Syphilis of the nervous system / by H.C. Wood.

Syphilis of the Nervous System.

By H. C. Wood, M.D., LL.D.

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SYPHILIS

OF THE

NERVOUS SYSTEM.

BY

H. C. WOOD, M. D., LL. D.,

1889.
GEORGE S. DAVIS,
DETROIT, MICH.

CONTENTS.

CHAPTER I.

CHAPTER II.

CHAPTER III.

CHAPTER IV.

PREFACE.

At a time like the present, when the world is overflowing with medical writings, it seems but right that the author who would lay claim to a portion of the time and thought of his medical brethren, should plainly state the basis on which his work rests. At the risk of being considered egotistic, I therefore venture to say that the present brochure is largely the outcome of personal experience. In the University Hospital and Dispensary, there have been treated under my supervision five thousand cases of nervous disease, of which at least fifteen per cent., or seven hundred and fifty, have been in the persons of syphilitics. During the seventeen years of my service at the Philadelphia Hospital, there were under my care about two thousand patients suffering from various affections of the nervous system, of whom more than fifty per cent., or over one thousand had suffered from syphilis. To these seventeen hundred and fifty cases must be added those with which I have come in contact in my private practice and as consultant to public and private hospitals for the insane—making a total of nearly two thousand cases.

CHAPTER I.

ETIOLOGY.

In a study of syphilitic diseases affecting the nervous system, it might not be thought necessary to discuss the etiology of the subject, because in all cases syphilis is primarily the cause of the disorder; yet many questions naturally arise in connection with the relations of syphilis to the nervous system, which require notice.

Certain syphilitic individuals pass through a long life, and through a long series of specific affections, without the nervous system being implicated; whilst in other cases syphilis early selects the brain or spinal cord. Rarely, however, are we able to explain these differences, or to discover in the individual case any exciting cause of the attack upon the nerve centre. It is true that Fournier† affirms that he has especially seen the disease in professional and other men whose brains were habitually over-active, and that various other authorities attach much influence to over-study and other forms of cerebral strain as exciting causes of brain syphilis. My own experience, however, hardly corresponds with this; I have met very few instances in which excessive brain-work unmistakably appeared as a distinct etiological factor, whilst I have seen hundreds of cases from amongst the laboring

† La Syphilis du Cerveau.

class, in persons in whom the intellectual faculties have been chiefly dormant; and I have also known numerous cases of syphilis occurring in intellectual workers, without specific disease of the nerve centres.

It is not unnatural to expect that a disease or a traumatism which is capable of exciting an inflammation of the nerve centre, may, when present in a syphilitic person, provoke a specific explosion in such centre. Thus, thermic fever is a very common cause of chronic meningitis, and in the *Journ. de Med. et Chir.* (Paris, 1879, p. 191) a case is reported in which cerebral syphilis followed an alleged sunstroke. In Roberts's case of precocious cerebral syphilis (hereinafter reported), the first convulsion came on whilst the man was fishing, on a very hot day, and may have been precipitated by the exposure. In a case which was sent to me from a neighboring village by a very intelligent physician, as one of sunstroke followed by organic brain disease, the post mortem showed that the original brain lesion was a gummatous tumor involving the motor centres, and it is much more probable that the primary supposed sunstroke was really an epileptiform convulsion, the first of the series which marked the coming into view of the cerebral disease, than that the gumma was produced by the sunstroke. A man with a latent gumma in his brain might very well have an epileptiform attack provoked by exposure to excessive heat: and if sunstroke ever is the starting point for brain syphilis, such cases must be rare.

Blows and other traumatisms do not seem to figure largely as exciting causes of nervous syphilis. I have seen one or two cases of specific brain disease attributed to violence by the patient, and several cases of possibly specific spinal disease—one in which a poliomyelitis followed a fall on the ice; one in which, after a fall from a cart and marked spinal concussion, a local myelitis developed; and one of a general myelitis following an injury by a horse. The only records of such cases known to me are those reported by Broadbent* and those collected by Heubner.†

A very important question connected with the etiology of nervous syphilis is as to the time of its development. It certainly belongs to the advanced stages of the disorder, and usually comes on some years after the primary infection; but I have seen it at every period from one year to thirty years. Fournier reports intervals of twenty-five years, and thinks from the third to the tenth year is the time of maximum frequency of nervous accidents.

The fact that nervous syphilis may occur many years after the cessation of all apparent evidences of the diathesis, is of great practical importance, especially as the nervous system is more prone to be attacked when the secondaries have been very light than when the earlier manifestations have been severe.

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* London Lancet, 1876, ii, p, 741.

† Ziemssen's Cyclopedia, xii, p. 301.

I have repeatedly seen brain syphilis in persons whose secondaries had been so slight as to have been entirely overlooked or forgotten, and who honestly asserted that they had never had syphilis, although they acknowledged to gonorrhœa or to repeated exposure, and confessed that their asserted exemption was due to good fortune rather than to chastity.

The following citations prove that this experience is not peculiar. Dowse* says: "Often have I had patients totally ignorant of having at any time acquired or experienced the signs or symptoms of syphilis in its primary and secondary stages, yet the sequelæ have been made manifest in many ways, particularly in many of the obscure diseases of the nervous system." Buzzard† reports a case of nervous syphilis where the patient was unconscious of the previous existence of a chancre or of any secondaries. Rinecker also calls attention‡ to the frequency of nervous syphilis in persons who afford no distinct history of secondary symptoms.

Although syphilis is prone to attack the nervous system many years after the infection, it would be a fatal mistake to suppose that nervous disease may not rapidly follow the chancre. What the minimum possible intermediate period may be, we do not know, but it is certainly very brief, as is shown by the following cases

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*The Brain and its Diseases, London, 1879, vol. i, p. 7.

†Syphilitic Nervous Affections, London, 1874, p. 80.

‡Archiv f. Psychiatrie, vii, p. 241.

of this so-called precocious nervous syphilis. Alfrik Ljunggrén, of Stockholm, reports‖ the case of H. R——, who had a rapidly-healed chancre in March, followed in May of the same year by a severe headache, mental confusion, and giddiness. Early in July H. R—— had an epileptic attack, but was finally cured by active antisyphilitic treatment. Although the history is not explicit, the nervous symptoms appear to have preceded the development of distinct secondaries other than rheumatic pains.

Davaine is said§ to have seen paralysis of the portio dura "a month after the first symptoms of constitutional syphilis." E. Leyden¶ found advanced specific degeneration of the cerebral arteries in a man who had contracted syphilis one year previously. R. W. Taylor details a case in which epilepsy occurred five months after the infection.* In the case of M. X——, reported by Ad. Schwarz,† headache came on the fortieth day after the appearance of the primary sore, and a hemiplegia upon the forty-sixth day. S. L——‡ had a paralytic stroke without prodromes six

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‖ Archiv f. Dermatol. u. Syphilis, 1870, ii, p. 155.

§ Buzzard, Syphilitic Nervous Affections, London, 1874.

¶ Zeitschrift f. klin. Med., Bd. v. 165.

* Jour. Nervous and Mental Dis., 1876, p. 38.

† De l' Hémiplegie Syphilitique Prêcoce, Inaug. Diss.' Paris, 1880.

‡ Ibid.

months after the chancre. A. P. L——‖ had an apopletic attack seven months after the chancre; A. S——, one five months after her chancre. In a case which recently occurred in the practice of A. Sydney Roberts of this city, the chancre appeared after a period of incubation of twenty-six days, and two months and eight days subsequent to this came the first fit; eight days after the first, the second convulsion occurred, with a distinct aura, which preceded by some minutes the unconsciousness. An interesting observation in this connection is that of Ern. Gaucher§ of a spinal syphilis occurring six months after the appearance of a chancre.

This citation of cases might be much extended, but has probably already gone too far, and I must content myself with referring the reader to the *Mémoire sur les Affections Syphilitiques Précoces des Centres Nerveux*, par Charles Mauriac, Paris, G. Masson, Editeur, 1879, and to the Thesis of M. Manchon on *Syphilis Cérébrale Précoce*, No. 407, 1883, Paris. In these publications are collected 80 cases of precocious syphilis: of these the period of incubation was:

One month	3 cases.
Two months	4 cases.
Three months	6 cases.
Four months	8 cases.
Five months	14 cases.

‖ Ibid.

§ Revue de Méd., 1882, ii, 678.

Six months	7 cases.
Eight months	3 cases.
Nine months	4 cases.
Ten months	1 case.
Eleven months	1 case.
Twelve months	29 cases.

A third etiological question in regard to syphilis of the nervous system is, as to its production by an inherited taint, as well as by an acquired infection. Inherited syphilis seems to be less prone than is acquired syphilis to attack the nervous system, but it is certainly capable of so doing.* As early as 1779, Joseph Glenck† reported a case, of a girl six years old, cured by a mercurial course of an epilepsy of three years' standing, and of other manifestations of hereditary syphilis. Graefe found gummatous tumors in the cerebrum of a child nearly two years old.‡ O. Huebner‖ details the occurrence of pachymeningitis hæmorrhagica in a syphilitic infant under a year old. Hans Chiari§ reports a case in which very pronounced

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* It is worth while here to state that there is a form of paralysis which occurs in very young syphilitic infants, in which a monoplegia, apparently of nervous origin, is really the result of a syphilitic affection of the bones of the affected limb. For an elaborate article on this subject by M. Laffitte, see Revue Mensuelle des Maladies des Enfants, Vol. 5, 1887.

† Doctrina de Morbis Veneris, Vienna.

‡ Arch. f. Ophthalm., Bd. i. Erst Abth.

‖ Virchow's Archiv, Bd. lxxxiv, 269.

§ Wien. Med. Wochenschrift, xxxi, 1881, 17.

syphilitic degeneration of the brain-vessels was found in a child fourteen months old. Both Barlow¶ and T. S. Dowse* report cases of nerve syphilis in male infants of fifteen months. For other similar instances the reader is referred to an article by J. Parrott,† and to a paper by M. E. Troisier.‡

Recorded cases prove decidedly—that a fœtus may be born with its nervous system the seat of gummatous disease —that the nervous outbreak may occur at any time—and that even after puberty specific nervous affections may primarily attack the unfortunate offspring, which has up to such time *seemingly* escaped the effects of parental impurity. Nettleship‖ reports the development of a cerebral gumma in a girl of ten years, and J. A. Ormerod§ of a tumor of the median nerve (probably gummatous) in a woman of twenty-three, both the subjects of inherited syphilis. Thomas S. Dowse** details a case of cerebral gumma at the age of ten years, and Samuel Wilks†† one of epilepsy, from inherited taint, in a boy of fourteen. J. Hughlings-

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¶ Lond. Patholog. Soc. Trans., 1877.

* The Brain and its Diseases, vol. i. p. 76.

† Archiv. de Physiologie, 1871–72, p. 319; also to his "Lecons sur le Syphilis hered.," Progrès méd., 1877 and 1878.

‡ Arch. de Tocologie, x. 411.

‖ Trans. Lond. Path. Soc., xxxii, 13.

§ Ibid., p. 14.

** Loc. cit., p. 71.

†† Lectures on Dis. of Nerv. Syst., Philadelphia, 1878, p. 333.

Jackson† reports paraplegia with epilepsy in a boy of eight, hemiplegia in a girl of eighteen, and hemiplegia in a woman of twenty-two;‡ the nervous affection in each instance being associated with, or dependent upon, inherited syphilis. E. Mendel‖ records the history of a child who enjoyed fairly good health until the ninth year of her age, when she suffered from weakness, with swelling of the glands of the neck, etc. At eleven years of age she was attacked with nervous symptoms, followed by delirium and hallucinations, with strabismus, irregularity of the pupils, and ending in apathy, convulsions, and death. At the post-mortem, syphilitic disease of the brain membranes was found.

A remarkable case is reported by Prof. Fournier (Union Medical, 1884), in which at the age of nine years, the child was well nourished, rosy, vivacious, and very intelligent, but commenced occasionally to wet the bed at night, and a little later was suddenly taken with a violent convulsion, accompanied by complete loss of consciousness, biting of the tongue, etc. Examination showed that the parents of the child had been syphilitic, and that at the age of three months, the child herself had unmistakable manifestations of the hereditary disorder, from which she had recovered under treatment. After the first epileptic attack, the symptoms continually increased in severity,

† Journal of Ment. and Nerv. Diseases, 1875, p. 516.

‡ Brit. Med. Journal, May 18, 1872.

‖ Archiv f. Phsychiatrie, Bd. i. 313.

the convulsions recurring frequently; the disposition of the child slowly changed, and ocular paralysis came on, followed after a time by loss of muscular power, and irregular intermittent muscular contractions; still later the child became idiotic, and at last died hemiplegic and comatose. At the autopsy indisputable syphilitic disease of the brain and its membranes was found.

In the Revue Generale D'Ophtalmologie, Vol. 6, p. 97, Dr. V. Caudron details the case of a young woman 17 years of age, with a history of having been a somewhat delicate but generally healthy child, who had undergone general bodily development with the usual rapidity. There had been none of the customary manifestations of hereditary syphilis, nor were there any cicatrical marks on the skin or mucous membranes; but she was found to be suffering from undoubted inherited syphilis.

A number of cases similar to those which I have just stated, have been reported in America by Dr. Albert H. Buck and by Dr. Knapp, of New York, and by Dr. Kipp. (See New York Medical Record, Oct. 1, 1887.)

I have myself known cerebral syphilis to occur at 21 years of age, as the result of the inherited taint, and report here in detail a case which was during the life, of especial interest on account of the curious mixture of hysterical and organic symptoms. The hysterical symptoms were so pronounced, and the history

of hysterical selfishness so clear, that the case was brought to me originally as one of hysteria in which deception was being attempted for selfish purposes. At my first visit, however, I thought I detected underlying evidences of organic brain disease, and the subsequent examination of the eyes revealed the presence of pronounced choked disks.

Bertha C., aged 20; mother and father dead; said to have been healthy as a babe and child, but history not very clear. She came under my care June, 1888; about a year previous she had suffered from a violent attack of illness and had been more or less sick ever since with malaise, loss of weight, excessive headaches, repeated vomiting and constipation. Under homœopathic treatment the symptoms had abated, but in April or May of 1888, she began to have nervous spells which (I copy now from my note book) "she states come on suddenly, sometimes with the hearing of a loud noise. It is affirmed that during the spell she is entirely unconscious and very pale, and that there are peculiar movements of the head after the attack. It is also stated that at one time she lost the power to use her hands, so that she was not able to feed herself." July 13th, I noted: "There is no failure of memory or mental activity, and no evidences of palsy, although the movements of the hands are slow and unsteady, as is also the step, but there is no evidence of lack of co-ordination. She habitually sits in a very peculiar position, with buttocks slid forward just to the edge of the chair, and the upper portion of her neck and the back of head resting on the chair. She says she does this "because it rests her head." There is a distinct callosity of the neck from this habitual pressure. There is pronounced protuberance of the lower cervical vertebræ, but no tenderness on jarring or pressure. There is marked stiffness of the muscles of the neck, and the optic disks are choked, but vision

is nearly normal. There is no sense of constriction in the abdomen or other portions of the trunk; no disturbance of general sensibility; but the patient complains much of pricking pains in the stomach, and is very emotional with pronounced hysterical symptoms." She was put on the use of iodide of potassium, and of corrosive sublimate, and reported herself July 9th as much improved; but there was at this time distinct stiffness in the back of the neck, and she had had one or two fainting spells in the last week. Owing to my absence from the city, the case was after this seen by Dr. F. X. Dercum, who reported as follows:

August 16, 1888. I was suddenly summoned at 6 A. M. to——, was told that Miss. B. had fallen from a window. I found her lying on a mattress in the parlor. Examined her from head to foot but found no trace of injury,—nothing but a doubtful bruise in the small of the back. She complained of great pain both in the back of the head, shoulders, arms, and in the right side of the head and the right eye. She appeared to be extremely hysterical, and resisted movement of the painful (?) parts. However, when the latter were moved by stealth no signs of pain were noticed. This was noticeably the case with the right arm, and which she in addition stoutly maintained was paralyzed, when later, thinking she was unnoticed, was seen to move it quite freely.

Occasionally she gave vent to shrill and piercing screams, but it was difficult to believe they were not hysterical, her emotional exaltation being so marked. The moment I became sympathetic in my demeanor she permitted free handling of the painful (?) parts, and I then carried her upstairs to bed. I examined her person even more carefully than before, but with the same negative result.

I now looked at the window from which I had been told she had fallen. In height it was about twelve feet from the ground; below it was a wooden porch, a fall upon which certainly

would entail *some* bruises. She had been found lying on the porch directly beneath the window about four o'clock in the morning. She was crying as though in pain, appeared to be perfectly conscious, and said she had fallen out of the window.

On inquiry I learned that the window had been found wide open, and also I learned the following interesting facts: Her bedroom door was found unlocked and a window on the first floor was found unfastened. On further inquiry I was told that the girl was often hysterical, and that she frequently did things to provoke sympathy. Again, I learned that her sister had lately been reading a novel to her, in which a somnambulist was a prominent character. She evidently had been much impressed by the somnambulistic performances in this book, and she frequently spoke about them. So great was her interest in this novel that the fact attracted the attention of the family.

The logical inference appeared to be, that the patient in an attack of real, or more probably simulated, sonambulism, had opened wide the window and blinds, and then stealthily crept down stairs, and by means of a first floor window made her exit from the house. She then lay down on the porch immediately beneath the window, and moaned until her sister sleeping in the room above was wakened. The household was at once thrown into great excitement, a neighboring physician was hastily summoned, and she was instantly the centre of anxious inquiries, loving endearments, and frantic caresses. Her object was certainly *un fait accompli.*

The next day patient appeared much better, was sitting up, walked around, and almost free from pains except those in the back of the head and neck.

August 18th, 1888. After presenting nothing unusual, she complained of feeling badly, and lay down on her bed about 8 o'clock in the evening. The nurse, a well trained woman, noticed that shortly afterward she had a fit, during

which the head, shoulders, and back became stiff, and arched backward, "like," said the nurse, "I have seen in hysterical people." Consciousness appeared, however, to be entirely absent. In a few minutes consciousness returned, and the patient spoke a few words, complaining greatly of pain in the head. In a quarter of an hour another seizure occurred, longer and more severe than the first; the head being jerked violently backward. When it had been subdued, the patient could not be roused; she was dead.

Post mortem.—Scalp normal; shows slight ecchymosis over vertex (caused, probably, by head striking top of bed). Calvarium normal. Dura not adherent; inner surface smooth, but very dry. Brain bulging, pale and tolerably firm. Surface of pia very dry. Very little blood in veins.

Base of brain: Meshes of pia and arachnoid œdematous with excessive gelatinous infiltration over pons, crura, and medulla, especially of all portions lying in the posterior cranial fossa. Infundibulum excessively distended and giving the appearance of a thin walled cyst. Third ventricle extremely dilated; lateral ventricles somewhat villous. Choroid plexuses very cystic. White matter of brain and cortex reveal nothing abnormal.

Base of skull reveals a healthy dura, except perhaps in the posterior cranial fossa, where it seems thicker and softer than normal.

Unfortunately no microscopic examination was made because the family objected so strenuously to its being done, and would not allow the cutting of any portions of the cerebrum. A very careful macroscopic survey of the membranes and brain vessels was, however, made, to determine the presence of tubercles, but none were found. The father had been very dissipated, and the gross character of the lesions was distinctly syphilitic. The fact that the cerebral symptoms lasted for over a year before the fatal result, is a strong argumen, against there having been tubercle.

