in many cases of spinal irritation resides in the sympathetic system, and the intimate anatomical relations existing between the two nervous centres is strongly in favor of this suggestion.

On the other hand, many of the phenomena of spinal irritation point strongly to the secondary involvement of the sympathetic system. It is thus that the visceral disturbances which form such prominent features are mainly to be explained.

The pathology of several others of the more

striking symptoms of spinal irritation has been a subject of frequent discussion, but at the present day presents no difficulties. Thus the excitation of pain in the tissues to which the cutaneous nerves are distributed results from the law that irritation at a nervous centre induces pain at the points in which the nerves arising from that centre end. Each compound spinal nerve sends a twig to the skin contiguous to it, and these twigs terminate immediately over the spinous processes. Now, whenever an irritation is thus transmitted to the periphery, it may be reflected back to the centre whence it came, by local irritations. Thus a patient is suffering from chronic inflammation of the spinal cord, and in consequence has pains and muscular spasms in his lower extremities. An irritation applied directly to the cord increases the pain and spasms; an irritation applied to the lower extremities augments the pain in the cord, and may induce pain and spasms in distant parts of the body. Hence it is that pressure on the skin over the spinous process not only causes cutaneous pain, but also gives rise to spinal pain, and neuralgic sensations in those nerves which come from the irritated part of the cord.

The pain existing in the cord is aggravated by percussion or muscular action. The spinal cord, it is true, is enclosed in a strong and thick, bony canal, which, however, is entirely filled by its contents. A blow, therefore, on the exterior of the column causes a vibration, which is propagated through the bony

structure to the cord and its membranes. If this blow be very violent, the concussion may be such as to inflict irreparable damage on the cord. When any portion of the cord is in a state of irritation, a very light blow upon the spinous processes, over the disordered part, will cause severe pain, or notably add to that already present. The vertebral column is flexible, and therefore muscular action may, by producing deviations from the ordinary line followed, occasion pressure, and, in the abnormal condition of the cord, excite pain.

Let us consider such cases as we are likely to see very often in the course of practice. Spontaneous pain in the upper region of the spine; a sharper and different kind of pain developed on pressure over the third and fourth dorsal vertebræ, which radiates to both side of the chest; there are infra-mammary pain and intercostal neuralgia; nausea and vomiting as common phenomena on the ingestion of food into the stomach, and involuntary twitchings of the muscles of the upper extremities. In these and similar cases, in which there are visceral derangements and spasmodic movements, these are reflex in character, and in those others in which there are paralysis and tonic muscular contractions, the morbid action probably extends to the lateral columns.

From all these points it appears to me that the pathology of spinal irritation is as clearly made out as that of any other disease in which we do not have the

opportunity of making *post-mortem* examinations, or in which, having such opportunities, the lesion remains undiscovered. In all such cases—and there are not a few, epilepsy, chorea, and hysteria and its analogues being among them—pathologists differ. It is better, however, as I said before, to have an erroneous opinion than none at all. If the one I have brought forward be wrong, let the fact be demonstrated, and I promise that it will go the way of many more which I and others who work have had to part with.

CHAPTER VII.

TREATMENT.

The principles of treatment applicable to spinal irritation are four:

1. To remove the cause.
2. To improve the general tone of the system.
3. To increase the amount of blood in the spinal cord and thus to improve the nutrition of this organ.
4. To set up a counter-irritant action in the vicinity of the disordered region of the cord.

1. The first indication is one that common sense teaches relative to all diseases, the cause of which is still in operation. It will very generally be found in cases of spinal irritation that there is or has been over-work or defective nutrition, or improper hygienic factors of some other kind, which must be overcome before success is possible. Sometimes the exciting influence is emotional, and this is usually most difficult to subvert. It is astonishing how very greatly emotional disturbance affects the disease in question, for better or worse, according to its character. It would appear in many cases that the spinal vessels are like those of the skin and the face, contracting and dilating according to the kind of emotion acting upon them. Emotions of a depressing character certainly aggravate the disorder, while those which are exhilarate

rating diminish the intensity of all the symptoms. Sometimes we find it impossible to change the current of morbid feeling, and then we will assuredly find our remedies fail of their full power. There are no salves that will heal a burnt hand if the patient keeps sticking the member into the fire.

2. The general tone of the system is to be improved by the use of tonics such as iron, quinine, mineral acids, cod-liver oil, and alcohol. In some cases iron, though indicated by the general condition of the body, is badly borne, causing gastric disturbance and headache. In such cases manganese—the sulphate, for instance—may be substituted in corresponding doses, with advantage. There are very few stomachs, in my experience, that will not tolerate manganese, and it appears to be fully as efficacious as iron in increasing the number of red corpuscles in the blood, improving the appetite and facilitating digestion.

I have made considerable use of the lacto-phosphate of lime, either singly or in combination with quinine, and am satisfied of its eligibility as an improver of the physical strength. It may be given in doses of from half a drachm to a drachm, three times a day, in water, after meals.

Alcohol, in some form or other, is an article of food which cannot very well be done without, if our prime object is to cure our patients. Of course, it is liable to be abused. I am sorry this is so, but if we

dispense with its use, we do so to the disadvantage of those whom it is our duty to cure by the means at our command. The form may safely be left to individual taste or peculiarity, but, as a rule, it will be found that the stronger liquors—whiskey, brandy, rum, and gin—agree better with the stomach than wines or malt beverages, besides being more curative in their influence.

3. The amount of blood in the spinal vessels may be increased by strychnia, phosphorus, and opium. I am much in the habit of giving a prescription in cases of spinal irritation which generally acts very happily. It is:

℞ Strychniæ sulphatis, gr. ʒ. i.
Quiniæ sulphatis,
Ferri pyrophosphatis, ää ʒ i.
Acidi phosphorici diluti,
Syrup zingiberi ää ʒ ij.
M. Ft. sol.

Dose: A teaspoonful three times a day, in a tumbler of water, after meals.

It should be taken persistently for a month, or even longer, if it appears to act favorably.

If the digestive power of the patient is weak, pepsine in the proportion of a drachm and a half may be added to the foregoing prescription, and by pepsine I mean the substance in its pure state uncontaminated with starch or sugar. Several articles of good quality are in the market. For several years I

have used Fairchild's and have always found it reliable.

Phosphorus may be used in its uncombined form or as phosphide of zinc, an eligible substitute which I have used for several years. Of course, the phosphide of zinc is administered for the purpose of obtaining the remedial effect of the phosphorus that enters into its composition. It may be advantageously combined in a pill with extract of nux vomica, in the proportion of a tenth of a grain of the former to a half of a grain of the latter substance.

Opium is a remedy of great power in spinal irritation, and is especially useful in those cases in which there are contractions of the limbs. It acts with even greater effect than it has been shown to do in cases of cerebral anæmia. I generally prefer to give it in the form of a pill of one grain, taken morning and night, though it is sometimes advisable to administer it either in the form of suppositories of the aquæous extract, or by hypodermic injections of morphia. I have frequently seen contractions, which had persisted for several weeks, relax in a few minutes under the influence of opium administered in either of these ways.

Latterly, I have made considerable use of picrotoxine in the treatment of cases of spinal irritation; its action seems to be very much like that of strychnia and it appears to exercise a decidedly beneficial influence in improving the nutrition of the cord. Experi-

ments made several years ago, by Orfila and Dr. Glover, established the fact that this substance is a powerful cerebro-spinal excitor, and my own observations and experiments with the substance, an outline of which was published in the *St. Louis Clinical Record*, for October, 1876, go to establish the same fact. I cannot say, however, that it has any especial advantage over strychnia. It may be given in doses of from the one hundredth to the fiftieth of a grain in pill three times a day. Such doses do not, however, produce any twitchings or rigidity of the muscles, very much larger quantities being necessary for such results.