When a syphilitic nervous affection first develops in a child ten or more years old, in whom there has been no pronounced evidence of the inherited taint, there is great danger of the character of the case being misunderstood. Indeed, in some instances I have seen, I believe an immediate diagnosis was scarcely possible. It is probable that in most, if not all, of the alleged recoveries from tubercular meningitis, the disease has been syphilitic. A child, reported to me by a very good practitioner as having been cured of tubercular meningitis, subsequently came under my care, and, I am sure, suffered from hereditary syphilis. Some time since I saw in my University clinic an orphan child, fourteen years of age, suffering from a chronic basal meningitis, and in the absence of any history or of any evidences of syphilis, I gave the fatal prognosis of tubercular disease; but, to my astonishment, after a prolonged treatment with iodides, complete recovery was obtained. Cases in which chronic basal meningitis has resulted, in young children, from inherited syphilitic taint, have also been given by F. Dreyfous.*

It is of the utmost importance to recognize that an apparently tubercular meningitis is really due to hereditary syphilis. Without a history, certainty may not be possible, but a general indefiniteness of symptoms and slowness of progression should arouse sus-

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* Revue mensuelle des Malad. des Enfants, 1883, i, 497; see also Gaz. hebdom. Sci. med. de Montpellier, 1883, v, 89.

picion, especially if the absence of pulse retardation, or the presence of any characteristic symptoms, indicate that the vault rather than the base of the cranium is involved.

The relation of inherited syphilis to various nervous affections not distinctly specific, cannot yet be positively determined; but arrested development and the consequent epilepsy, idiocy (see *Brain*, vol. vii, 404), and early brain sclerosis, are probably sometimes the outcome of such inheritance; and the cases collected by E. Mendel* show that chronic hydrocephalus is frequently of specific origin.

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* Archiv. f. Psychiatrie Bd., i, 309; see also Virchow's Archiv. Bd., xxxviii, 129)

CHAPTER II.

THE BRAIN AND ITS MEMBRANES.

Section I. Pathology.

There is much reason for believing that there is a close connection between syphilis and sclerosis of the nerve centres; but in the present brochure are considered only those affections which are indisputably, directly syphilitic. There are two lesions of the cerebrum belonging in this category, which for present purposes may well be considered distinct, although their relations are in nature very close—if they be not indeed different manifestations of the same thing. The first of these is gummatous meningeal inflammation: the second, disease of the blood vessels; beside these two is a third lesion or affection, meningo-encephalitis, whose relations with syphilis is very close, but whose nature has not hitherto been well made out.

As has been taught, by Rindfleisch, Fournier, Wagner, and others, the gummatous tumor probably always commences in the sheath of the arterioles, and by the formation of minute cells, which, as was insisted upon by Wilks in 1863, are produced by the proliferation of the nuclei which lie immediately under the vascular endothelium. Heubner, seems to me correct in teaching that a localized gummatous in-

flammation always starts in the brain membranes, and never in the brain substance; although Fournier, whilst admitting the peripheral origin of most gumma, still claims that they are not always meningeal. I have never seen a gummatous brain tumor which had not really sprung from the brain membranes, although a number have come under my notice which were situated within the brain, and might be supposed to have arisen in the brain itself. Always, however, they had come from an infolding of the pia-mater in some deep fissure, or from the velum interpositum in the lateral ventricles. The most common seat of the tumor or gummatous inflammation, is the base of the brain, and it is very frequently found in the neighborhood of the pons varolii and corpora quadrigemina. It may, however, locate itself upon the vault of the cranium, and in my experience, has been especially frequent in the anterior and motor regions of the cortex; not rarely, especially affecting the immediate neighborhood of the Rolandic fissure.

The gummatous mass is usually surrounded by a reddish zone of inflamed nerve tissue, into which it is sometimes fused. It may exist as a roundish, isolated tumor, but more usually is spread out, irregular in shape, and more or less confluent with the brain beneath it. When there is wide spread meningeal inflammation, the exudation is often large, constituting an extended, formless, gelatinous mass; this form of gummatous exudation is much more

frequently met with at the base than at the vault of the cranium. The cerebral gumma varies in size from a mere grain to a mass several inches in length, and is very apt to be multiple. Its color is whitish or yellowish, or occasionally reddish, according as it has undergone degeneration, and is more or less vascular. Not rarely two distinct zones exist in the gumma, the inner one being dry, yellowish in color, opaque, and resembling somewhat the region of caseous degeneration in the tubercle, whilst the outer is pinkish, and more or less semi-translucent.

The only lesion with which the cerebral gumma can be readily confused is tubercle, and usually the distinction is easy. Rarely is the mass so spherical as that of tubercle; moreover, it is usually surrounded by a zone of reddish tissue, which is commonly wanting in tubercle; then it is never completely caseous, as it does not, like the tubercle, undergo degeneration uniformly and regularly. Moreover, it much more frequently gives rise to cerebral softening, than does tubercle. There are, however, some cases in which it is necessary to study the tumor with the microscope in order to distinguish it with certainty from tubercle.

On microscopic examination of a cerebral gumma, the most characteristic structures to be detected are small cells, such as are found in gummatous tumors in other portions of the body. These cells are most abundant in the inner zone, which, indeed, may be entirely composed of them. In the centre of the

tumor they are more or less granular and atrophied; in some cases the caseous degeneration has progressed so far that the centre of the gumma consists of minute acicular crystals of fat. In the external or peripheral zone of the tumor the mass may pass imperceptibly into the normal nerve tissue, and under these circumstances it is that it contains the spider-shaped cells or stellate bodies described by Jastrowitch, and especially commented upon by Charcot and Gombault, and by Coyne. These are large cells containing an exaggerated nucleus and a granular protoplasm, which continues into multiple, branching, rigid, refracting prolongations, which prolongations are scarcely stained by carmine. Alongside of these cells other largish cells are often found without prolongations, but furnished with oval nuclei and granular protoplasm. Amongst these cells will be seen the true gummatous cells, as well as the more or less altered neuroglia and nerve-elements. In the perivascular lymphatic sheaths in the outer part of the gumma is usually a great abundance of small cells. The spider-shaped cells are probably hypertrophied normal cells of the neuroglia, and have been considered by Charcot and Gombault as characteristic of syphilitic gummata of the brain. In a solitary gumma, however, of considerable size, from the neighborhood of the cerebellum, studied by Coyne and Peltier, there were no stellate cells. Coyne considers that their presence is due to their previous existence in the normal state of the regions affected by the gumma.

Exactly how syphilitic gumma of the brain are removed in cases of recovery, it is difficult to determine. It is certain that they become softened, and disappear more or less completely; and it is probable that the cicatrices or the small peripheral cysts which are not rarely found in the surfaces of the brain are oftentimes remnants of gummatous tumors. In a number of cases collected by Gros and Lancereaux there were small areas of softened tissue, or small calcareous and caseous masses, or cerebral lacunæ corresponding to the cicatrices of softening, or imperfect cysts, coincident with evidences of syphilis elsewhere. V. Cornil also states that he has found small areas of softening with well-established syphilitic lesions of the dura mater and cranium, but believes that the lacunæ or cysts depend rather upon chronic syphilitic lesions of cerebral arteries than upon gummatous inflammation.

When a gummatous tumor comes in contact with an artery, the latter is usually compressed and its walls undergo degeneration. The specific arteritis may pass beyond the limit of the syphilome and extend along the arterial wall. Not rarely there is under these circumstances a thrombus, and if the artery be a large one, secondary softening of its distributive brain-area occurs.

Cortical Syphilis.—Our knowledge of the lesions of the brain cortex produced by syphilis, is imperfect and uncertain, but there seem to to be two conditions which require notice here.

The first of these varieties is a diffused gummatous infiltration of a wide territory of the cortex, with or without pronounced exudation in the cerebral membrane. This syphilitic infiltration is probably always attended with irritation of the pia mater, and agglutination of this with the brain substance. I have, at various autopsies, seen the brain substance involved with the under surface of an irregular gummatous exudation, which apparently had sprung first from the the membranes, and most of the cases of recorded cortical disease are of this character. Moreover, I have never seen cases in which the main infiltration was in the cortex of the brain itself and the membranes only slightly or secondarily involved. Such cases must be extremly rare. The descriptions of the older writers, without careful microscopic studies, are of no value in determining the existence of syphiltic infiltration of the cerebral cortex, and the satisfactory cases are very infrequent in medical literature. Two instances are very briefly recorded by Rumpf,* who simply states that he found a diffuse syphilitic disease of the capillaries and small arteries in the brain cortex: the symptoms during life having more or less closely resembled those of dementia paralytica.

Heubner reports a case recorded by Schule.†

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* Die Syphilitischen Erkrankungen des Nervensystems, p. 159.

† Ziemssen Cyclopœdia of Practical Medicine, vol. xii, p. 31.

The symptoms had been those of dementia paralytica, with frequent outbreaks of confirmed constitutional syphilis, and the patient had been in an asylum for twenty years. At the autopsy there were found, beside a circumscribed gummatous inflammation between cranium and dura mater:

"A hemorrhegic pachymeningitis, an old opacity and thickening of the soft membranes, and an atheromatous degeneration of the large arteries of the base; a peculiar pale gray, as it were, swollen condition of the cerebral cortex; a small softening of the left nucleus lenticularis; and a gray degeneration of the lateral columns of the spinal cord, chiefly on the left side. Upon microscopic examination, it appeared that in the cerebral cortex the texture of the neuroglia had taken on another and homogenous quality, and was abnormally filled up with nuclei, single and in groups, chiefly along the vessels, which were themselves much altered. Their walls were thickened, sclerosed, and their cells had undergone fatty degeneration, or their channels were accompanied by close rows of nuclei, or by lines of spindled cells, others being surrounded by a dense web of connective tissue, or obliterated so as to become fibrous bands. The ganglion cells were shrunken in various degrees."

The second variety of cortical brain lesion is not spoken of by writers, but is that in which change appears to be a subacute inflammation affecting the vessels and the neuroglia. I report later in this brochure, in detail, a case of this character.

The disease occurred in the person of a young man who was suffering from undoubted syphilis, and presented during life many of the symptoms of cere-

bral syphilis. In this case the alterations had apparently reached their fullest extent in the anterior lobes, where there was a total destruction of the normal nerve tissues; towards the posterior lobes the alterations of the cortical structure grew less and less, until they gradually disappeared in normal tissue. This made it possible, in the single case, to study the development of the lesion. Whilst in the anterior portion of the brain the pia mater was completely adherent, in the posterior portions it was entirely free. It was found that in some places there was evident structural alteration of the cortex without the pia mater being distinctly abnormal, even the vessels of the cortical substance being more diseased than those of the pia mater, showing that the lesion commenced in the brain and spread from it to the membranes, rather than *vice versa*. In portions of the brain in which the neuroglia and the nerve cells appeared to be entirely normal, the coats of the blood vessels were distinctly thickened, and the walls of the vessels themselves covered externally more or less closely with small cells, or large nuclei imbedded in, or adherent around, them, the vascular spaces being well developed, perhaps even a little abnormally large. Here and there in such portions of the tissue would be found places where these cells had aggregated in groups, or small masses, about some larger vessels. In the anterior portions of the brain a similar condition of the vessels was found, only much exaggerated, the

walls being enormously thickened, and the small cells or large nuclei more abundant; but no where, how-

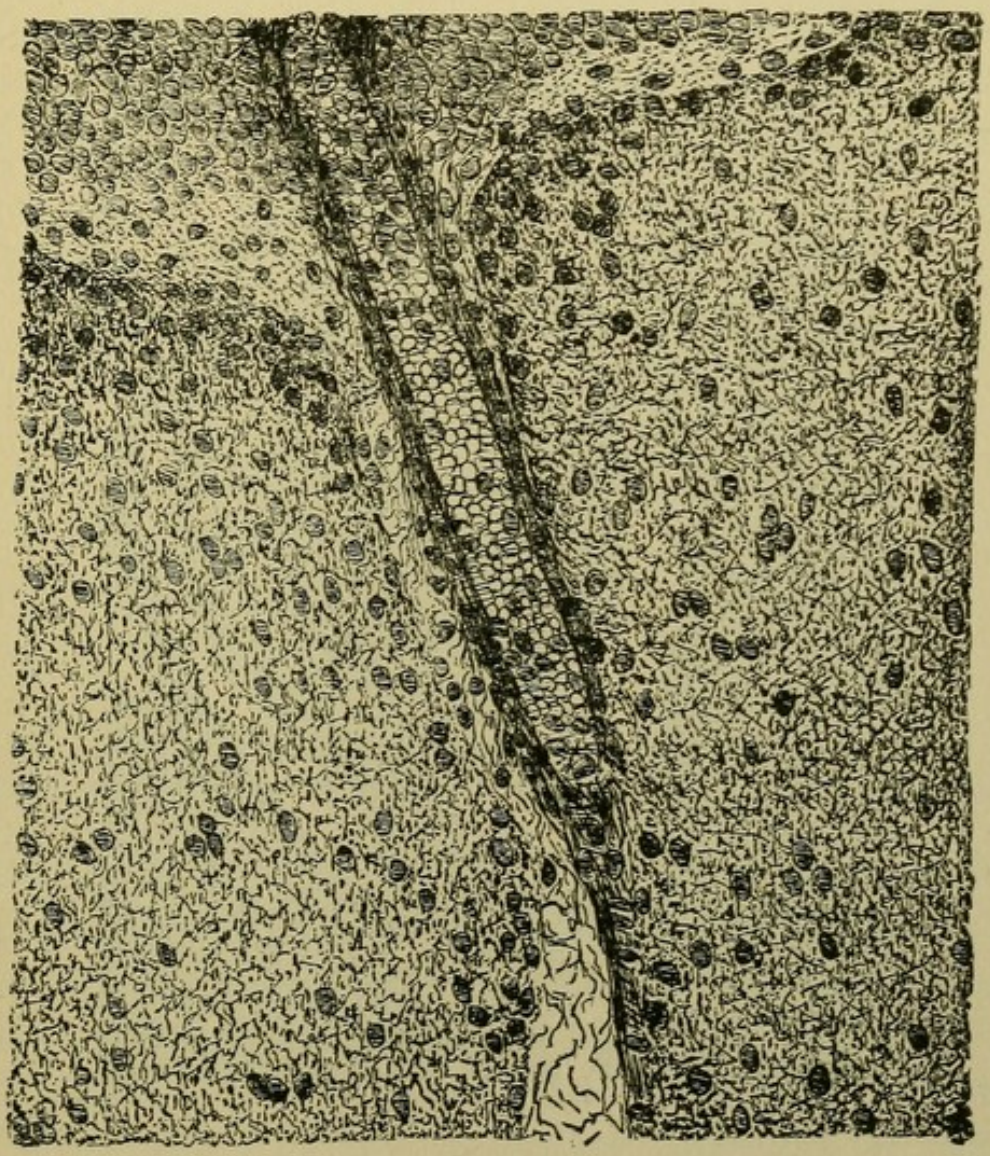

FIG. 1.

Showing edge of convolution bordering upon inflamed Pia Mater. Arteriole entering between convolutions, showing Periarteritis. × 250.

ever, were the cells aggregated into even minute gummatous masses. My studies indicated clearly that the

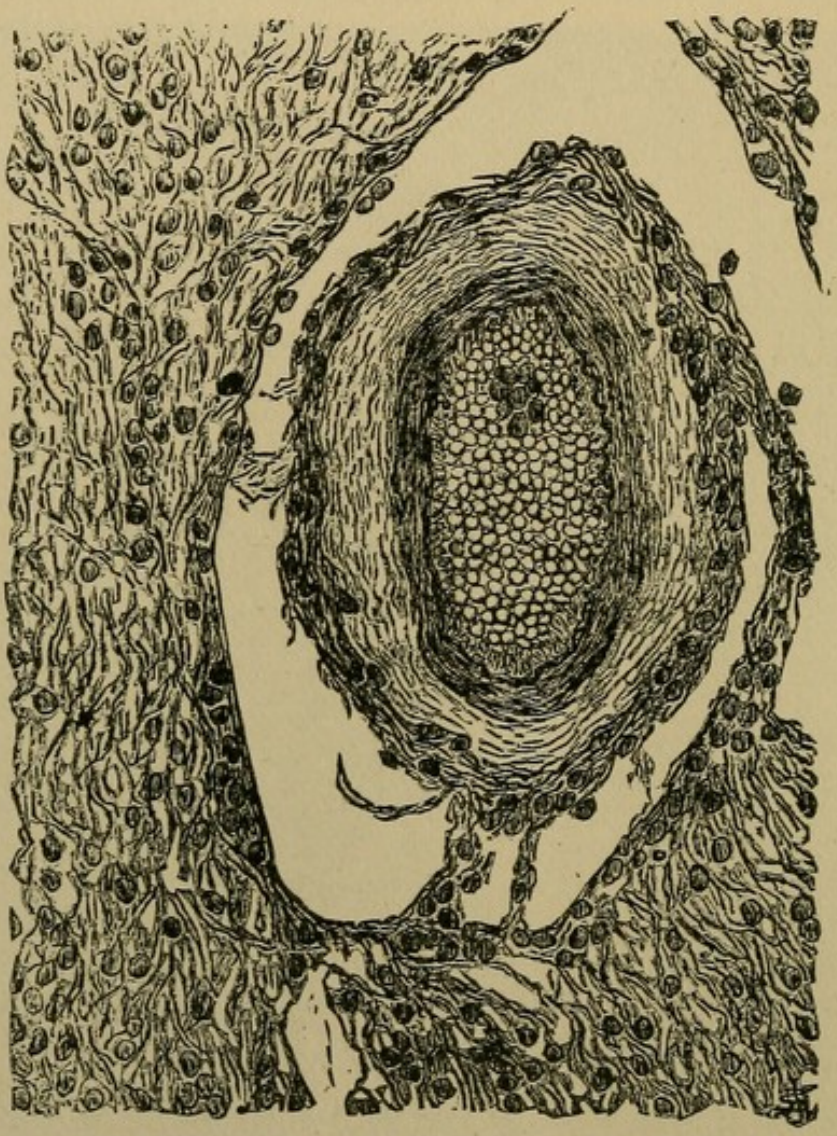

FIG. 2.

Cross Section in Pia Mater. × 250.

disease commenced in the external coats of the vessels, but soon involved the general neuroglia tissue, the

whole structure being more or less filled with cellular elements similar to those found adhering to the vessels. At the same time there was a destruction of the proper nerve tissue, so that in the most advanced portions of the brain the cells had entirely disappeared. In this portion of the brain were also found, loosely

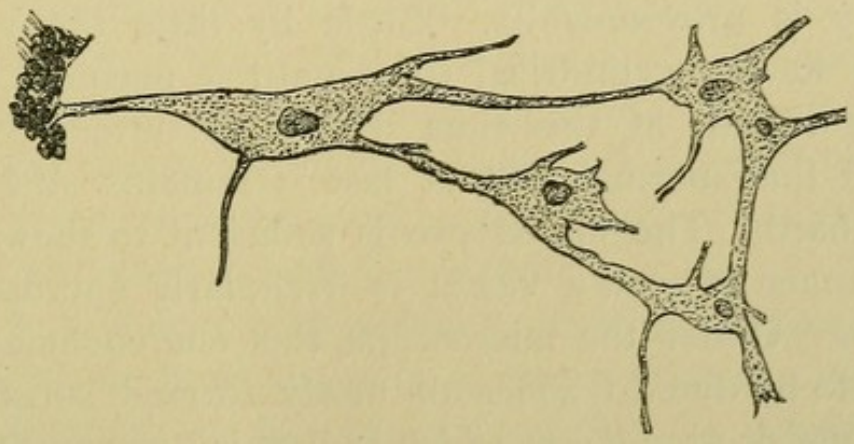

Fig 3.

Leucocytes tending to organize into tissue. × 500 (reduced).

adhering to the pia mater, curious reticulated, protoplasmic (many nucleated) masses, apparently the result of fusing together and development of white blood corpuscles into a sort of connective tissue.