Nitro-glycerine, or glonoine, as it is euphemistically called, is a remedy of very considerable power in the treatment of spinal irritation. The dose to begin with is the one-hundredth of a drop. One drop of a one-per-cent. solution is the quantity that I usually begin with. It may be taken three or four times a day on a lump of sugar. The immediate effects are a slight headache coming on in about four minutes, an increase in the force and frequency of the pulse, and a general feeling of exhilaration. In the course of a week or ten days the doses may be increased to two drops. It is rarely necessary to go beyond this point in the treatment of spinal irritation, but in epilepsy I have given it in ten times this quantity with entire safety and advantage. It not infrequently happens that there are very striking

immediate effects of the administration of nitroglycerine in cases of spinal irritation. I have seen women who had been in bed for several months unable to walk or even stand without suffering get up and go about the room for several hours after a dose of this remedy, repeating the performance day after day and eventually being entirely cured.

Coca in the form of the fluid extract, or, better still, some reliable preparation of the wine, is of undoubted efficacy as a nerve tonic, and as a stimulant to the spinal cord. I rarely treat a case of the disease without using this remedy thoroughly and persistently. The active principle cocaine is also useful, and may be given in doses of a half a grain three times a day. It is not, however, so generally advantageous as the wine.

The application of water as hot as can be borne is an admirable agent in increasing the flow of blood to the spinal vessels. Nothing is better for the purpose than Dr. Chapman's india rubber bags, though of course other agencies will suggest themselves to the practitioner. Dry heat may be substituted in some cases with benefit.

4. The fourth indication is one of great importance, and, when properly carried into effect, a cure will often result in slight cases without any other means of treatment being employed. The *rationale* of the action of counter-irritants in this and similar derangements is by no means clearly understood. It

is a question which I do not, however, propose to discuss. Of counter-irritants my experience leads me decidedly to the employment of blisters in preference to any others. They should be applied to the skin, immediately over the painful part of the spine, and should be renewed as often as may be necessary. Tartar-emetic ointment, though useful, is more painful and I think not so efficacious as blisters. Dry cups are more admissible, and almost always do good. They should be applied on each side of the spinous processes for an extent of four or five inches above and below the painful spot. Leeches, or any other means for the abstraction of blood, are, according to my experience, always prejudicial.

The actual cautery is more readily applied and is less painful than a blister. The platina button-pointed cauterizer may be used, the instrument being brought to a white heat in a blast lamp or a Bunsen's burner, and the skin on each side of the painful spot touched with it three or four times in a line; or the cauterizing apparatus made by Upham, of Boston, or that of Paquelin, of Paris, may be advantageously used in the same way. An instrument designed by my son, Dr. Græme M. Hammond, is superior to either, for it admits of common illuminating gas being used as the heating agent, and of a degree of accuracy in the application not to be obtained by those appliances in which the heating is effected before the instrument is applied to the skin. In this last respect it is as good

as the galvanic cautery, and is much more convenient in other ways. The operation should be repeated if necessary.

Relative to the comparative advantages of the actual cautery and blisters, the former is to be preferred when an immediate effect is required. It sometimes acts with a degree of promptness to which no other application can attain, for while a physician is waiting for a blister to draw his patient may die. Nothing can take its place in such cases. I have seen cases in which vomiting was excessive and distressing to the last degree cease as if by magic on a single application of the white-hot platina to a painful spot in the spine. The mushroom vesication produced by aqua ammoniæ and such like substances is of little or no avail. But the cautery fails more frequently than Spanish fly blisters, for the reason, probably, that it sometimes acts too rapidly to act amply. In the case of the young lady from New Brunswick, to whose case I have already alluded, the actual cautery was used more than a dozen times, all round the tender region of the spine, and yet no curative effect was produced. Blisters, however, did the required work in the most satisfactory manner. Therefore, unless there is imperative necessity for haste, blisters are to be preferred.

I have thus far said nothing of electricity as a remedial agent in spinal irritation. I at one time thought, with many others, that it exercised a decided

effect in dilating the spinal blood vessels and thus increasing the amount of blood in the cord, but I have for several years been satisfied that it has no such influence, and that its power, no matter how it is applied or in what form it be employed, is simply that of a counter-irritant. The galvanic current applied to the skin over the painful region of the cord causes redness and even vesication if it be sufficiently strong, and the electrodes be kept long enough in one place; its action, therefore, is beneficial and it may be used every day for five minutes or more at a time. A like favorable opinion may be given of the faradic current applied in like manner; the electrodes either being both wet sponges or one of them being a wire brush. Faradism is also useful when applied to distant parts of the body in which there are aberrations of sensibility or of motility.