Syphilis of the Blood Vessels.—Syphilis is one of the most frequent causes of atheroma of the arteries, and in syphilitic subjects atheroma of the vessels of the brain is very frequent. As in the changes which it causes, as well as in the course of its development, it does not differ from athe-

roma elsewhere, I shall not discuss its pathology in detail; but there is a form of syphilitic disease which is especially prone to attack the arteries at the base of the brain, and is more destructive in its history. The first change in the blood vessel is a loss of its transparency, with the development of a peculiar whitish appearance which increases until the whole artery is grayish-white. Little by little the vessel loses its flat cylindrical form until it becomes perfectly round; at this time it is much firmer to the touch than normal, and at last it remains stiff and and hard. The naked eye is sufficient to show that the lumen of such a vessel is irregularly encroached upon. Under the microscope, this encroachment is seen to be due to zones of newly formed substance of white or grey color, which at first is dry and tough, but in the last stage hard and cartilaginous. Accord- to Heubner, this newly-grown substance is developed between the elastic lamina of the intima and the endothelium, and consists at first of endothelial cells, which constantly increase and alter until they form a firm felted tissue composed of spindle and stellate cells, into which run prolongations from the nutritive vessels. This mass may increase longitudinally, involving more and more of the main artery. It may become organized and take upon a structure similar to that of the original wall of the vessel, when the process comes to a standstill with great lessening of the lumen of the vessels; or it may be transformed into a fibrous con-

nective tissue, the whole affected portion of the artery becoming useless. This degeneration especially attacks the carotids and their branches, the arteries of the Sylvian fissure and of the corpus callosum, near their origins, and by interference with the terminal arteries which supply the corpus striatum, not rarely produces softening of it.

The disease of the brain cortex, which has been spoken of as connected with disease of the vessels, is probably largely dependent upon, and secondary to, the affection of the blood vessels. It might therefore well be considered at this place, had it not already been discussed in sufficient detail.

Syphilomata may produce softening and breaking down of the brain tissue by pressure upon the vessels, or even upon the brain substance, but the softenings, the wide spread degenerations of brain tissue which are so frequent in syphilitic subjects, are much more frequently due to disease of the blood vessels, either alone or in connection with syphilitic disease of the membranes. It must also be remembered that the peculiar degeneration described in the last paragraph, although more frequent in the large vessels, may occur in the smallest and that a large or a small vessel so diseased is unable to properly exercise its function, and very frequently becomes the seat of a thrombus.

Section II. Symptomatology.

It has always been stated that syphilis may produce various more or less distinct lesions of the nerve cen-

tres. It must be remembered, however, that it is not usual for one of these lesions to exist by itself, but that in any individual case, usually two, or perhaps all of them, are present. Since the lesions of cerebral syphilis vary, it is evident that the symptoms of the disorder must also vary: moreover, the same lesion occupies now this, now that, brain region, and as the symptoms which it produces are the outcome of interference with the function of the part of the brain immediately implicated, it is evident that the same lesion must in different cases cause different symptoms: it is, indeed, rare to find two cases of syphilitic brain disease offering exactly similar symptoms and running parallel courses, so that it is difficult to make a picture of a typical or ideal case of the disease.

In attempting the study of symptomatology, it is best to begin with gummatous meningitis as the most ordinary form of the specific brain affection. As the gummatous mass may diffuse itself widely, or may be strictly localized, under the head of gummatous syphilis of the brain membrane are included cases of localized gummatous tumors, and also cases of syphilitic meningitis, *i. e.*, cases in which the large regions of the meninges are involved in an inflammation with gummatous exudation.

Gummatous Syphilis of the Brain Membrane.

Cases of gummatous brain syphilis may, for our present purpose, be very well divided into the acute

and chronic, it being remembered that a case which in its onset is most acute, almost invariably ends in a chronic disorder.

Although the clinician is justified in talking about acute syphilitic meningitis, I am myself much inclined to doubt whether acute inflammation of the brain membranes or of the brain substance, ever develops as a primary syphilitic lesion. It seems to me much more probable that such acute inflammation is always preceded by a chronic meningitis, or by the formation of a distinct gummatous tumor; nevertheless it is very certain that acute meningitis may develop in a case when there have been no *apparent* symptoms, and therefore may seem to be absolutely abrupt in its onset.

Some years ago, I was asked to see in consultation, a patient who was suffering from a partial hemiplegia as the result of an attack of acute brain congestion, and was told that in the midst of apparently perfect health, the man came home from business complaining of sleepiness, was shortly afterwards found comatose, and almost immediately after this became violently convulsed. The convulsions persisted for some time under the administrations of a homœopathic practitioner; the doctor who was then summoned, found the patient comatose, fiercely convulsed, with a full bounding pulse and high temperature. Very free venesection was practiced and the patient became quiet, although still un-

conscious. A few hours later a recurrence of the convulsive movements was subdued by cupping the back of the neck. Shortly after this treatment the convulsions ceased, the respiration became regular, and after a few hours consciousness returned.

After this return to consciousness, however, there was slight weakness of the left side, which in the course of forty-eight hours had distinctly increased. Believing that the case was one of syphilis, I suggested the free exhibition of mercury, and a few days later my diagnosis was confirmed by the appearance of a plainly specific squamous eruption on the hand. Under antisyphilitic medication, complete recovery was obtained. In this case the mode of coming on and the gradual increase of the hemiplegia after the convulsion, indicated that a latent gumma had preceded the acute attack.

Almost always very careful investigation will, in these cases of acute brain syphilis, show that there have been prodromic symptoms which have been overlooked. As an example I may cite the case of B. R., aged 28, whom I also saw in consultation. It was stated that in the afternoon of January 21, 1887, without prodromes, he suddenly became dizzy and fell, the fall being followed by light delirious stupor, high fever, very rapid pulse, succeeded after some hours by clear mental action, with persistent headache and malaise, and five days later by an epileptic convulsion. In this instance, however, careful cross-questioning

elicited from the man's wife the statement that, although he had been attending to his business regularly up to January 21, he had previously complained of great drowsiness.

The further course of this case is sufficiently interesting to be worthy of noting: On January 28th there was weakness of the external rectus muscle without ocular paralysis, with violent headache, and very rapid and feeble pulse. When left to himself, Mr. R. continually talked nonsense, but when aroused would answer questions with a fair degree of correctness. He did not, however, recognize clearly those about him, and at night was irrational and frequently delirious, with periods of profound, almost stuporous sleep. Under active mercurial treatment, by the 18th of February he was much better, but on that day, he was suddenly seized with epileptiform convulsions lasting for some hours, followed by prolonged hebetude with wandering delirium at night, great headache, hallucinations, retention of urine and strabismus. Mr. R. was now freely ptyalized, and subsequently given a drachm of iodide of potassium three times a day. By the 2nd of March all the symptoms had vanished and convalescence seemed fairly established. Early in May he returned to his business, and since that time has remained in good health, under the continued use of small doses of the iodide of potassium.

Another case illustrative of the form of syphilis now under consideration, is that of Patrick McC., who was picked up by the police patrol, and brought into the University Hospital as a case of apoplexy.

He was profoundly unconscious, with flushed face and conjunctiva, with contracted pupils which responded very feebly to the light; pulse, 58; temperature, 96.8. He remained for

some hours in a condition of stupor, with retention of urine; but calomel being very freely administered, in 48 hours he was able to answer questions and to complain of headache. Under the continued use of iodide of potash, which was rapidly increased to a drachm three times a day, he soon convalesced, and in two weeks after his admission was discharged from the hospital without the appearance of any symptoms. This patient, after recovery of consciousness, stated that he was entirely well until three days before his admission into hospital, when he was seized by violent headache increased by light, giddiness, ringing of the ears, and a marked sense of hebetude. Unmistakable evidences of syphilitic infection, past and present, were upon his person.

It is evident, that a case of chronic syphilis may, at any time suffer from an epileptic or an apoplectic attack, readily mistaken for an acute disease. It is perhaps not so universally recognized that a sufferer from a chronic syphilitic brain lesion is liable to an attack of not only simple brain congestion, but also of an acute meningitis. At the University Hospital Dispensary, I once made the diagnosis of chronic cerebral syphilis in a patient who the next day was seized with violent delirium, and typical evidences of acute meningitis, accompanied with excessive pain in the head and convulsions. After the convulsions had persisted for four days, I was sent for, and found the man offering every symptom of explosive meningitis, and after his death it was discovered that an acute meningitis had been engrafted upon a chronic meningitis evidently of syphilitic origin. A similar case to

this is reported by Gamel,* in which intense headache, fever, and delirium, came on abruptly in an old syphilitic subject, and ended in general palsy and death. At the autopsy the symptoms were found to have depended upon an acute meningitis secondary to a large gumma.

In this connection may well be cited the observation of Molinier † in which violent delirium, convulsions, and coma, occurred suddenly. A very curious case is reported by D. A. Zambaco,‡ in which attacks simulating acute meningitis, occurring in a man with a cerebral gummatous tumor, appear to have been malarial. In such a case the diagnosis of a malarial paroxysm could only be made out by the presence of the cold stage, the transient nature of the attack, its going off with a sweat, its periodical recurrence, and the therapeutic effect on it of quinine.

The symptoms of *chronic brain syphilis* are so protean, so polymorphic, sometimes in the single case so kaleidoscopic in the weekly or even daily shiftings and combinations, that it is almost impossible to reduce them to any order. Possibly the most dangerous cases are those in which the symptoms are least severe, and so elusive that they fail to call attention to the existence of severe organic disease of the brain.

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* Inaug. Diss., Montpellier, 1875.

† Revue Med. de Toulouse, xvi, 1880.

‡ Des Affectiones Nerveuses Syphilitique, Paris, 1862, p. 485.

Malaise, a little brain failure, a succession of causeless headaches—these may for a long time be all the outcomes. The following outline of a case taken from my notebook will serve to illustrate this mild form of the disorder:

Mr. A. J. F., aged 50, was first seen by me April 28, 1880. The history that he gave was that during 1875 and 1876, being the head of a large corporation engaged in legal struggles for existence, he was under great strain and overwork, and gradually failed in health until April 1876, when he was suddenly seized with partial blindness, and loss of power in his legs. This continued, at times worse, at times better, for some months, until finally he was forced to take to his bed with great prostration, and mu h distress in the head, and a sense of pressure of the forehead. July 1876 he began to get about, but was unable to attend to business; any mental exertion brought on distress of the head with confusion of thought. He stated that he had never had any distinct spells of giddiness, but much numbness about the head, and that there was loss of control over his muscles so that, to use his words, "when he wanted to change position he could not tell how to do it." This symptom varied in intensity from time to time. There had been distinct failure of memory for recent events, but no convulsive attacks. In February 1880, without warning, he fell unconscious, but was not convulsed. The unconsciousness lasted for five minutes followed by delirium and great excitement. Under the administration of chloral he went to sleep, but it was several days before he recovered completely. Since the beginning of the illness his eyesight had not been very good, but he had obtained some imperfect relief from glasses. In 1878 he noticed that he could see a great deal better in the night than in the day,—in the day everything seemed blurred. During all these years he had been a good walker; no disturbance

of bladder or rectum or of the sexual functions; had had some tingling in the hands and feet; at times heard very distinctly bands of music, voices, etc.;—the hearing of these sounds was sometimes so distinct as to deceive him, but had never produced any mental delusion; there had been no visual delusions; he had had no second attack of unconsciousness. April 28, at the time he came under my care, his symptoms according to my notes were as follows: "Appetite and digestion good; no disturbance in the power of electro-muscular contractility or reflexes of the arms and legs; some little lack of sensibility in the legs so that he can not separate the points of the æsthesiometer at two and a half centimeters; has some sensation of numbness on the right side of the head associated with some loss of power of separating the æsthesiometrical points as contrasted with the opposite side of the head. Vision at times perfect, but often duplex, and not infrequently he sees, two, three, four, or even five secondary images, all the secondary images being blurred. There has been distinct change of disposition, he having become irritable and apathetic.

Under the frequent cauterization of the neck and the administration of iodide of potassium, Mr. F's symptoms gradually abated and after some months he left me perfectly cured.

March 13, 1886, Mr. F. reported at my office with symptoms of failure of health accompanied with loss of power to do mental work; some mental confusion, some headache, but more pronounced general distress in the head, and very marked right ptosis. He was first salivated, and afterwards iodide of potassium was administered to him in doses of half a drachm three times a day, associated with small doses of mercurials. Under this treatment he greatly improved, and by June had recovered his general health, and also the use of his right eyelid.

Oct. 1888. Mr. F. returned suffering from the old symptoms, with, however, the ptosis not so pronounced as before,

but affecting very distinctly both eye-lids. Under the use of large doses of iodide and mercurials he again recovered.

In the more severe cases of chronic brain syphilis which have come under my observation, most usually after a greater or less continuance of prodromes such as have been mentioned, epileptic attacks have occurred with a hemiplegia, or a monoplegia, which is almost invariably incomplete, and usually progressive; very frequently diplopia is manifested before the epilepsy, and on careful examination is found to be due to weakness of some of the ocular muscles. Not rarely oculo-motor palsy is an early and pronounced symptom, and a marked paralytic squint is very common. Along with the development of these symptoms there is almost always distinct failure of the general health and progressive intellectual deterioration, as shown by loss of memory, failure of the power to fix the attention, mental bewilderment, morbid somnolence, perhaps aphasia, and towards the end of life not rarely dementia. If the case convalesce under treatment, the amelioration is gradual, the patient traveling slowly up the road he has come down. If the case end fatally, it is usually by a gradual sinking into complete paralysis, or the patient is carried off by an acute inflammatory exacerbation, or, as in two of my cases, amelioration may be rapidly occurring and a very violent epileptic fit produce a sudden fatal asphyxia. Death from brain-softening around the tumor is not infrequent, but a fatal apoplectic hemorrhage is rare.

I do not think much is to be gained by attempting to classify cases of cerebral syphilis, but Fournier separates them into the cephalic, congestive, epileptic, aphasic, mental, and paralytic, although in so doing he scarcely facilitates description or study. Heubner makes the following types:

"1. Psychical disturbances, with epilepsy, incomplete paralysis (seldom of the cranial nerves), and a final comatose condition, usually of short duration.

"2. Genuine apoplectic attacks with succeeding hemiplegia, in connection with peculiar somnolent conditions, occurring in often-repeated episodes; frequently phenomena of unilateral irritation, and generally at the same time paralyses of the cerebral nerves.

"3. Course of the cerebral disease similar to paralytica dementia."

In regard to these types, the latter seems to me clear and well defined, but contains those cases which I shall discuss under the head of Cortical Disease.

Meningeal syphilis as seen in this country does not conform rigidly with the other asserted types, although there is this much of agreement that, when the epilepsy is pronounced, the basal cranial nerves are not usually paralyzed, the reason of this being that epilepsy is especially produced when the gummatous change is in the ventricles or on the upper cortex. In basal affections the epileptoid spells, if they occur at all, are usually of the form of *petit mal;* but this rule is general, not absolute. The apoplectic somno-

lent form of cerebral syphilis, for some reason, is rare in this city, and it seems necessary to add to those of Heubner's, a fourth type, to which a large proportion of our cases conform, and a fifth, and still more rare form of the disorder. These types I would characterize as follows:

4. Psychical disturbance without complete epileptic convulsions, associated with palsy of the basal nerves and often with partial hemiplegia.

5. Paraplegia associated with ocular or other symptoms indicative of lesions at the base of the brain.

I have seen a number of cases in which, along with the symptoms of disease of the spinal cord, have been present evidences of implication at the base of the brain, such as headache, dilatation of the pupils, squint, or some times even paralysis of the facial, trigeminal, or other basal nerves not connected with the vision; multiple lesions in syphilis of the nerve centres, are of course very frequent, and in the cases now under consideration I believe that the lesions existed at different levels upon the cord, some implicating the medulla oblongata, or even the pons, whilst others are placed at varied heights in the spinal column. As an example of this class of cases, I append an account of one which was long under my care. The history of syphilitic infection was not complete, but the character of the symptoms and the fact that they rapidly yielded to anti-syphilitic medica-

tion, and were not obviously affected by other treatment, is sufficient evidence as to the real nature of the disease.

X. Y., aged 27, has no knowledge of specific infection, although acknowledges frequent exposure. Health good until March 14, 1884, when he was taken with a general feeling of malaise and languor, which increased for a week, and then became so bad that it forced him to go to bed. At this time power to pass water failed, so that his urine had to be drawn off by catheter; bowels costive; complete anorexia; great weakness; some headache, and dull, steady pain in the arms, which, with restlessness, kept him awake. He came under my care April 7th; at this time his body, and especially the legs, were emaciated. The notes read: "Muscles soft and flabby, and reflexes greatly exaggerated, especially knee jerk; grasp of hands very weak; is able to stand, but walks very feebly, and only a few steps, with much staggering; station not affected by shutting the eyes; æsthesiometer shows the sensibility decidedly impaired in the legs, normal in the arms; has drooping of right eyelid and double vision; urine has to be drawn with catheter; suffers no pains, except some dull pain in the arms."

He was first treated with alternate hot and cold water douches to the legs, and iodide of potassium. He improved steadily, and by April 20th the double vision had disappeared. On the 20th it was noted that vision, the bladder functions, and sensibility, were normal, and that his grip was stronger; but the legs were still distinctly weak, although he was able to walk a little, and went about a great deal on crutches; the knee jerk had become nearly normal. There was little headache, but a great deal of dizziness.

The large doses of iodide of potassium and the small doses of corrosive sublimate, were continued through the summer, and by the first of August the patient was able to walk

very well. Near the middle of August he recommenced his office work, when one day, after standing three or four hours, a sense of weakness developed in the legs, which, in spite of treatment, grew steadily worse, until he was forced to take up crutches again. Simultaneously with the lameness, there developed pain in the elbows very similar to that from which he had first suffered; also headache. There was no return of the urinary symptoms, except occasionally slowing or arrest of the passing of the urine.

The iodide, which he had been taking through the summer in small doses, was increased to 150 grains a day. In four days slight evidences of iodism developed, and the dose was decreased to 75 grains a day. Under this treatment the symptoms ameliorated, and by the latter part of September the patient had become quite strong and able to walk freely, although there was still some pain in the arms and head. In October, treatment with small doses of the alteratives was continued, iodide of potassium and the green iodide of mercury being used. In October a violent headache with dizziness came on, but was relieved by blisters back of the ears, leeches to the back of the neck, and an increase of the iodides. In February of 1885 there was still a tendency to headache after study; but his legs seemed entirely well, and he could use them freely. The patient's condition slowly improved, with occasional backsets, and in November, 1887, he appeared to be entirely recovered, and was able to run and jump about as freely as ever. Subsequently there were several slight relapses, with headache, weakness of the legs, etc. Under mild but persistent antispecific medication, the health of the patient became more thoroughly established; and at the date of present writing (March, 1889) he has remained for many months entirely free from abnormal manifestations, and able to do a very large amount of work in his profession.

It must be remembered that the separation of

these varieties of cerebral syphilis, is artificial and arbitrary, so that the most satisfactory way of approaching this subject is to study the important symptoms in severalty, rather than to attempt to group them into recognizable varieties of the disease; and this method I shall here adopt.

Headache is the most constant, and usually the earliest, symptom of meningeal syphilis; but it may be absent, especially when the lesion is located in the reflexions of the meninges which dip into the ventricles, or when the basal gumma is small and not surrounded with much inflammation. The length of time it may continue without the development of other distinct symptoms, is remarkable. In one case * at the University Dispensary, the patient affirmed that he had had it for four years before other causes of complaint appeared. It sometimes disappears when other symptoms develop. It varies almost indefinitely in its type, but is, except in very rare cases, at least so far paroxysmal as to be subject to pronounced exacerbations. In most instances it is entirely paroxysmal; and a curious circumstance is, that very often these paroxysms may occur only at long intervals. Such distant paroxysms are usually very severe, and are often accompanied by dizziness, sick stomach, partial unconsciousness, or even by more marked congestive symptoms. The pain may seem to fill the whole cra-

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* Book Y, p. 88, 1879.

nium, may be located in a cerebral region, or fixed in a very limited spot. Heubner asserts that when this headache can be localized, it is generally made distinctly worse by pressure at certain points; but my own experience is hardly in accord with this. Any such soreness plainly cannot directly depend upon the cerebral lesion. In the great majority of cases I have seen, there has been no local tenderness; indeed, both in cerebral and spinal syphilis, according to my own experience, localized soreness indicates an affection of the bone or of its periosteum. In many cases, especially when the headache is persistent, there are distinct nocturnal exacerbations.

It will be seen that there is nothing absolutely characteristic in the headache of cerebral syphilis; but excessive persistency, apparent causelessness, and a tendency to nocturnal exacerbation, should in any cephalalgia excite suspicion of a specific origin—a suspicion which is always to be increased by the occurrence of slight spells of giddiness, or by delirious mental wandering accompanying the paroxysms of pain. When an acute inflammatory attack supervenes upon a specific meningeal disease, it is usually ushered in by a headache of intolerable severity.

When the headache in any case is habitually very constant and severe, the disease is probably in the dura mater or periosteum; and this probability is much increased if the pain be local and augmented by firm, hard pressure upon the skull over the seat of the pain.

Disorders of Sleep.—There are two antagonistic disorders of sleep, either of which may occur in cerebral syphilis, but which have only been present in a small proportion of the cases that I have seen. Insomnia is more troublesome in the prodromic than in the later stages, and is only of significance when combined with other more characteristic symptoms. A peculiar somnolence is of much more determinate import. It is not pathognomonic of cerebral syphilis, yet of all the single phenomena of this disease it is the most characteristic. Its absence is, however, of little import in the diagnosis of an individual case.

As I have seen it, it occurs in two forms. In the one variety, the patient sits all day long, or lies in bed in a state of semi-stupor, indifferent to everything, but capable of being aroused, answering questions slowly, imperfectly, and without complaint, but in an instant dropping off again into quietude. In the other variety the sufferer may still be able to work, but often falls asleep while at his tasks, and especially toward evening has an irresistible desire to slumber, which leads him to pass, it may be, half of his time in sleep. This state of partial sleep may precede that of the more continuous stupor, or may pass off when an attack of hemiplegia seems to divert the symptoms. The mental phenomena in the more severe cases of somnolency are peculiar. The patient can be aroused —indeed, in many instances he exists in a state of torpor rather than of sleep; when stirred up he thinks

with extreme slowness, and may appear to have a form of aphasia; yet at intervals he may be endowed with a peculiar automatic activity, especially at night. —Getting out of bed; wandering aimlessly and seemingly without knowledge of where he is, and unable to find his couch; passing his excretions in a corner of the room or in other similar locality, not because he is unable to control his bladder and bowels, but because he believes that he is in a proper place for such act—he seems a restless nocturnal automaton rather than a man. In some cases the somnolent patient lies in a perpetual stupor.

Apathy and indifference are the characteristics of the somnolent state, yet the patient will sometimes show excessive irritability when aroused, and will at other periods complain bitterly of pain in his head, or will groan as though suffering severely in the midst of his stupor—at a time, too, when he is not able to recognize the seat of the pain. I have seen a man with vacant, apathetic face, almost complete aphasia, persistent heaviness and stupor, arouse himself when the stir in the ward told him that the attending physician was present, and come forward in a dazed, highly pathetic manner, by signs and broken utterances begging for something to relieve his head. Huebner speaks of cases in which the irritability was such that the patient fought vigorously when aroused; this I have not seen.

This somnolent condition may last several weeks.

T. Buzzard* details the case of a man who, after a specific hemiplegia, lay silent and somnolent for a month, and yet finally recovered so completely as to win a rowing match on the Thames. I have now under my care a patient who is entirely rational, though he still suffers from occasional uncontrollable headaches; who several years since was profoundly somnolent for four months, much of the time so absolutely comatose that his discharges were passed in his bed without his knowledge, and his food swallowed automatically when put into his mouth by a nurse.

In its excessive development, syphilitic stupor puts on the symptoms of advanced brain-softening, to which it is indeed often due. Of the two cases with fatal result which I have notes, one at the autopsy was found to have symmetrical purulent breaking down of the anterior cerebral lobes, apparently from disease of the basal arteries; the other, softening of the right frontal and temporal lobes, due to the pressure of a gummatous tumor and ending in a fatal apoplexy.

This close connection with cerebral softening explains the clinical fact that apoplectic hemorrhage is apt to end the life in these cases of somnolent syphilis. But a prolonged deep stupor in persons suffering from cerebral syphilis does not prove the existence of extensive brain-softening, and is not incompatible with subsequent complete recovery. As an

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* Clinical Lectures on Dis. Nerv. Sys., London, 1882.

element of prognosis, it is of serious but not of fatal import.

Paralysis.—When it is remembered that a syphilitic exudation may appear at almost any position in the brain, that spots of encephalic softening are a not rare result of the infection, that syphilitic disease is one of the causes of cerebral hemorrhage, it is plain that a specific palsy may be of any conceivable variety, and affect either the sensory, motor, or intellectual sphere. The mode of onset is as various as the character of the palsy. The attack may be instantaneous, sudden, or gradual. The gradual development of the syphilitic gumma would lead us, *a priori*, to expect an equally gradual development of the palsy; but experience shows that in a large proportion of the cases the paralysis appears suddenly, with or without the occurrence of an apoplectic or epileptic fit. Under these circumstances it will be usually noted that the resulting palsy is incomplete; in rare instances it may be at its worst when the patient awakes from the apoplectic seizure; but commonly it progressively increases for a few hours and then becomes stationary. These sudden partial palsies, probably result from an intense congestion around the seat of disease, or from stoppage of of the circulation in the same locality: whatever their mechanism may be, it is important to distinguish them from palsies which are due to hemorrhage. I believe this can usually be done by noting the degree of paralysis.

A suddenly-developed, *complete* hemiplegia, or other paralysis, may be considered as in all probability either hemorrhagic or produced by a thrombus so large that the result will be disorganization of the brain-substance, and a future no more hopeful than that of a clot. On the other hand, an *incomplete* palsy may be rationally believed to be due to pressure or other removable cause; and this belief is much strengthened by a gradual development. The bearing of these facts upon prognosis it is scarcely necessary to point out.

Although the gummata may develop at almost any point, they especially affect the base of the brain, and are prone to involve the nerves which issue from it. Morbid exudations, not tubercular or syphilitic, are rare in this region. Hence a rapidly but not abruptly appearing strabismus, ptosis, dilated pupil, or any paralytic eye-symptom in the adult, is usually of a syphilitic nature. Syphilitic facial palsy is not so frequent, whilst paralysis of the facial nerve from rheumatic and other inflammation within its bony canal, is very common. Paralysis of the facial nerve may therefore be specific, but existing alone is of no diagnostic value. Since syphilitic palsies about the head are in most instances due to pressure upon the nerve-trunks, the electrical reactions of degeneration may be obtained in the affected muscles.

There is one peculiarity about specific palsies which has already been alluded to as frequently pres-

sent—namely, their temporary, transient, fugitive nature, they varying in character and seat. Thus an arm may be weak to-day, strong to-morrow, and the next day feeble again, or the recovered arm may retain its power and a leg fail in its stead. These transient palsies are much more apt to involve large than small brain territories. The explanation of their largeness, fugitiveness, and incompleteness is that they are not directly due to clots or other structural changes, but to congestions of the brain-tissues in the neighborhood of gummatous exudations. Squint, due to direct pressure on a nerve, will remain when the accompanying monoplegia due to congestion disappears.

Motor palsies are more frequent than sensory affections in syphilis, but hemianæsthesia, localized anæsthetic tracts, indeed any form of sensory paralysis, may occur. Numbness, formications, all varieties of paræsthesia, are frequently felt in the face, body, or extremities. Violent peripheral neuralgic pains are rare, and generally when present denote neuritis. Huguenin, however, reports* a severe trigeminal anæsthesia dolorosa, which was found after death, from intercurrent disease, to have depended upon a small gumma pressing upon the Gasserian ganglion. A somewhat similar disease has been reported by Allen McLane Hamilton.†

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* Schwiez. Corr. Blät., 1875.

† Alienist and Neurologist, iv, 58.

The special senses are liable to suffer from the invasion of their territories by cerebral syphilis, and the resulting palsies follow courses, and have clinical histories, parallel to those of the motor sphere. The onset may be sudden or gradual, the result temporary or permanent. Charles Mauriac* reports a case in which the patient was frequently seized with sudden attacks of severe frontal pain and complete blindness, lasting from a quarter to half an hour; at other times the patient had spells of aphasia lasting for one or two minutes. I have seen in two cases nearly complete deafness develop in a few hours in cerebral syphilis, and disappear abruptly after some days. Like other syphilitic palsies, therefore, paralysis of special senses may come on suddenly or gradually, and may occur paroxysmally.

Among the palsies of cerebral syphilis must be ranked aphasia. An examination of recorded cases shows that syphilitic aphasia is subject to vagaries and laws similar to those which dominate other specific cerebral palsies. It is usually a symptom of advanced disease, but may certainly develop as one of the first evidences of cerebral syphilis, and I have seen it as the most marked symptom in an acute syphilitic paroxysm when no distinct history of prodromes was obtainable. Coming on after an apoplectic or epileptic fit, it may be complete or incomplete; owing to the smallness of

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* Loc. Cit., p. 31.

the centre involved, and the ease with which its function is held in abeyance, a total loss of word-thought is not so decisive as to the existence of cerebral hemorrhage as is a total motor palsy. Like hemiplegia or monoplegia, specific aphasia is sometimes transitory and paroxysmal. Buzzard* records several such cases. Mauriac† details a very curious case in which a patient, after long suffering from headache, was seized by sudden loss of power in the right hand and fingers, lasting about ten minutes only, but recurring many times a day. After this had continued some time, the paroxysms became more completely paralytic, and were accompanied by loss of the power of finding words, the height of the crises in the palsy and aphasia being simultaneously reached. For a whole month these attacks occurred five or six times a day, without other symptoms except headache, and then the patient became persistently paralytic and aphasic, but finally recovered. To describe the different forms of specific aphasia and their mechanism of production, would be to enter upon a discussion of aphasia itself — a discussion out of place here. Suffice it to say that any conceivable form of aphasia may be induced by syphilis, although on account of the tendency of the syphilitic lesion, when placed near the speech centres, to spread its influence over a wide territory, I have very rarely

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* Loc. cit., p. 81.

† Aphasie et Hemiplégie Droite Syphilit., Paris, 1877.

been able to detect any of the more extraordinary forms of aphasia, such as word-blindness, etc.

The aphasia may be the result of a gummatous tumor involving the artery, or of a clot; but I have seen passing, repeated, attacks of complete aphasia, followed by a permanent condition of partial aphasia caused by syphilitic degeneration of the middle cerebral artery, as proven by autopsy, when there was no localized meningeal gumma present.

Owing to the centres of speech being situated in the cortical portion of the brain, aphasia in cerebral syphilis is very frequently associated with epilepsy. Of course right-sided palsy and aphasia are united in syphilitic as in other disorders. If, however, the statistics given by Tanowsky* be reliable, syphilitic aphasia is associated with left-sided hemiplegia in an extraordinarily large proportion of cases. Thus in 53 cases collected by Tanowsky, 18 times there was right-sided hemiplegia, and 14 times left-sided hemiplegia, the other cases being not at all hemiplegic. Judging from the autopsy on a case reported in Mauriac's brochure, this concurrence of left-sided paralysis and aphasia, depends partly upon the great frequency of multiple brain lesions in syphilis, and partly upon the habitual involvement of large territories of the gray matter secondarily to diseased membrane. An important practical deduction is that the conjoint exist-

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* L'Aphasie Syphilitique.

ence of left hemiplegia and aphasia is almost diagnostic of cerebral syphilis.

Probably amongst the palsies may be considered the disturbances of the renal functions, which are only rarely met with in cerebral syphilis, and which are probably in most instances dependent upon the specific exudation pressing upon the vaso-motor centres in the medulla. Fournier speaks of having notes of six cases in which polyuria with its accompaniment, polydipsia, was present, and details a case in which the specific growth was found in the floor of the fourth ventricle. Cases have been reported of true saccharine diabetes due to cerebral syphilis,* and I can add to these an observation of my own. The symptoms, which occurred in a man of middle age with a distinct specific history, were headache, nearly complete hemiplegia, and mental failure, associated with the passage of comparatively small quantities of urine so highly saccharine as to be really a syrup. Under the influence of iodide of potassium, the sugar in a few weeks disappeared from the urine.

Epilepsy.—Epileptic attacks are a very common symptom of meningeal syphilis, and are of great diagnostic value. The occurrence in an adult of an epileptic fit, after a history of intense and protracted headache, should always excite grave suspicion.

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* Consult Servantié, Des Rapports du Diabète et de la Syphilis, Paris, Thèse, 1876; also case reported by L. Putzel, New York Med. Record, xxv, 450.

Before I had read Fournier's work on *Nervous Syphilis*, I taught that an epilepsy appearing after thirty years of age was very rarely, if ever essential epilepsy, and unless alcoholism, uræmic poison, or other adequate cause could be found, was in nine cases out of ten specific; and I therefore quote with satisfaction Fournier's words: "L'épilepsie vraie, ne fait jamais son premier dêbut à l'âge adulte, à l'âge mûr. Si un homne adulte, au dessus de 30, 35, à 40 ans, vient, à être pris pour la première fois d'une crise épileptique, et cela dans la cours d'une bonne santé apparente, il y a, je vous le répète, hui ou neuf chances sur dix pour que cette épilepsie soit d'originie syphilitique."

Syphilitic epilepsy may occur either in the form of *petit mal* or of *haut mal*, and in either case may take on the exact characters and sequence of phenomena which belong to the so-called idiopathic or essential epilepsy. The momentary loss of consciousness of *petit mal* will usually, however, be found associated with attacks in which, although voluntary power is suspended, memory recalls what has happened during the paroxysm—attacks, therefore, which simulate those of hysteria, and which may lead to an error of diagnosis.

Even in the fully developed type of convulsions, the aura is only rarely present. Its absence is not, however, of diagnostic value, because it is frequently not present in essential epilepsy, and it may be pronounced in the specific disease. It is said that

when in an individual case the aura has once appeared, the same type or form of approach of the convulsion is thereafter rigidly adhered to. The aura is sometimes *bizarre:* a severe pain in the foot, a localized cramp, a peculiar sensation indescribable and unreal in its feeling may be the first warning of the attack. Again, an aura may affect a special sense: thus, I had a patient whose attacks began with blindness. Whenever, under such circumstances, I have had an opportunity of making a post mortem, I have found an organic lesion of the special sense centre or tract whose function had been disturbed during life.

In many, perhaps most, cases of specific convulsions, instead of a paroxysm of essential epilepsy being closely simulated, the movements are in the onset, or more rarely throughout the paroxysm, unilateral: indeed they may be confined to one extremity. This restriction of movement has been held to be almost characteristic of syphilitic epilepsy, but it is not so. Whatever diagnostic significance such restriction of the convulsion has, is simply to indicate that the fit is due to cortical organic lesion of some kind. Tumors, scleroses, and other organic lesions of the brain-cortex are as prone to cause unilateral or monoplegic epilepsy when they are not specific, as when they are due to syphilis. Indeed what has here been said in regard to the occurrence of aura, of spasm, or of paralysis, applies almost as equally well to other organic brain diseases as syphilis.

Specific and non-specific tumors or growths, produce by their interference with the function of a part, similar results.

Sometimes an epilepsy dependent upon a specific lesion implicating the brain-cortex, may be replaced by a spasm which is more or less local, and is not attended with any loss of consciousness. Thus, in a case which recovered in the University Hospital, a man aged about thirty-five, offered a history of repeated epileptic convulsions, but at the time of his entrance into the hospital, instead of epileptic attacks, there was a painless *tic*. The spasms, which were clonic, and occurred very many times a day (sometimes every five minutes), were very violent, and mostly confined to the left facial nerve distribution. The trigeminus was never affected, but in the severer paroxysms, the left hypoglossal and spinal accessory nerves were profoundly implicated in all of their branches. Once, fatal asphyxia, from recurrent laryngeal spasm of the glottis, was apparently averted only by the free inhalation of nitrite of amyl. The sole other symptom was headache; but the specific history was clear, and the effect of antisyphilitic remedies rapid and pronounced.

It is very plain that such attacks as those just detailed are closely allied to epilepsy. Indeed, there are cases of cerebral syphilis in which wide spread general spasms occur similar to those of a Jacksonian epilepsy, excepting in that consciousness is not lost,

because the nervous discharge does not overwhelm the centres which are connected with consciousness. (Case, *Canada Med. and Surg. Journ*, xi, 487). On the other hand, these epileptoid spasmodic cases link themselves to those in which the local brain affection manifests itself in contractions or persistent irregular clonic or tonic spasms. Contractures may exist, and may simulate those of descending degeneration (case, *Centrbl. Nerv. Heik.*, 1883, p. 1), but in my own experience are very rare. A case of syphilitic athetosis may be found in the *Lancet*, 1883, ii, 989.

The clonic spasms of cerebral syphilis may assume a distinctly choreic type, or may in their severity simulate those of hysteria, throwing the body about violently. (See Allison, *Amer. Med. Jour.*, 1877, 74). It is, to my mind, misleading, and therefore improper, to call such cases syphilitic chorea, as there is no reason for believing that they have a direct relation with ordinary chorea. They are the expression of an organic irritation of the brain-cortex, and are sometimes followed by paralysis of the affected member; in other words, the disease, progressing inward from the brain membrane, first irritates, and then so invades a cortical centre as to destroy its functional power. (Case, *Chicago Med. Jour. and Exam.*, xlvi, 21).

Psychical Symptoms.—As already stated, apathy, somnolence, loss of memory, and general mental failure, are the most frequent and characteristic mental symptoms of meningeal syphilis; but, as will be shown

in the next chapter, syphilis is able to produce almost any form of insanity, and therefore mania, melancholia, erotic mania, delirium of grandeur, etc., may develop along with the ordinary manifestation of cerebral syphilis, or may come on during an attack which previously has been attended by only the usual symptoms. Without attempting any exhaustive citation of cases, the following may be alluded to:

A. Erlenmeyer * reports a case in which an attack of violent headache and vomiting was followed by paralysis of the right arm, and paresis of the left leg, with some mental depression; a little later the patient suddenly became very cheerful, and shortly afterward manifested very distinctly delirium of grandeur with failure of memory. Batty Tuke † reports a case in which, with aphasia, muscular wasting, strabismus, and various palsies, there were delusions and hallucinations. S. D. Williams ‡ records a case in which there were violent paroxysmal attacks of frontal headache. The woman was very dirty in her habits, only ate when fed, and existed in a state of hypochrondriacal melancholy. Leiderdorf details a case with headache, partial hemiplegia, great physical disturbance, irritability, change of character, marked delirum of grandeur, epileptic attacks, and finally dementia, eventually cured by iodide of potassium.‖ Several cases illus-

* Die Leutischen Psychosen.

† Jour. Ment. Sci., Jan. 1874, p. 560.

‡ *Ibid*, April, 1869.

‖ Medicin. Jahrbucher, xx, 1864, p. 214.

trating different forms of insanity are reported by N. Manssurow.*

That the attacks of syphilitic insanity, like the palsies of syphilis, may at times be temporary and fugitive, is shown by a curious case reported by H. Hayes Newington,† in which, along with headache, failure of memory, and ptosis, in a syphilitic person, there was a brief paroxysm of noisy insanity.