But no form of electricity for application to the spine, in cases of the disease under consideration, is at all comparable to the statical. The patient should sit on the insulated stool, and sparks of two or three inches in length be drawn from that part which is the seat of the disease, and from the regions contiguous thereto. It very generally happens that prompt relief of the tenderness and of any deep-seated pain that may be present is at once obtained by this means, so that spots on which the weight of the clothing could not be borne without great suffering, may now be pounded with a fist without causing more inconven-

ience than if the patient had never had spinal irritation. On the following day it will usually be found that a part of the tenderness has returned; there is, however, a decided mitigation, and every day sees an improvement. Not the least of the advantages attending the use of the statical electricity, is the fact that it can be applied without the necessity of removing the patient's clothing.

Probably upon the whole, blisters are of greater curative power in spinal irritation than is statical electricity, but the latter has advantages which will very often cause it to be preferred both by physician and patient. A blister entails great suffering and inconvenience, while statical electricity leaves the patient as comfortable and as free from any pain due to its administration, as though it had never been applied. On the other hand, blisters are always at the command of the physician, while statical electricity is often difficult to obtain, and sometimes cannot be got at all. The physician is most favorably situated who has both of these agencies at command.

I have derived great benefit from the use of percussion applied to the painful part of the spine and its vicinity, as well as to the muscles of the back, the trunk, and the limbs. It is, I think, far preferable to the so-called massage, which latter, as usually practiced, I never employ. Good percussors can be made of the india-rubber rattles for infants. A slit should be cut in them, the bits of tin inside of them turned out, and

the hollows filled with bits of raw cotton so as to give them proper degree of consistency or firmness. It is advisable to use two employed very much in the same manner as hatters use the sticks employed for the purpose of beating the felt. Every night and morning the back should be pounded in the way mentioned, about five minutes being required if the operation is limited to that part of the body. It is astonishing how rapidly in some cases the soreness disappears and the eccentric symptoms vanish under the use of this agent. It is more efficacious, I think, with those patients who are not very severely affected and who may consequently be spared the pain and annoyance of severe counter-irritant measures.

In addition to these therapeutical measures, there are others of a more strictly hygienic character which require to be enforced. The air ought to be pure, the food nutritious, and the surroundings of the patient cheerful. Exercise should be taken daily in the open air, if the patient be able; but fatigue should on no account be incurred. It is better not to exercise than to become tired.

The recumbent position, by allowing the blood to gravitate to the spinal vessels, is always more comfortable to the patient than any other. It should therefore be kept during the greater part of the day, both as being more agreeable and as tending to facilitate the cure.

It is necessary to address special attention to the

stomach when there is such persistent vomiting as is present in some cases of spinal irritation. In such instances it will be found, when they are extreme, that nothing stays on the stomach, even the blandest and most easily digested substances being immediately rejected.

A great deal can often be accomplished by requiring that the diet should be of the simplest possible character, and that only a very small quantity should be taken at a time. If the patient cannot retain a tablespoonful of milk or beef tea, try a teaspoonful; and if this is thrown up, give half a teaspoonful. Even the smallest quantity that can be kept down is better than a larger quantity thrown up; and when once a lodgment is effected, the portion may be repeated in half an hour, so that during the day no small amount of nutriment enters the system.

I learnt a very important point from Dr. Lambert, in this: that warm liquids are often more apt to be retained than cold ones. Since seeing the case with him in New Jersey, to which allusion has been made, I have very frequently with great advantage substituted drinks as hot as could be swallowed, for the ice-cold fluids that had been ingested only to be promptly vomited.

Among medical means, I have never used anything comparable to the valerianate of caffeine, which may be given in doses of from three to five grains as often as it appears to be required. Its only objection is its great cost. In a very obstinate case which I saw recently in consultation with Dr. Whybrew, every noted medicine had been tried without effect, when a couple of doses of the valerianate of caffeine at once arrested the vomiting.

In my experience, the preparations of cerium, however useful they may be in the vomiting of pregnancy, are inefficacious in that of spinal irritation.