Syphilis of the Brain Cortex.

The mental symptoms which are produced by syphilis are often pronounced when paralysis, headache, epilepsy, or other palpable manifestations show the presence of gross gummatous lesion. In previous paragraphs much has been said about these psychical disturbances, but it seems necessary further to discuss the question whether alienation disturbances can be produced by syphilis without the accompaniment of headache, or other evidences of the presence of organic disease, and whether syphilis is capable of producing an insanity or a paralysis except by causing a distinctly gummatous lesion.

According to our present nomenclature, a case in which psychical disturbances are present without more definite symptoms of organic brain disease, is properly spoken of as one of insanity; whereas if the other

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* Die Tertiare Syphilis, Wien, 1877.

† Jour. Ment. Sci., London, xix, 555.

organic symptoms are present, the case should be spoken of as one of gummatous syphilis. There are a few alienists who recognize the existence of a distinct form of insanity properly entitled to be called syphilitic, and there are others who deny that insanity is ever directly caused by syphilis, *i. e.*, that syphilis can produce mental disturbance without causing the evidence of an organic lesion. It is certain that a pure insanity often occurs in a syphilitic subject; but in life, syphilis is very frequently joined with alcoholism, poverty, mental distress, physical ruin, and various depressing emotions and conditions which are well known to be active causes of mental disorder. It may well be that syphilis may co-act with these causes; or it may be that syphilis may, by the moral depression which it produces, become an indirect cause of insanity; but under neither of these sets of circumstances could such insanity be properly spoken of as syphilitic.

If syphilis can produce directly disease of the brain cortex, such disease must give rise to mental disorder, provided it is properly situated and sufficiently extensive. Now if the lesion be so placed that it affects the psychic, and avoids the motor and sensory regions of the brain, it will produce a pure insanity, *i. e.*, an insanity without paralysis, spasms, headache, convulsions, or other symptoms of organic brain disease. Again, if such a brain disease be wide spread, involving the whole cortex, it may cause a progressive mental disorder accompanied by gradual loss of

muscular power in all portions of the body, ending in dementia with general paralysis; or, in other words, it may produce an affection more or less resembling the so-called general paralysis of the insane:

Since a man having syphilis may have a disease which is not directly due to the syphilis, when a syphilitic person has any disorder, there is only one positive way of determining during life how far said disorder is specific—namely, by studying its amenability to antisyphilitic treatment. In approaching the question whether a lesion found after death is specific or not, of course such a therapeutic test as that just given is inapplicable. We can only study as to the coexistence of the lesion with other lesions known to be specific. Such coexistence, of course, does not absolutely prove the specific nature of a nutritive change, but renders such nature exceedingly probable.

What has just been said foreshadows the method in which the subject in hand is to be here examined, and the present article naturally divides itself into two sections—the first considering the coexistence of anatomical alterations occurring in the cerebral substance with syphilitic affections of the brain-membranes or blood-vessels, the second being a clinical study of syphilitic insanity.

In looking over the literature of the subject I have found the following cases in which a cerebral sclerotic affection coincided with a gummatous disease of the membrane.

Gros and Lancereaux,* report a case having a clear syphilitic history in which the dura mater was adherent to the skull. The pia mater was not adherent. Beneath, upon the vault of the brain, was a gelatinous exudation. The upper cerebral substance was indurated, and pronounced by Robin, after microscopic examination, to be sclerosed. At the base of the brain there were atheromatous arteries and spots of marked softening.

Joseph J. Brown† reports a case in which the symptoms were, melancholia, excessive irritability, violent outbursts of temper, very positive delusions, disordered gait, ending in dementia. At the autopsy, which was very exhaustive, extensive syphilitic disease of the vessels of the brain and spinal cord was found. The pia mater was not adherent to the brain. The convolutions, particularly of the frontal and parietal lobes, were atrophied, with very wide sulci filled with bloody serum. The neuroglia of these convolutions was much increased, and "appeared to be more molecular than normal; the cells had degenerated, and in many places had disappeared, their places being only occupied by some granules," These changes were most marked in the frontal convolutions.

H. Schule‡ reports a very carefully and meritori-

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*Affec. Nerv. Syphilis, 1861, p. 245.

† Allgem. Zeitschrift f. Psychiatrie, xxviii, 171–2.

‡ Journ. Ment. Sci., July, 1875 p. 271.

ously studied case. The symptoms during life exactly simulated those of dementia paralytica. The affection commenced with an entire change in the disposition of the patient; from being taciturn, quiet, and very parsimonious, he became very excited, restless, and desired continuously to buy in the shops. Then failure of memory, marked sense of well-being, carelessness and indifference for the future, developed consentaneously with failure of the power of walking, trembling of the hands, inequality of the pupils, and hesitating speech. There was next a period of melancholy, which was in time followed by continuous failure of mental and motor powers, and very pronounced delirium of grandeur, ending in complete dementia. Death finally occurred from universal palsy, with progressive increase of the motor symptoms. At the autopsy characteristic syphilitic lesions were found in the skull, dura mater, larynx, liver, intestines, and testicles. The brain presented the macroscopic and microscopic characters of sclerosis and atrophy; the neuroglia was much increased, full of numerous nuclei; the ganglion-cells destroyed. The vessels were very much diseased, some reduced to cords; their walls were greatly thickened, and full of long spindle-shaped cells, sometimes also containing fatty granules.

C. E. Stedman and Robt. T. Edes, report* a case in which the symptoms were, failure of health, ptosis,

* American Journ. Med. Sciences, lxix, 433.

trigeminal palsy with pain (anæsthesia dolorosa), and finally mental failure with gradual loss of power of motion and sensation. At the autopsy the following conditions were noted: apex of the temporal lobe adherent to dura mater and softened; exuded lymph in neighborhood of optic chiasm; sclerosis of right Gasserian ganglion, as shown in a marked increase of the neuroglia; degeneration of the basal arteries of the brain.

These cases are sufficient to demonstrate that sclerosis of the brain-substance not only may co-exist with a brain lesion which is certainly specific in its character, but may also present the appearance of having developed *pari passu* with that lesion, and from the same cause.

It has already been stated in this article that cerebral meningeal syphilis may coexist with various forms of insanity, and cases have been cited in proof thereof. It is of course very probable that in some of such cases there has been that double lesion of membrane and gray brain matter which has just been demonstrated from the records of autopsies; but if we find that there is syphilitic insanity, which exists without evidences of meningeal syphilis, and is capable of being cured by antispecific treatment, such insanity must be considered as representing the disease of the gray matter of the brain. Medical literature is so gigantic that it is impossible to exhaust it, but the following list of cases is amply sufficient to prove the point at issue—namely, that there is a syphilitic insanity which exists without obvious meningeal disease, and is capable of being cured by antisyphilitic treatment:

NO.	REPORTER AND JOURNAL.	SYMPTOMS.	RESULTS.—REMARKS.
1	Louis Streisand. .. .. .. *Die Lues als Ursache der Dementia*, Inaug Diss., Berlin, 1878.	Epilepsy, delirium of exaltation, alteration of speech, headache, failure of memory.	Rapid cure with mercury.
2	*Ibid*.....	Delusions, delirium, general mania, great muscular weakness.	Cure with mercury.
3	Müller of Luetkirch . .. *Journ. of Mental Dis.*, 1873–74, 561.	Symptoms resembling general paralysis, and diagnosis of such made until a sternal node was discovered.	Cure by iodide of potassium.
4	Esmarch and W. Jersen . *Allgem. Zeitschrift f. Psychiatrie.*	Sleeplessness, great excitement, restlessness, great activity, incoherence, and violence.	Cure by mercury.
5	Leidesdorf. . . .... *Medizin. Jahrbucher*, xx., 1864, 1.	Complete mania; played with his excrement, and entirely irrational	Complete cure by iodide of potassium.
6	Beauregard.. .. . . *Gaz. hébdom. de Sci. méd de Bordeaux*, 1880, p. 64.	Symptoms resembling those of general paralysis.	Cure by iodide of potassium.
7	M. Rendu..... ..... *Ibid.*	Loss of memory, headache, irregularity of pupils, ambitious delirium, periods of excitement, others of depression, embarassment of speech, access of furious delirium, ending in stupor.	Mercurial treatment, cure.
8	M. Rendu... ... . *Gaz. hébdom. de Sci. méd. de Bordeaux*, 1880, p. 64.	Hypochondria, irregularity of pupils, headache, failure of memory, melancholy, stupor.	Mercurial treatment, cure.
9	Albrecht Erlenmeyer.. ... *Die Luëtischen Psychosen*, Neuwied, 1877.	Melancholia with hypochondriasis, sleeplessness, fear of men, and belief they were all leagued against him.	Iodide of potassium, cure.
10	*Ibid*.....	Religious melancholia, with two attempts at suicide, ending in mania.	Iodide of potassium, cure.
11	*Ibid*.....	At times very violent, yelling, shrieking, destroying everything she could get hands on; at times erotomania; no distinct history of infection, but her habits known to be bad, and had bone ozœna and other physical syphilitic signs.	Iodide of potassium, cure.
12	*Ibid*.	Epileptic attack followed by a long soporose condition, ending in mental confusion, he not knowing his nearest friends, etc.; almost dementia.	Cured by mercurial inunction.
13	*Ibid*.....	Great fear of gendarmes, etc., mania, with hallucinations, loud crying, yelling, etc., then convulsion, followed by great difficulty of speech.	Cured by mercurial inunctions with iodide internally; subsequently return of convulsions, followed by hemiplegie and death.

NO.	REPORTER AND JOURNAL.	SYMPTOMS.	RESULTS.—REMARKS.
14	A. Erlenmeyer ... . *Die Luëtischen*, etc.	Great unnatural vivacity and loquacity, wanted to buy everything, bragged of enormous gains at play, etc.; some trouble of speech.	Iodide of potassium, cure. Attended to business, and seemed as well as before. Relapse. (See Symptoms.)
	Ibid.. .... Relapse of Case 14.	Fifteen months after discharge from asylum relapse; symptoms developing very rapidly, delirium of grandeur of the most aggravated type, with marked progressive dementia, failure of power of speech, and finally of locomotion.	Failure of various anti-specific treatments.
15	A. Erlenmeyer ..... *Die Luëtischen*, etc.	Failure of mental powers, inequality of pupils, trembling of lip when speaking, uncertainty of gait, almost entire loss memory, once temporary ptosis and strabismus.	Iodide of potassium in ascending doses failed. Recovery under mercurial inunctions.
16	*Ibid*.....	Failure of mental power, pronounced delirium of grandeur, hallucinations of hearing, failure of memory, strabismus and ptosis coming on late.	Iodide of potassium, corrosive-sublimate injections. Cure.
17	*Ibid*.....	Failure of memory and mental powers, slight ideas of grandeur, disturbance of sensibility and motility, aphasia coming on late.	Cure with use of iodide and mercurial inunctions.
18	*Ibid*....	Melancholy, great excitability, ideas of grandeur; after a long time sudden ptosis and strabismus.	Iodide of potassium failed; mercurial course improved; joint use cured patient.
19	*Ibid*.....	Various cerebral nerve palsies, great relief by use of mercurial inunctions, then development of great excitement, delirium of grandeur, failure of memory and mental powers, and finally death from apoplexy; no autopsy.	
20	J. B. Chapin..... *Amer. Journ. Insanity*, vol. xv, p. 249	Melancholia with attempted suicide, epilepsy, headache, somnolent spells.	Iodide of potassium, cure.
21	*Ibid*.....	Acute mania, noisy, very destructive; syphilitic disease of tibia.	Iodide of potassium, cure.
22	Snel.....	Maniacal excitement.	Cured by specific treatment.
23	Wm. Smith ..... *Brit. Med. Journ.*, July, 1868, p.	Apathetic melancholy, indelicate, speaking only in monosyllables, and much of the time not at all, sullen and menacing.	Rapidly cured by conjoint use of iodide and mercurials. The symptoms first developed 3 months after chancre.

A study of the brief analyses of the symptoms just given shows that syphilitic disease of the brain may cause any form of mania, but that the symptoms, however varied they may be at first, unless relieved, end almost always in dementia.

Of all the forms of insanity, general paralysis is most closely and frequently simulated by specific brain disease. The exact relation of the diathesis to true, incurable, general paralysis, is very difficult to determine. It seems well established that amongst persons suffering from this disorder, the proportion of syphilitics is not only much larger than normal, but also much larger than in other forms of insanity. Thus, E. Mendel* found that in 146 cases of general paralysis, 109, or 75 per cent., had a distinct history of syphilis, whilst in 101 cases of various other forms of primary insanity, only 18 per cent. had specific antecedents. H. Obersteiner had in 1000 cases of mental disease,† 175 cases of dementia paralytica; of these, 21.6 per cent. had syphilis; moreover, of all the syphilitic patients 51.4 per cent. had dementia paralytica.

Various opinions might be cited as to the nature of this relation between the two disorders, but for want of space, the curious reader is referred to the work just quoted, and to the thesis of C. Chauvet,‡

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* Progres. Paral. der Irren, Berlin, 1880.

† Monatshefte f. prakt. Dermat, Dec., 1882.

‡ Influence de la Syph. sur les Malad. du Syst. Nerveux, Paris, 1880.

for an epitome of the most important recorded opinions.

Those who suffer from syphilis are exposed in much greater proportion than are other persons to the ill effects of intemperance, sexual excesses, poverty, mental agony, and other well-established causes of general paralysis. It may be that in this is sufficient explanation of the frequency of general paralysis in syphilitics, but I incline to the belief that syphilis has some direct effect in producing the disease. However this may be, I think we must recognize as established the opinion of Voisin,* that there is a syphilitic peri-encephalitis which presents symptoms closely resembling those of general paralysis. Such cases are examples of the *pseudo-paralysie générale* of Fournier.†

The question as to the diagnosis of these cases from the true incurable paresis is, of course, very important, and has been considered at great length by Voisin,‡ Fournier,§ and Mickel.¶

The points which have been relied upon as diagnostic of syphilitic pseudo-general paralysis are:

The occurrence of headache, worse at night and present amongst the prodromes; an early persistent

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* Paralysie générale des Alienés, 1879.

† La Syphilis du Cerveau, Paris, 1879.

‡ Loc. cit.

§ Loc. cit.

¶ Brit. and For. Med.-Chir. Review, 1877.

insomnia or somnolence; early epileptiform attacks, the exaltation being less marked, less persistent, and perhaps less associated with general maniacal restlessness and excitement, the articulation being paralytic rather than paretic; the absence of tremulousness, especially of the upper lip (Fournier); the effect of antispecific remedies.

When the conditions in any case correspond with the characters just paragraphed, or when any of the distinguishing characteristics of brain syphilis, as previously given, are present, the probability is that the disorder is specific and remediable. But the absence of these marks of specific disease is not proof that the patient is not suffering from syphilis. Headache may be absent in cerebral syphilis, as also may insomnia and somnolence. Epileptiform attacks are not always present in the pseudo-paralysis, and may be present in the genuine affection; a review of the cases previously tabulated shows that in several of them the megalomania was most pronounced; and a case with very pronounced delirium of grandeur, in which the autopsy revealed unquestionably specific brain lesions, may be found in Chauvet's *Thesis*, p. 31.

Case 14 of the table is exceedingly interesting, because it seems to represent, as successively occurring in one individual, both pseudo and true general paralysis. The symptoms of general paralysis in a syphilitic subject disappeared under the use of mercury, to recur some months afterward with increased

violence, and with new obstinency that resisted with complete success antisyphilitic treatment. I have myself seen cases in which the symptoms of general paralysis existed in persons with a syphilitic history, but in which all of the differences supposed by Voisin, Fournier and Mickle to be diagnostic, failed, excepting only the therapeutic test, *i. e.*, the effect of the iodide of potassium; in such cases an immediate diagnosis was simply impossible, and great caution is needed in interpreting the therapeutic test, since very frequently true general paralysis occurs in syphilitic subjects; the non-production of iodism in such a case is a ground for hope, but unless with the toleration there is soon distinct improvement, the hope is prone to be a delusive one.

It must be considered, as at present established, that syphilis may produce a disorder whose symptoms do not apparently differ from those of general paralysis; that true general paralysis is very frequent in the syphilitic; that the curable cortical affection producing the symptoms of true general paralysis may change into, or be followed by, an incurable form of the disease, and that, therefore, it is the duty of the practitioner in a case presenting symptoms of general paralysis, to use a treatment of antisyphilitic remedies, unless there be an absolutely clear history of freedom from syphilitic taint. That cortical disease, apparently syphilitic, may exist along with widespread degeneration of the vessels, but without distinct gummatous disease, and

give rise to symptoms which are not distinctly different from those of some cases of general paralysis as is proven by the following case of which I subjoin the clinical record with the results obtained by post mortem examination:

Mr. R. M. M. came first under my care March 2, 1888, with a history that some years since he had acquired syphilis from a woman who came to an interior town, and who, in the course of a very short time, infected fifteen boys, seven of whom are now dead. He had various constitutional disturbances, and had been having obscure nervous symptoms. He stated that he had had some little pain in the head, but that it had never been severe; there was also a clear history of his having had spells, lasting several days, of apathy and somnolence; no failure of memory, however, could be detected, and he was still attending to his business as a clerk. There was no paralysis or ocular symptoms, but there was a very marked slowness and thickness of speech, and an evident loss of quickness in intellectual action. He was put upon antispecific treatment, both iodide and mercury being used. In the latter part of May he was taken acutely ill with delirum, great restlessness, and partial aphasia. Mercury was freely exhibited, and after the appearance of ptyalism, he rapidly grew better, and in about two weeks was able to come to my office. Under the continued used of the iodide of potassium and mercury, he steadily improved, and when I left Philadelphia in the middle of July, recovery apparently was not far from complete.

During the summer he is represented as having been in good condition, but in the latter portion of September he had an acute attack, and was admitted September, 28, 1888, to the University Hospital. It was noted that day "that the pupils were equally dilated, and responded, though somewhat slug-

gishly to light; that the knee jerk was exaggerated, but that there was no ancle clomus; that there was no loss of sensation; that intellection was exceedingly imperfect; that there was great, almost delirious, restlessness, and partial aphasia, the patient answering many questions—'Yes' and 'Yes,' sir—without respect to the nature of the interrogation, although he was able to use a number of words intelligently." It was exceedingly difficult to make him understand at all what was wanted, and it was impossible to obtain satisfactory results in testing for sensory aphasia.

Under protracted treatment, there was some, but not very great improvement in Mr. M.'s condition, but in the latter part of October his aphasia rather rapidly increased, and his restlessness became more pronounced and was accompanied by delirious wakefulness at night. Whilst under immediate observation, on October 24th, his right hand in a few minutes became (but not completely) paralyzed, without disorder of sensation. On getting him to bed it was found that his gait was very ataxic, and that the right leg distinctly dragged; when walking there was a marked tendency to go toward the left. The attack had been preceded by complaint of pain in the head on the left side, but the nurse's attention was first called by noticing that the man was violently rubbing his right fingers, and swearing. She found that the arm and hand were both stiff, but in a little while the little finger became limber, as did the other fingers, successively, a little later. After the first few minutes the partial hemiplegia did not increase.

Mr. M. again improved under treatment, and on the 13th of November, was brought to my office. He, at this time, had not sufficient intellectual power to go about the city by himself. He was very wakeful at night, having a distinct tendency to wander about, and to get up frequently to go down stairs, so that he had to be watched. His sister asserted that at home he recognized objects, so that she could send him for

the scissors and thread; but, under examination at the office, it was exceedingly difficult to make him do what he was told, or to get him to recognize the most ordinary objects. He evidently had some ideas, and with a great deal of effort made me understand that he was "nervous to-day, and could not do as well as common." Most of the time his talk was gibberish, but occasionally he would get out a few words conveying sense. He was handed a printed form commencing with my name; the name he pronounced correctly, but after it, all he said was gibberish, no word being so spoken that it could be understood. He wrote his own name in a book legibly; but when told to write the word "cat," wrote "rats." When the pen was out of ink, he could not be made to understand that he was to dip it into the ink-stand; but when it was refilled with ink, he went on writing. After writing three or four words, he seemed to lose all control over himself, and was unable to do more. At this time there was no paralysis.

About one week later, Mr. M. was taken with mild delirium and restlessness, accompanied by slight hemiplegia. This lasted two or three days, and was followed by return to his previous state. Shortly after this, he had an attack of right-sided hemiplegia, more pronounced than any previous, but not affecting the face, and not accompanied with delirious excitement as had been all his earlier attacks. Under treatment he recovered from this, and was able, on December 12, to report at my office. His pupils at this time were very mobile, his knee jerks very active, and his power of thought and speech greater than at the previous visits. He recognized what scissors were used for, and cut with them; called knife and keys by their right names, but also called scissors "keys." During the next two weeks he was much of the time very restless, spending hours packing his valise, insisting that he was going away; very excitable, especially at night, and without pronounced change in his aphasia. December 15th, he had a

slight convulsive attack in the morning. December 29th, when thought by his friends to be better, he was suddenly taken with violent choreic movements of the right arm, affecting sometimes the shoulder, sometimes only the forearm and fingers, accompanied by complete loss of consciousness. After this Mr. M. never recovered consciousness; the choreic movements continued, but grew more feeble and at last ceased; motor power slowly failed in all parts of the body, and death occurred after ten days of automatic existence.

Autopsy, fourteen hours after death; head only examined. The base of the brain was normal, but the arteries had undergone great change, and to the naked eye appeared to be in an advanced state of atheroma. A well-formed thrombus extended far up into each middle cerebral artery; on the right side this thrombus was very white, and apparently much older than the soft red thrombus on the left side. On the upper surface of the brain, the arachnoid and pia mater were everywhere very much agglutinated and slightly thickened The change was especially marked over the anterior portions of the brain, where the membranes were so adherent that they could not be separated without being torn to pieces. No localized lesions were discovered, except that there was some softening of the island of Reil on the left side. Careful examination failed to detect the presence of gummatous tumors, sclerotic scars, or other evidence of focal lesions in the brain, either present or past, save only the softening just spoken of.

Microscopic examination of the anterior lobes of the brain, in which the diseased process had gone to its fullest extent, showed the blood-vessels and capillaries, from the largest to the smallest, everywhere gorged with blood, their walls enormously thickened, and all the coats, excepting the endothelum, participating in the change. The perivascular spaces were in many places enlarged, in some places apparently obliterated. In the walls of the blood-vessels, and especially

exterior to them in the brain cortex were everywhere numbers of small cells, which in some places were collected into minute masses; in the pia mater these cells were more abundant than in the brain substance itself, and in a few places were collected in masses of considerable extent—never, however, into such isolated and well marked aggregation as could properly be called even a minute gummatous mass. The whole cortical substance was filled with small cells or large nuclei similar to those described, and evidently of similar nature to them; nerve cells and nerve tubules in the most affected regions entirely gone, no trace of them apparent, unless some of the round nuclei just spoken of were the remains of shrunken and altered nerve cells.

In the posterior lobes of the brain, where the pia mater was not adherent, the nerve cells were perfectly preserved, and the neuroglia not excessively abundant; but the coats of the vessels, even in the small capillaries, were thickly studded, or even covered over, with the same small cells as described above—and in some places there was found even small masses of these cells about the blood-vessels. The perivascular spaces were very large in this portion of the brain, and very clear. It was noted, also, that the changes of the vessel were fully as marked, or even more marked, in the brain substance than in the pia mater.

Section III. Diagnosis.

In a diagnosis of cerebral syphilis, a correct history of the antecedents of the patient is of vital importance. Since very few of the first manifestations of the disorder are absolutely characteristic, whilst almost any conceivable cerebral symptoms may arise from syphilitic disease, treatment should be at once

instituted on the appearance of any disturbance of the cerebral functions in an infected person.

Very frequently the history of the case is defective, and not rarely actually misleading. Patients often appear to have no suspicion of the nature of their complaint, and will deny the possibility of syphilis, although they confess to habitual unchastity. My own inquiries have been so often misleading in their results that I attach but little weight to the statements of the patient, and in private practice avoid asking questions which might recall unpleasant memories, depending upon the symptoms themselves for the diagnosis.

In discussing the diagnostic value of the various symptoms of cerebral syphilis, it has seemed to me that the clearest view of the matter can be obtained by considering first the more acute, and secondly the more chronic forms of the disease.

The symptoms of an acute syphilitic brain attack may closely simulate those of epilepsy, of apoplexy or of acute inflammation of the brain or its membranes. Under these circumstances the diagnosis may be difficult, and may depend upon the acuteness of the physician in discovering, by cross-examination of the friends of the patient, the prodromic manifestations which had passed by unnoted or unappreciated. These prodromes are especially worthy of very close study, not only on account of their value in the recognition of the nature of an acute brain syphilis, but because in chronic brain syphilis they may presage an acute

attack, and thus enable the practitioner to ward off what otherwise might prove a fatal exacerbation.

Peristent headache, slight failure of memory, unwonted slowness of speech, general lassitude, and lack of willingness to mental exertion, sleeplessness or excessive somnolence, attacks of momentary giddiness, vertiginous feelings when straining at stool, yelling, or in any way disturbing the cerebral circulation, alteration of disposition, any of these—and *a fortiori* several of them—occurring in a syphilitic subject, should be the immediate signal for alarm. Of these varied possible prodromic symptoms, the most important and characteristic, according to my experience, are headache, and somnolence; slight and shifting localized weaknesses sometimes precede an acute attack, but are more characteristic of the disease at a later stage. A momentary weakness of one arm; a slight drawing of the face, disappearing in a few hours; a temporary dragging of the toes; a partial aphasia which appears and reappears; a squint which to-morrow leaves no trace; all or any of these may be due to a non-specific brain tumor, to miliary cerebral aneurisms, or to some other non-specific affection, but in the majority of cases when these phenomena occur repeatedly in a patient who is not suffering from hysteria, they are the result of syphilis.

In private practice, instances are comparatively rare in which it is not possible to obtain any history of prodromes indicating the true nature of a sudden

violent syphilitic attack, which mimicks apoplexy or other acute organic brain disease. In hospital practice it is, however, otherwise. I have frequently seen cases of brain syphilis picked up in the streets by the police, or sent in by physicians, with the simple statement that the patient had suffered from apoplexy, a sunstroke, a fall from a cart or flat, an epileptic fit, or other acute accident or disease. Fortunately, the primary treatment of an acute brain congestion the result of syphilis, is similar to the treatment of a similar condition from other causes; but it is all-important that the true nature of the disease be made out in the course of a few hours.

In studying such a case, the presence or absence of Bright's disease, of general arterial atheroma, and of traumatism, must first be determined on account of the close connection of these affections or accidents with organic brain disease not syphilitic. Pronounced disturbance of the temperature is frequent in hemiplegic apoplexy, very rare in syphilitic attacks; its presence is therefore of diagnostic import, although its absence is of comparatively little value as a guide. Complete hemiplegia, and conjugate deviation of the head and eyes, are common apoplectic symptoms, which if ever present in syphilitic attacks are extremely rare. The presence in any individual case of decided ocular palsy not accompanied with hemiplegia, of partial hemiplegia, of partial loss of consciousness, of spasmodic contraction of the muscles of

the back of the neck, of any cortical localizing symptom, or of spasms tonic or clonic in moderate sized groups of voluntary muscles of the body, should always very strongly arouse suspicion. Under these circumstances, a careful examination of the person of the patient will often reveal cicatrical marks, primary or secondary alterations of structure, or tenderness of the tibia or of the sternum * sufficiently marked to be recognized even in a condition of partial unconsciousness.

The age of the patient must also be taken into consideration. Apoplexy occurs most frequently in persons over fifty years of age, while congestive syphilitic attacks are most common before that age. The course of a case for the first six or ten hours after the commencement of the acute paroxysm, is sufficiently different in the two affections to be worthy of the closest study. A hemiplegic or embolic apoplexy which is sufficiently severe to keep up pronounced disturbance of consciousness for some hours, is almost invariably accompanied by a complete hemiplegia, or more rarely by some other palsy which is complete; whilst in the syphilitic attack it is rare for the paralysis to be complete, and frequently it is altogether wanting. I believe myself, that a complete, suddenly developed

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*** I desire especially to direct attention to the effect of firm pressure over the sternum, as not rarely eliciting distinct evidences of a tenderness which is almost pathognomonic o syphilis.**

hemiplegia, or other wide spread palsy, even when occurring in a syphilitic patient, is almost invariably the result of hemorrhage or of thrombosis. Unless the clot has been a very large one, the return to consciousness after hemorrhagic apoplexy is usually much more rapid than it ordinarily is in syphilitic cases. Headache after an apoplexy is rare, whilst headache is very frequent after a severe syphilitic congestive attack.

In any individual case, the diagnosis is greatly strengthened by the presence of evidences of irritation of the base of the brain, such as ocular palsies or ocular spasms, or spasms of the neck or of the face. In many of these cases of syphilis, it is not possible at first to make an absolutely positive diagnosis, but the experienced practitioner ought to be rarely at fault in his management of the case. A probable diagnosis can usually be made, and when there are any distinct grounds for supposing that the case is one of syphilis, antispecific treatment should be at once resorted to, since it can do no harm in a case of true apoplexy, and may be the means of saving life in the syphilitic mimicry of that disorder.

In rare cases of acute syphilis, the attack takes on itself some peculiar form. Under these circumstances, the mere strangeness and irregularity of the symptoms should arouse the physician's suspicion, as there is nothing more typical of brain syphilis than the failure of the symptoms to conform to ordinary types of organic brain disease. As an instance of

such an attack may be stated the case reported by J. A. Omerod (*Brain*, vol. v, 260) in which a man who had been in good health, save only that he had suffered from headache, awoke one morning in a semi-delirious condition, then went to sleep, and slept for three days steadily, arousing only when fed. After this somnolence there was impairment in memory and mental faculties, but no marked symptoms.

The general grounds of diagnosis in *chronic brain syphilis* have been sufficiently mapped out in the section devoted to symptomatology, but some reiteration may be allowable.

It must be remembered that the symptoms of cerebral syphilis are those of organic brain disease, and that any peculiarity they may possess is due to the fact that syphilitic lesions are prone to be multiple or widespread, to be situated in peculiar locations, and to be rapidly developed at an age when other organic brain diseases are rare. The cerebral cortex with its separated centres is especially prone to be invaded, hence complete hemiplegia is very rare, whilst multiple, local, or partial palsies are frequent; the base of the brain is more frequently attacked, hence symptoms of basal chronic meningitis occurring in non-tubercular adults are usually the outcome of syphilis; on the other hand, the occipital lobes are rarely affected, hence homonymous hemianopsia is uncommon.

Headache occurring with any form of ocular

palsy or with a history of attack of partial monoplegia or hemiplegia, vertigo, *petit mal*, epileptoid convulsions, or disturbances of consciousness, or attacks of unilateral or localized spasms, should lead to the practical therapeutic test. Ocular palsies, epileptic forms of attacks occurring after thirty years of age, morbid somnolence even when existing alone, are sufficient to put the practitioner upon his guard. It is sometimes of vital importance that the nature of the cephalalgia shall be recognized before the coming on of more serious symptoms; any apparent causelessness, severity, and persistency, should arouse suspicion, to be much increased by a tendency to nocturnal exacerbations, or by the occurrence of mental disturbance or of giddiness at the crises of the paroxysms. Not rarely there are very early in these cases, curious almost indefinable, disturbances of cerebral functions which may be easily overlooked, such as temporary and partial failure of memory, word-stumbling, fleeting feelings of numbness or weakness, and alterations of disposition. In the absence of hysteria, an indefinite and apparently disconnected series of nerve accidents is of very urgent import. To use the words of Hughlings-Jackson, "A random association, or a random succession, of nervous symptoms, is very strong warrant for a diagnosis of syphilitic disease of the nervous system." Cerebral syphilis occurring in an hysterical subject, may be readily overlooked until fatal mischief is done. When any paralysis occurs, a study

of the reflexes may sometimes lead to a correct diagnosis. Thus, in syphilitic hemiplegia, the reflex on the affected side is very frequently exaggerated, whilst in hysterical hemiplegia the reflexes are usually alike on both sides. When both motion and sensation are disturbed in an organic hemiplegia, the anæsthesia and motor paralysis occur on the same side of the body, whilst in hysteria they are usually on opposite sides.

In his recent lectures upon the subject, Prof. Gowers attaches a great deal of importance to the rate of development of optic neuritis in the diagnosis of syphilis. He correctly states that a rapid growth never causes a chronic form of neuritis, although now and then a slow growth may cause an acute form. From this he reasons that, while acuteness of the neuritis is of little diagnostic value, chronicity—a neuritis that remains for a long time moderate or slight in degree—is distinctly opposed to the diagnosis of a syphilitic growth, and adds considerable weight to the similar indication afforded by great chronicity of other symptoms. This indication, he thinks, is especially valuable when the early symptoms are equivocal, and we find it difficult to say how long the tumor has existed.

Although great weight necessarily attaches to the dictum of Prof. Gowers, in my own experience very rarely has the diagnosis been aided by a study of the rate of development of an optic neuritis. I am fully convinced that frequently the syphilitic growth is (and remains for a long time) very small in extent, and

does not produce optic neuritis at all; and that where the specific brain lesion is more extensive, the syphilomatous inflammation does not necessarily spread rapidly. Also, unfortunately, the choked disk, or the consequent atrophy, are but too often established before the case comes into the practitioner's hands, so that it is impossible to determine how slow or how rapid the first changes have been.

The diagnosis of cerebral syphilis during life, is always a matter of inference. Only after autopsy can we say with a positive certainty that the individual has suffered from specific disorder of the brain or its membranes. Rapidly developed glioma, and rachitic, tubercular or other meningitic inflammation, may simulate a syphilitic lesion. Moreover, I know of no evidence showing that syphilis protects its victim from the development of a non-specific brain lesion.

In the diagnosis of cerebral syphilis during life, the nearest approach to certainty that we can arrive at is in those cases in which the patient has presented the symptoms of cerebral syphilis, and has recovered under distinct antisyphilitic treatment. For therapeutic purposes a probable diagnosis is all that is required, and hence the value of the so-called therapeutic test.

It has been denied (see *Therapeutic Gazette* for December, 1888, and March, 1889) that syphilis in any way protects against the action of the iodide of potassium, or that there is any value in the thear-

peutic test. But I must insist that in nerve syphilis there is usually an extraordinary tolerance of the iodide, so that almost all such syphilitic subjects will bear doses of 20 grains and over, frequently repeated. It is, indeed true, that there are a few persons suffering from undoubted syphilis in whom this tolerance does not exist, but such patients are exceptional. There are a very few healthy persons who can take the iodide at once in large doses without serious inconvenience; and there is a still more numerous class in whom tolerance of the iodide can be established by commencing with small doses and gradually increasing. The vast majority, however, of persons who are free from syphilitic affection, cannot take doses of over 10 grains of the iodide three times a day without the production of iodism, except as the result of the habitual use of the remedy. When iodides are tolerated by the normal individual, such individual is said to have an idiosyncrasy, which makes him an exception to the general rule. In syphilitics this rule is reversed, and when the person suffering from syphilis cannot endure iodides, the lack of tolerance is owing to an idiosyncrasy—*i. e.*, the individual is an exception to the general rule. The number of exceptions to the rule in either case is so small that, for the purposes of practical medicine, when we find that a person can tolerate large doses of the iodides, the probabilities that such person is suffering from syphilitic infection are so strong as to warrant the tenta-

tive diagnosis of syphilis if the tolerance of the iodide be accompanied by the presence of symptoms of organic nerve disease not readily explainable.

In the comparatively few cases of primary and early secondary syphilis which I have had to treat, I have found that a very considerable proportion of the patients will not bear the use of the iodides, and I believe that the *tolerance of the iodides* belongs to the *advanced*, rather than the early, *stages* of the disorder.

The converse of the opinion which was given a few lines back, does not hold with as much force upon the practitioner as does the proposition itself. The production of iodism by small doses of the drug is, however, evidence (*not proof*) that the patient is not suffering from syphilitic disorder, and in any given case renders it probable that the symptoms are not the result of syphilitic affection. It is, however, in practice, essential to remember that there are exceptions to the general rule, and that whenever there is a clear history of infection, and the symptoms trend towards specific disease, trials of other forms of anti-specific medication should be made before the final working opinion is formed. Thus, last spring, I saw a gentleman from a distant city in whom, in middle life, epileptic convulsions had developed with mental failure, evidences of ocular paralysis, headache, and great depression of the general health, and in whom there was a clear history of chancre. He could not tolerate iodide of potassium at all; even small doses

caused great gastric disturbance. The careful use of mercurials, followed by the employment of the iodide in very small doses, restored the patient to health.

Section III. Prognosis.

The ebb and flow of the currents of life and death in meningeal syphilis, vary so greatly and so unexpectedly, that practitioners of the largest experience may well hesitate in their forecasts of the future of the case before them. In practice two distict classes of opinions are asked for. In an acute attack, the question is as to recovery from the individual attack. Here the general laws of prognosis in acute brain disease hold to some extent, but must always be favorably modified, and unless the occurrence of a complete hemiplegia or moneplegia, or of conjugate deviation of the head and eyes, or marked rise of temperature, indicate the presence of a clot or thrombus, the chances always are strongly in favor of recovery. I have, however, seen death occur during simple epileptic convulsions in two cases of brain syphilis. The arrest of respiration which is so common in the attacks, continued too long for life to be restored. On the other hand I have repeatedly seen patients who were unconscious, with urinary and fæcal incontinence, and absolute relaxation of their whole muscular system, and who indeed were apparently dying, recover.

The prognosis of an acute primary attack of

cerebral congestion or inflammation of specific origin is on the whole favorable, although it should be somewhat guarded. Moreover in such a case, so long as there is life, a positively hopeless prognosis is not justifiable. In chronic syphilis, the prognosis should be favorable, unless there be reasons for supposing that there is absolute destruction of brain tissue, or unless the patient has failed to respond favorably to antisyphilitic treatment. With growing experience, however, has come, in my own case, growing caution in predicting as to the future.

At one time it was my habit to give a very favorable prognosis in any individual case so soon as I was sure of the tolerance of the iodide. I now know that it is possible for a syphilitic patient to tolerate the iodides in indefinite doses, and yet to obtain no relief from their use. A favorable prognosis ought not, therefore, to be based upon the simple tolerance of the drug; but when along with such tolerance the symptoms soon begin to rapidly ameliorate, there is always good grounds for predicting a more or less complete recovery.

Even under the most hopeful circumstances, however, we are liable to be cruelly disappointed, so that, although encouragement should be given, and the probabilities of recovery be stated, at least to the friends of the patient we should express the possibilities of unsuspected disaster.

The causes why the iodides may be tolerated by

the syphilitic person, suffering from organic nervous disease, and yet afford no relief, are several.

In the *first place*, there is a class of cases in which the primary lesion is in the blood-vessels, and we have no sufficient ground for believing that a syphilitic arterial degeneration, which is at all advanced, is capable of being cured by treatment.

In the *second place* it is not always possible to distinguish between a gummatous curable syphilis, and an incurable syphilitic-meningeo-encephalitis. I have seen very numerous cases in which sclerosis of the nerve-centres has been present in syphilitic persons who were tolerant of the iodides but had not been benefited by their use.

In the *third place*, a gummatous tumor may itself be entirely subordinate to the iodides, and yet have set up by pressure a lesion of the surrounding nerve-centre which is not controllable by any specific medication, so that symptoms of organic brain-disease may continue after the removal of the gumma. A case in which I had an opportunity to make the autopsy illustrates this point well. In a man who had long suffered from cerebral syphilis, under the influence of the large doses of the iodides and of mercurials, the symptoms had all disappeared, except that at irregular intervals epileptic convulsious recurred, and were not controlled by long-continued, and very careful, specific medication. In one of these convulsions the man died, and, after death, in the cerebral cortex

a small patch of sclerosis was discovered, evidently a scar, marking the former site of a gumma.

Section IV. Treatment.

The treatment of cerebral syphilis is best studied under two heads: First, the treatment of the accidents which occur in the course of the disease; second, the general treatment of the disease itself.

It must be remembered that in, perhaps, the majority of cases in which death occurs in properly-treated cerebral syphilis, the fatal result is produced by an exacerbation—or, as I have termed it, an accident—of the disease. Under these circumstances the treatment should be that which is adapted to the relief of the same acute affection when dependent upon other than specific cause. In a large proportion of cases the acute outbreak takes the form either of a meningitis or else of a brain congestion. In either instance, when the symptoms are severe and attended with pronounced arterial excitement, free bleeding should be at once resorted to. The amount of blood taken is, of course, to be proportionate to the severity of the symptoms and the strength of the patient. I have seen life saved by the abstraction of about a quart of blood, whilst in other cases a few ounces suffice. Care must, of course, be taken not to mistake a simple epileptic fit, one of a series of recurrent paroxysms, for a severe cerebral attack; but even when the fit is a simple epileptic convulsion, if it has been preceded by

severe headache and is accompanied by stupor, with marked disturbance of the respiration, measures for immediate relief are usually required. Further, if the epileptic status exists and the convulsions be perpetually repeated, or if there be violent delirious excitement, the symptoms may be considered as very urgent. In taking blood, the orifice should be large so as to favor a rapid flow, and the bleeding be continued until a distinct impression is made upon the pulse. In cases in which the action of the heart has continued to be violent after as much blood as was deemed prudent had been taken, I have seen good results obtained by the hypodermic injection of three drops of the tincture of aconite root every half hour, until the reduced pulse and free sweating indicated the system was coming under the influence of the cardiac sedative.

Of course, I do not mean to encourage the improper or too free use of the lancet in these cases, but in the few instances of death during acute exacerbation of cerebral syphilis that I have seen, I have almost invariably regretted that blood had not been taken at at once, and very freely at the beginning of the acute attack. After venesection, or in feeble cases as a substitute for it, the usual measures of relief in cerebral congestion should be instituted—cupping to the back of the neck, stimulating clysters of turpentine or assafetida, sinapisms to the legs and arms, cold to the head, croton oil as a derivative by

the mouth. These and other well-known remedies or remedial measures scracely require discussion, as their use is directed against the brain congestion and not against its cause, and therefore independent of the nature of such cause.

In chronic cerebral syphilis, dry cupping and the actual cautery may occasionally be employed with temporary advantage, but they are rarely of much value. When there is cachexia or marked failure of the general health, the careful use of fresh air, tonics, rest, regulated exercise, diet, and the other hygienic measures for building up of the health, are sometimes of service. So long, however, as the cause of the failure of health remains, so long will these measures be of little value; and when by antisyphilitic treatment, the cause has been removed, the bodily condition will usually right itself. For this reason in cerebral syphilis, all measures other than those distinctly antispecific, are comparatively of very little importance.

In an individual case of cerebral syphilis, the first therapeutic question which must be decided by the practitioner, is as to whether mercurials or the iodides shall be employed. As a medical student, I was taught that the iodide of potassium is suitable for the treatment of advanced syphilis, while the mercurials should be chiefly reserved to combat the early manifestation of the disorder. There is a certain amount of truth in this distinction, but what truth

there is applies not so much to cases of cerebral syphilis as to other forms of the advanced disease. Cerebral gummata may, of course, develop when disease of the bone and deep tissues, shows a wide-spread general infection, which is also manifested by the failure of vitality; but in the great majority of cases of cerebral syphilis that have come under my care, especially in private practice, there have been no pronounced wide-spread lesions, no general breaking down of tissue, and no cachexia.

To my thinking, the decision, whether iodides or mercurials should be employed, ought to rest upon the symptoms of the individual case rather than upon the stage of the disorder. The contraindication for the free use of mercurials is, not the number of years since the primary affection, but a condition of low vitality and a tendency to necrotic changes. Under these circumstances, mercurials, if employed at all, must be used with the greatest caution. In a few such cases, however, I have obtained the best results by withdrawing the ordinary mercurials and iodides, and giving large doses of tincture of iron with small doses of corrosive sublimate, although there was a distinct cachexia. The following prescription affords a mixture the taste of which is not usually objected to. The dose, and, indeed, the proportion of the ingredients, should be varied to suit individual cases.

℞ Hydrarg. chl. corrosiv., gr. iss.
Tr. ferri chloridi, f ʒ ii.
Glycerinæ, f ℥ i.
Ol. caryophylli, ♏xviii.
Syrupi, q. s. ad f ʒ xviii.
M. S.—Teaspoonful after meals, in water.

A very great disadvantage attends the use of the iodides, namely, the slowness of their action. In some cases this is a matter of minor importance, but in other instances it is vital. There occur to my remembrance at this moment, two cases in which the iodides were being used freely, and in which the symptoms had greatly ameliorated, although occasional epileptic convulsions still occurred. In each case the respiratory arrest of an epileptic fit lasted a moment too long, and death resulted. At the autopsies gummatous lesions were found, which were evidently yielding to the iodide of potassium. The iodide would probably have sufficed for the cure had it not been for the fatal accidents of the long arrest of respiration; but if mercury had been exhibited so soon as the cases came under care, the rapid removal of the lesions would have probably prevented the fatal fit. More and more has it become with me a favorite rule of action in cerebral syphilis, without evidences of cachexia or a distinct history of mercurialization, to begin the treatment with mercury in such doses as are necessary to cause very slight salivation, and to maintain a mercurial impression just below the line of slight tenderness of the gums, for some days or weeks, *pro re nata*.

So far as the specific lesion is concerned, it makes little or no difference how the mercury is introduced into the system; and the method of administration should be suited to the exigencies of the individual case. When there is no disturbance of the alimentary canal, and when the mercurials are borne without interfering with the taking or assimilation of food, I believe the administration of the remedy by the mouth is the more accurate plan, both as to dosage and effect. When the symptoms are extremely urgent, and it is desired to affect the system as rapidly as possible, mercurial inunctions should be practiced whilst the drug is being given by the mouth; and when there is a tendency to diarrhœa, the mercurial inunction should be used alone. By some practitioners the officinal oleate of mercury is preferred to the ointment, on the ground of its being more cleanly and more rapidly absorbed; but after considerable trial, I have been unable to obtain evidences that the oleate yields itself more rapidly to absorption than does the older preparation, and it has seemed to me distinctly more irritant. A half drachm of the ointment or the oleate may be rubbed into the skin at a time, in a warm room, and let remain on the person. An excellent plan is to order the patient, commencing with the beginning of the week, to rub the ointment, on Sunday night, into the left axilla; Monday night, into the left flank or side of the abdomen; Tuesday night, into the inside of the left thigh; Wednesday night, into the right axilla; Thursday

night, into the right flank; Friday night, into the right thigh; Saturday night, into the region of the umbilicus; after this, recommencing with the left axilla. A method which has been much practiced in Europe is, that of giving mercury hypodermically; but I believe that the dangers of local inflammation are such as to over balance any superiority of the plan. Smirnoff's modification of the Scarenzio method is probably the best of the various attempts to overcome the local evils of mercurial hypodermic medication. A mixture of calomel and chloride of sodium, ten per cent. each, in distilled water, is used in such dose that one and one-half grains of calomel are injected deep into the buttocks in the neighborhood of the vertical fold, which in most lean persons is about an inch and a half back of the trochanter. Two injections should be administered at one time on opposite sides of the body; and should never be given less than four days apart, and when the symptoms are not urgent, only once a week.

In practicing this injection, absolute antiseptic precautions should be taken. My first experience with this method was so unfortunate as to discourage its use entirely. One double injection was practiced upon a patient suffering from cerebro-spinal syphilis, in the University Hospital. About ten days after the injection had been given, the patient left the hospital without notable local symptoms, but ten days or two weeks later, came back with very deep sloughing

ulcerations at the seat of the injections. In spite of all that could be done, these sloughs increased in size, and the patient died seemingly in a considerable degree from the exhaustion produced by the local disease.

After a mercurial course, either in the syphilitic or nonsyphilitic subject, iodide of potassium should be given in order to secure elimination of the mercury from the system. When, in a case of cerebral syphilis, the time for the exhibition of the iodide has arrived, the question of the dose becomes important. It is usually best to begin with 10 grains three times a day; in the course of two or three days this may be increased to 20 grains. Usually the patient who will tolerate a drachm of iodide a day will also tolerate two drachms a day. A majority of those persons who can take two drachms a day without the production of iodism can take three drachms. It is, therefore, safe to advance the dose very rapidly after it has been found that a drachm a day causes no inconvenience. Not rarely it seems almost impossible to produce iodism. I have frequently given the iodides up to or even beyond six drachms a day. I do not believe that larger amounts than these are of any especial service, and I am not sure that any advantage is gained by going beyond a daily dose of half an ounce. Although the iodide is known to pass readily through animal membranes, the suggestion naturally presents itself that probably much of such a

dose as this fails of absorption. In order to test this question, I recently had a quantitative analysis made by Dr. John Marshall, Demonstrator of Chemistry in the Medical Department of the University of Pennsylvania, of the urine of a patient who was taking three hundred and sixty grains of the iodide a day. The results were as follows:

First twenty-four hours,—total quantity of urine passed 1253 c.c.; potassium iodide, 16.84 grammes (258 grains).

Second twenty-four hours,—total quantity of urine passed 1621 c.c.; potassium iodide, 20.2 grammes (310 grains).

Third twenty-four hours,—total quantity of urine passed 1531 c.c.; potassium iodide, 17.606 grammes (270 grains).

Fourth twenty-four hours,—total quantity of urine passed 1078 c.c.; potassium iodide, 14.488 grammes (222 grains).

The average daily amount of the iodide recovered from the urine by Dr. Marshall was two hundred and sixty-five grains against three hundred and sixty grains ingested. It is almost certain that the iodide when given in large amounts is freely eliminated by the intestines, as well as in the saliva and perspiration, and I think the reader, making a proper allowance for such loss, will agree with me that the work of Dr. Marshall shows that the iodide, when given in daily doses of three hundred and sixty grains, is practically all absorbed.

Whenever symptoms of iodism are apparent in cases of cerebral syphilis, the remedy should be withdrawn for a few days, and then smaller doses administered, the effort being to keep just within the line of iodic intoxication. Owing to the necessity for frequent varying of the dose, it is preferable to exhibit the iodide in solution by itself, adding the vehicle used to cover the taste of the iodide at the time of administration.

The iodide is so soluble that a watery solution, one minim of which represents a grain of the salt, is readily made, and is permanent. I have been accustomed to use the following formula, directing the patient to add to a dessert or tablespoonful of No. 2 and a quarter tumbler of water, the desired number of minims of No. 1:

℞ Potassii iodidi, ʒ i.
Aquæ, q. s. ad f ʒ ii.
S.—No. 1.

℞ Syr. sarsaparillæ comp., f ʒ viii.
S.—No. 2.

At one time the profession had a great deal of confidence in the value of the so-called "Woods" in advanced syphilis; at present they are very little used, yet I am not sure that they possess no value. At present writing one case recurs to my mind in which a long treatment with the ordinary forms of mercurials and iodides had entirely failed to achieve good; but

in which "Zittman's Decoction" was exhibited with rapid results.

The compound syrup of sarsaparilla is too feeble in medicinal ingredients to be of value except as a vehicle to cover the taste of the iodide. Moreover, the large amount of sugar which it contains unfits it for use in massive doses. If, however, the compound fluid extract of sarsaparilla be added to it, the patient will get a very fair imitation of the older preparation of the "Woods." The following preparation may therefore be substituted for No. 2 of the formula just given:

℞ Syr. sarsaparilla comp.,
Ext. sarsaparilla fld. comp., ää f ℥ iv.

S. No. 2. Dose, a dessert spoonful.

CHAPTER III.

SPINAL SYPHILIS.

Section I. Pathology.

Our knowledge of spinal syphilis is still so imperfect as to make the discussion of the subject somewhat unsatisfactory. The recorded cases, with careful autopsies are few, and when recovery occurs, doubt must often rest upon the location if not upon the nature of the lesion. Moreover it is especially difficult to decide what cases shall be considered to be instances of true spinal syphilis, since there is scarcely any degeneration of the spinal cord which does not frequently occur in syphilitic persons, and which has not been attributed to specific infection. That some relation exists between syphilis and the contiuous—or tract—scleroses of the cord, is generally acknowledged, but this relation is not sufficiently direct to force us to consider these various chronic inflammations as distinctly syphilitic, and I shall not in the present brochure further consider the spinal scleroses.

An acute myelitis occasionally develops in the syphilitic subject, and it is possible that the syphilitic taint may be the direct cause of the inflammation; it has also been thought by some authorities, that the specific disorder bears an etiological relation with subacute myelitis, consequently I shall enter a little more fully into a consideration of myelitis and subacute myelitis,

although it does not appear to be proven that they are direct outcomes of the constitutional disorder.

In the *Revue de Medecine* (Jan., 1884) Dejerine records the case of a person, suffering from chronic syphilis, in whom there were fulgurant pains, with increasing weakness of the legs, and subsequently, after very severe exposure to the weather, sudden development of complete paraplegia followed by trophic troubles, and death in twenty-eight days. At the autopsy there was found a central myelitis with pronounced lesion of the ganglionic cells; inflammatory changes of the pia mater and capillaries, and neuroglia, extreme alteration of the nerve roots, and secondary degeneration of the columns of Goll and the lateral columns. In a second case recorded by Dejerine, there appears to have been no exposure or apparent immediate exciting cause. The symptoms and lesions were similar to those just spoken of, but death resulted in eight days. Whether such attacks as these, occurring in syphilitic subjects, are produced directly by the syphilis or not, is at present doubtful. The same is true of myelitis, of which I have reported two rather peculiar fatal cases in syphilitic subjects. The general symptoms of this affection are, progressive loss of power with grossly exaggerated reflexes, severe twitchings and jerkings of the legs, rigidity, usually more or less marked pain and other sensory disturbances in the legs, and finally partial anæsthesia and complete paraplegia, paralysis of bladder, bed-sores,

and death from exhaustion. At the autopsy the most important changes found in the cord have been thickening of the main blood vessels, and the presence of great numbers of round neuroglia-cells in both gray and white matter, with complete disappearance of the nerve tubules. One of my patients died of a rapidly developed central myelitis supervening upon the subacute disease, and affording lesions similar to those described by Dejerine in addition to the changes of the subacute affection.

In another class of spinal cases occurring in syphilitics, the symptoms resemble those of the so-called acute ascending paralysis (Landry's paralysis). According to Huebner, they are without anatomical lesions, but in the majority of the recorded cases no proper microscopic study of the cord has been made. Huebner states, however, that Kussmal failed in one case, after such study, to detect lesion. As some of these cases may really have been instances of peripheral neuritis, it is essential that in the future the peripheral nerves as well as the spinal cord be carefully studied. I have seen one case which might be placed in this category. The first symptom was numbness in the legs, with a small deep sharp-cut ulcer on the plantar surface of the great toe; directly after this, loss of motion and sensation in the legs and thighs, rapidly becoming almost complete, and spreading quickly to the trunk and arms, so that in one week the patient was a flaccid, helpless mass, and the

breathing so interfered with that he was believed to be dying. After almost losing the power of swallowing, this patient began to get better, and finally so regained power of his hands and feet that he was able to partially dress himself and walk a distance of ten or twelve feet, when he was suddenly seized with pleuritic effusion and died. During the first week of the disease his temperature was 100° F. At the autopsy the spinal membranes were found to be normal, but in the cord there were very distinct lesions; the neuroglia seemed everywhere more granular than normal; the ganglionic cells were not distinctly diseased; the white matter in various places was much changed, the tissue appearing abnormally dense and opaque where most affected; the nerve-tubules seemed to gradually lose their myeline, and in places were reduced to simple axis-cylinders. Finally, the axis-cylinders became smaller and smaller until in the most altered portions of the cord they had disappeared. As the autopsy was obtained with great difficulty, it was not possible to get the peripheral nerves for study.

In regard to these very acute cases, it seems to me uncertain whether the disease should be attributed to syphilis. In my case, twenty years had elapsed since the chancre, alcohol was habitually used in great excess, and the attack was apparently precipitated by great exposure. On the other hand, the man bore well enormous doses of iodide of potassium, and slowly progressed under them.

Huebner * gives as the forms of syphilis of the cord:

First—Syphilitic neoplasms, including those cases in which the neoplasm is single, and those in which it consists of small multiple and disseminated new formations on the membranes of the spinal cord.

Second—Syphilitic callus, in which there is found after death a circumscribed induration of the cellular tissue about the cord, usually with adhesion to the dura mater.

Third—Simple softening of the cord. This form of softening is described by Steenberg. Heubner himself appears to doubt whether simple softening of the spinal cord ever occurs as a distinct syphilitic lesion, and also further doubts the existence of a genuine syphilitic myelitis.

Fourth—Cases in which the symptoms resemble those of the so-called acute ascending paralysis, but in which after death no lesion can be found.

Of these alleged forms of spinal syphilis, the fourth variety has already been discussed at sufficient length. The third variety perhaps may be considered to in some degree correspond with that form of disease which will be hereafter known in this paper as syphilitic infiltration of the spinal cord; but a true softening of the cord probably does not exist as an original syphilitic lesion. Gummatous tumors springing from

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* Ziemssen's Cyclopedia of Practical Medicine, vol. xii.

the membranes, and gummatous changes in the cord itself, may so far interfere with the circulation of the spinal cord as to produce softening, which would, however, be not a primary, but secondary, lesion, and which, strictly speaking, should not be called syphilitic.

The so-called syphilitic callus as described by Heubner, is probably not a primary syphilitic lesion, but rather the result or remnant of a true gummatous inflammation, as, indeed, Heubner himself appears to believe. The symptoms in a case reported by Virchow were, stiffness in the nape of the neck, pains in the neck and arms, and finally paralysis of both arms. In a case very elaborately detailed by Heubner, the symptoms were pain in the neck and right arm, and later on in the right leg and left arm, followed by paralysis of the right arm without loss of sensibility, complete loss of power of the right arm and leg, weakness of the left arm, and a few days later of the left leg also. Some time after this, the following symptoms progressively appeared: Spasms in all the extremities, general paræsthesiæ, incontinence of urine, difficulty of respiration (first the inspiration, and then the expiration, becoming more difficult), paresis of the tongue, ptosis of the right side, difficulty of swallowing, and involuntary passage of fæces. From these symptoms the patient was relieved by active antisyphilitic treatment; and he finally recovered sufficiently to follow his vocation as a colporteur for several years, although he had a marked ataxic gait. At

the autopsy, covering much of the cervical cord, was found a large mass which had evidently been formed by consolidation of the membranes. When examined by the microscope it was found to consist of ordinary fibrous connective tissue, with here and there accumulations of pigment containing great numbers of nuclei. It is plain that in this case a widespread gummatous meningitis, which by pressure was rapidly abolishing the functions of the cervical spinal cord, was softened down by active antisyphilitic treatment, but that the local changes which it had produced could not be removed, and the secondary so-called callus was left. The syphilitic callus of Heubner must therefore be considered, not a variety of syphilitic disease, but the scar or result of gummatous inflammation which has been partially cured.*

The most usual form of gummatous spinal syphilis is that in which the exudate takes the form of a neoplasm or of a series of small independent neoplasms or growths, springing from, or at least connected with, the spinal membranes. In some cases the new growths seem to arise from the arachnoid or pia mater, and force their way inward; but in others they have a tendency to grow outward and cause agglutination of

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* In the latter portion of the present chapter are recorded cases showing the importance, in spinal syphilis, of persisting in the use of antispecific remedies for years; and I cannot help suspecting that in cases of syphilitic callus such practice might sometimes result in ultimate cure.

all of the cord membranes, sometimes even disease of the vertebræ themselves. I have seen instances in which the neoplasm invading the spinal cord had such small connection with the membranes, as to suggest that the syphilitic matter had originally been deposited in the cord itself. The neoplasm is usually irregular in shape, assuming sometimes the form of a sharply-defined tumor, sometimes that of an irregular circumscribed infiltration of the membranes, and occasionally extending for a considerable distance up and down the cord.

The second form of spinal syphilis has been especially commented upon by Rumpf (*Syphilitische Erkrankungen des Nervensystems*). The change appear to be first a thickening of the blood vessels, and especially a dilatation of their peri-vascular spaces, with the exudation of numerous minute cells into the walls and around the vessels which appear to be the centres of the infiltration. The process is usually accompanied with adherence of the pia mater, which is also infiltrated with cells. It would seem, therefore, that we must at present acknowledge the existence of two forms of gummatous or true spinal syphilis—that in which the membranes are chiefly the seat of the disease, and that in which there is infiltration of the cord from its own vessels. In nature these two forms usually co-exist. It is not very rare to find a meningeal growth which has distinctly invaded the cord, although usually the growth remains distinct even if it

has caused disease of the cord by pressure. On the other hand, I have never seen, at an autopsy, infiltration without disease of the membranes.

Section II. Symptomatology.

Gummatous Meningitis. — It is evident that the symptoms of gummatous spinal meningitis must, more or less, resemble those of a subacute or chronic non-specific meningitis, but at the same time must be more or less peculiar and variable, because the gummatous inflammation may be exceedingly localized, wide spread, or occupy only a small region. Moreover, the symptoms must vary with the seat of the lesion, especially when the lesion is strictly localized. In meningitis the most active manifestations are the results of irritation of the nerve roots. For this reason pain and spasm are prominent, and often precede paralysis, which is chiefly the outcome of pressure.

The seat of the pain usually corresponds to the seat of the lesion, but is peripheral rather than centric. In other words it is referred to the endings of the nerves whose posterior roots are involved in the inflammation. In some cases furious agonies shoot along the arms or legs; and fulgurant crises in the extremities simulate those of posterior sclerosis. Perhaps more frequently the pains are in the trunk, especially in the lumbar or dorsal region. They are described as like the thrust of a knife, a girdle of hot iron, or a

tearing or clawing as if by a living animal. More rarely the pains are comparatively slight and aching in character. Sometimes a fixed spot on the spinal column burns or aches, or is fitly described as an indescribable distress, and in some cases, according to Heubner, the suffering is distinctly increased by pressure over the spot. I have seen three or four cases presenting the last feature, but in each instance have believed that the patient was suffering not simply from spinal syphilis, but also from an implication of the vertebral periosteum or of the vertebræ themselves, and have been confirmed in this opinion by subsequent events. When the lesion is purely meningeal there is probably no marked local tenderness. The following case is of great interest as proving that syphilitic deposits in the spinal membranes may give rise to, or be associated with, inflammations, softening, and breaking down of the vertebræ.

B. C. Italian. Entered the Philadelphia Hospital, June 1, 1885. Between the man's natural stupidity and linguistic difficulties, it was found impossible to get a satisfactory history; but he stated that he had been well and strong until three months before, when he was hurt on the neck and back, and had not been able to work since. For the last month he had noted that his arms were steadily losing power. At the time of entrance he was evidently very ill, and was suffering from general paralysis. Lying in bed he could make all the movements of the lower limbs, but with great feebleness and slowness; all movements of the arm below the elbow were lost, except in the left thumb, and the right fingers could be moved only by a very strong effort of the will; power was almost com-

pletely lost in the upper arms, but the deltoids still responded very feebly. The face was not paralyzed, and sensation was well preserved. He complained of violent pain in the back of the neck shooting down into the limbs, especially the arms. On coughing, there was violent pain referred to the sternal region. Pressure over the lower cervical vertebræ caused pain, as did also pressure upon the head, or attempts to move the neck. There was no control over the urine and fæces. Shortly after entrance to the hospital, the patient developed a fatal pneumonia.

At the post mortem examination, the ordinary lesions of pneumonia were foumd. The cerebrum, cerebellum, and pons, afforded nothing abnormal except slight capillary congestion. From the third to the sixth cervical vertebræ, there was a marked thickening of the membranes covering the cord. The growth which gave rise to it mainly involved the anterior face of the cord and encircled about two-thirds of the circumference. The bodies of the vertebræ were eroded, and the cord itself greatly thickened and broadened. Below, the growth terminated abruptly, but above more gradually; and about opposite the fourth cervical vertebræ there was a lenticular protuberance between the posterior and anterior roots on the left side.

Microscopic examination showed the external mass to be composed of a structureless base containing numerous narrow curved cells; and the inner portion of the mass to be composed of innumerable small, round, closely packed cells, which were sometimes irregularly diffused, but were more usually crowded into globular bodies, which were commonly melted into the surrounding tissue, but in rare cases were more or less distinctly isolated. In some of these bodies the cells were undergoing fatty degenerations. At the point of greatest pressure, the spinal cord was chiefly composed of structureless minute granular neurogliar matter, with numerous roundish neurogliar

connective tissue cells, no nerve tubules being discovered. The nerve cells of the gray matter could still be made out, but were shrunken, and mostly without processes.

In spinal syphilis not only is pain a characteristic symptom, but paræsthesiæ are not rare phenomena; such are formications, tingling in the extremities, numbness, and feeling as though the limb were asleep, intense sense of coldness on the surface, sensation of water running over the limb, etc. Early in the disorder there is sometimes very marked hyperæsthesia, but later, even though the pain persists, marked blunting of sensibility comes on, and there may be a complete anæsthesia; this anæsthesia is sometimes localized in irregular tracts. Thus, in a case reported by Alfred Mathieu,* although there was complete anæsthesia of the outer side of the left leg and foot, the inner side retained its normal sensibility. In some instances there is the abdominal cincture of ordinary myelitis. My records show that even in these early stages there may be diplopia, amblyopia, or other disorder of vision, and the pupil may be distinctly affected. In these cases it is probably the upper portion of the cord which is affected.

Disturbances of motility, in the majority of cases, do not develop until some time after sensation has been affected, but may come on very early. Usually, the first symptoms are those of irritation, such as rigidity of the neck, back, and limbs, or even of isolated

* Ann. de Dermatol. et Syph., vol iii., 1882.

groups of muscles. Tremors have been described as frequently present. These may be convulsive, and are often plainly reflex in their origin; indeed, I am inclined to believe that they are always reflex tremblings, and never true tremors. Huebner describes a case in which a paralyzed limb was thrown into violent tremblings whenever passive motion was attempted. The patella-reflex is usually grossly exaggerated, although it may be lost in the latter stages of the disorder. Not rarely there is the condition which has received the misnomer of spinal epilepsy. This exaggeration of the reflexes may be limited to one leg, when it is almost pathognomonic. In some cases severe cramps are excited by movement. Usually there is no tenderness of the contracted muscles. These symptoms of the meningitic stage may continue for weeks or even months, without there being pronounced paralysis, although locomotion is not rarely interfered with by stiffness of the legs. Finally, if the case progresses, the patient notices a weakness in one or both legs, or (if the disease be situated high up in the spinal cord) in one or both arms, which rapidly increases until there is almost complete loss of power. This rapid increase of palsy following long-continued disturbance of sensation, is almost pathognomonic. In most cases one side of the body is more affected than the other. The sphincters are prone to be implicated, and in advanced stages of the disease there is usually complete loss of control

over the bladder and rectum. The patient may live for months without very distinct change of this condition, or bed-sores and other trophic disturbances may rapidly develop and death ensue in a short time. I have seen under these circumstances marked elevation of temperature, rapid feeble pulse, mental weakness, and the general symptoms of septicæmia last for many weeks. Ammoniacal cystitis is of course prone to be developed during this stage. When motility fails, sensibility is usually blunted, although the pains may even increase. Heubner affirms that an incompleteness of the anæsthesia is characteristic of the disorder.

Owing to the diseased condition of the vessels, hemorrhages or thrombosis may suddenly interrupt the course of a gummatous disease of the spinal membrane.

In a patient of my own who was believed to be suffering from gummatous spinal meningitis, there was an abrupt development of violent tearing pains, loss of power and sensibility, and all the other symptoms which are characteristic of meningeal spinal hemorrhage. A. Weber reports a case in which, after doubtful premonitory symptoms, such as vertigo, loss of power on the right side, pressure on the top of the head, and tinnitus aurum, there was sudden development of convulsions, and death. At the autopsy, a syphilome of the right vertebral artery was found, with a recent thrombosis of the basilar artery.*

* Amer. Journ. of Neur. and Psychiat., vol. ii.

The typical course of spinal syphilis, such as has been described, may be variously departed from. Sometimes the power of co-ordination is early affected, and the symptoms resemble those of locomotor ataxia. I doubt, however, whether under any circumstances there is loss of the knee-jerk in the early stages of the gummatous disease of the spinal membrane. The lesion in such case is probably an infiltration of the cord itself. Sometimes the paralytic symptoms are from the onset very prominent, because the membranous disease has been accompanied by rapid exudation so situated as to involve chiefly the anterior nerve roots, and by pressure and inflammation quickly suspend their functions. It may well be, however, that these cases of spinal syphilis in which the symptoms are almost exclusively paralytic, are due to disease of the cord itself, although the strictly localized character of the symptoms sometimes strongly indicates that the lesion is an external tumor. As illustrating this, I cite a case reported by Dr. C. W. Suckling in the Birmingham *Medical Review*, August, 1885, in which a syphilitic patient distinctly suffered from lack of power attacking the left leg, increasing until in the course of a week it amounted to complete paralysis, with hyperæsthesia, vaso-motor paralysis, and consequent rise of the local temperature in the leg, accompanied by complete loss of sensation in the opposite leg. In this case, there was analgesia of the right side, and hyperæsthesia on

the left extending to a sharply defined limit to two inches above the umbilicus; but there was no severe pain at any time. It is evident that this patient suffered either from a tumor pressing on one half of the cord, or a localized hemimyelitis; and that the lesion was specific, was strongly indicated by the almost complete recovery obtained by the use of large doses of iodide of potassium, and mercury.

A case illustrating the occasional difficulty of diagnosing spinal syphilis is reported by C. Eisenlohr.* The first symptom was obstinate constipation, with very great discomfort after defecation; then appeared incontinence of urine with weakness of the legs; finally, a sudden complete palsy of the right leg with marked anæsthesia in both legs, partial loss of power in left leg, violent boring abdominal pains, and distress in the bladder. In the last stages there were severe neuralgic pains in both legs, with complete loss of sensation, bed-sores, atrophy of the leg muscles, with reactions of degeneration, and death from exhaustion. At the autopsy an advanced meningitis was found which had apparently commenced in the region of the cauda equina, and given rise to complete degeneration of the nerves. The only alteration of the cord was an ascending degeneration of the posterior columns.

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* Neurologische, Centralblatt, 1884, p. 75.

Diffused Spinal Syphilis.

The symptoms of diffused syphilitic infiltration in the spinal cord vary according to the seat of the lesion: paralysis with or without spasm; anæsthesia with or without pain; spasm without paralysis; or pain without anæsthesia, being the most marked manifestations according as the motor or sensory tracts are chiefly involved. When, as is usually the case, the march of the organic alteration is slow, it is evident that the symptoms will more or less closely resemble those of sclerosis of the affected part. Especially is this true since secondary degenerations of the spinal cord appear to be very prone to follow on the primary lesion.

Sometimes paraplegia chiefly occupies the patient's attention; it may be attended with flaccidity of the implicated muscles, but, perhaps more usually, the muscles are more or less contracted, and the reflexes excited so that a clinical picture resembling that of spastic palsy is formed. In such cases severe pain is rare, but paræsthesia, coldness af the extremities, and some loss of sensibility are not infrequently present; when a syphilitic spastic paraplegia is accompanied by severe pain, the probabilities are very strong that the lesion is in the membrane of the cord.

In other patients the function of co-ordination is especially at fault, and the action and gait may resemble those of a true locomotor ataxia. This resemblance may be further intensified by the existence

of lancinating and fulgurant pains in all respects precisely like those of a true posterior sclerosis.

Sexual excitation preceding or during an attack of spinal syphilis is rare, but may occur. Pain is not nearly so frequent and prominent a phenomena as in specific spinal meningitis, and when present usually resembles that of a posterior sclerosis. Girdle sensations are not rare.

It is hardly necessary to occupy space with a further detailed description of the various symptoms which are present in syphilis attacking the spinal cord itself. They are precisely the same symptoms as are produced by other organic diseases of the cord. The characteristic features of the disease are not so much in the individual symptoms as in their collocation. The lesions of syphilis are prone to be multiple, and are rarely as strictly confined to individual functional tracts as is sclerosis; consequently the symptoms of syphilis of the cord are very apt to be mixed. Thus there will be loss of co-ordination associated with retention of the patella-reflex,—or the patella-reflex may be lost at a time when there is marked loss of power in the muscles rather than loss of their co-ordinating function; or an apparently true picture of locomotor ataxia may be afforded save only that there are distinct girdle pains like those of myelitis; or an apparent locomotor ataxia will be associated with loss of power over the rectum, or bladder; or a case which up to a certain point offers a typical outline of lateral

sclerosis, suffers from fulgurant pains, or from paralysis of the sphincters.

Almost any conceivable mixture, or interweaving of spinal symptoms, may occur as the result of syphilis of the cord, so that the most pathognomonic evidence of the existence of the disease is an atypical aggregation of symptoms. Whenever a contradictory mass of phenomena, evidently spinal in origin, present themselves before the practitioner, the suspicion should at once be strongly aroused that the patient is suffering from the specific disorder.

Instead of discussing further the symptoms of syphilis of the spinal cord, I shall give short descriptions of several cases which have been under my care, in which the diagnosis has been confirmed by the result of antispecific treatment. It is possible that in some of these cases both cord and membranes were affected; and it seems to me very certain, that often it is impossible to say during life, how far the lesion is meningeal or spinal.

Mr. J. J. presented himself to me for treatment the early part of the past winter, and has therefore been under care for about six months. My notes taken at the time of the first visit are as follows:

"Suffers much with violent, shooting, darting, boring pains in the legs, resembling, according to his description, those of locomotor ataxia. At the time of the pain, slight contact with the part increases the suffering; but seizing the part firmly, or rubbing it hard, brings some relief. The knee jerk is abolished, but is produced to a slight extent when the blow

is reinforced by his violently clenched hands. There are no cerebral symptoms; the pupils are small, not affected by light or pinching, but dilated slightly when he looks at far-off objects, showing, therefore, Argyll-Robertson pupil. Both the station and walk are exceedingly imperfect and unsteady, and there is great loss of endurance, so that walking a very short distance exhausts him entirely." Mr. J. was put upon iodide of potassium and corrosive sublimate in full doses, and commenced to improve. At present, he considers himself well, as he is able to walk long distances without undue fatigue, and in the last two months has only suffered once or twice from pains just before a severe storm. His station and gait are each of them normal, or nearly so, but the pupils have only very imperfectly regained the power of responding to light, and the knee jerk is still absent.

Wm. M. stated that he had chancres 15 years before; also a history of great sexual excess. In December, 1885, first noticed that his gait was unsteady; at the same time suffered from sickening pains in the lumbar region, and loss of sexual desire. In March or April he began to have lightning pains in the legs like those of locomotor ataxia. The loss of control over his legs became more and more manifest, and by the 5th of July he was unable to walk; according to his statement, this inability was due to lack of control rather than to lack of power. There was also a time when he could not walk at night, although he could in the day time. About this time "girdle sensations" were felt at night, and he suffered much from coldness and numbness of the feet. He states that at one time he had diplopia; there had been no headache, and no loss of memory; but he had irritability of the bladder during the day, incontinence during the night. When he entered the University Hospital, September 20th, his general appearance was that of a healthy man, and he presented no other symptoms except those connected with his legs and bladder; the knee jerk was

absent on both sides; there was a great loss of power in all the muscles of the legs, and although there was no wasting of the muscles, the electrical response was more sluggish than normal. Sensation was very distinctly blunted in both legs, and also appreciably delayed. The æsthesiometer points were, in most portions of the leg surface, not separated at less than 11 inchees, and nowhere nearer than 7 inches. The ocular examination showed disk atropic, greenish; retinal vessels small; right eye vision $\frac{20}{xv}$; left eye vision $\frac{20}{xxv}$.

Argyll-Robertson pupil was present; no ocular paralysis was discoverable. The urine was normal. Patient was treated with mercurials by the mouth, and by inunctions, and by iodide of potassium. Great improvement took place, but he left the hospital before he was cured.

Wm. Dougherty. Admitted to the University Hospital, Feb. 29, 1888. During the three months before admission suffered from steady pain in the back, which during the last month had been accompanied by girdle pains and marked tendency to excessive sleepiness and alteration of the gait; further states that he has been affected with headache and slowness of speech for the last year. At present is unable to rise from the chair except with aid of his arms, on account of stiffness and feebleness of his legs; walks with the true spastic gait, but watches the ground carefully; on closing his eyes his gait becomes staggering, but is still able to walk. Sensibility greatly impaired on the abdomen, buttocks, and legs. He was put on the use of one drachm of the iodide of potassium a day, and improved very rapidly in his gait and also in his speech. After being in the hospital a little under two months he was discharged, with the note that he could walk very well.

The following cases which occurred in my service at the University Hospital, have been reported a little more in detail by the chief of clinic, Dr. F. X. Dercum,

in the University Medical Magazine, for November, 1888:

J. W., aged 34, at his first visit to the clinic was so extremely ataxic that he was unable to walk unless assisted on each side by a friend; swaying when standing was extreme; there were ataxic pains in the calves, feet, and thighs; the knee jerk was absent; and the sesibility in both hands and feet was much diminished. The symptoms much resembled those of locomotor ataxia, but were aberrant in that there were painful spasms of the muscles of the legs. Under the use of the iodides and mercurials slight improvement was obtained; but it was not until the third year of his attendance at the dispensary, and after the prolonged administration of moderate doses of antisyphilitic remedies, that a very distinct gain was achieved. He then steadily became less ataxic until he was able to walk by himself well, although the diminished sensibility persisted, as did also the loss of the knee jerk.

H. A., aged 32, decidedly ataxic in both arms and legs, shooting pains in the calves of the legs, loss of sensibility in the feet, and some paræsthesia. The knee jerk was absent except upon reinforcement by muscular effort in distant parts of the body. The general health was much impaired. In this case the aberrant symptoms were; constriction of the abdomen, and great tenderness upon pressure over certain widely separated nerve trunks. Specific treatment was kept up steadily for thirteen months, when the pains began to diminish; the knee jerk, although still absent when the man was quiet, became more active upon reinforcement, and the ataxia began to grow less. By the end of three years the improvement was very striking, and when the patient walked with the eyes open, the gait was almost normal.

Section III. Prognosis.

Owing probably to the minute size of the cord, and the great consequent tendency to suffer irreparably from pressure or from spreading inflammation, the prognosis in spinal syphilis should be even more guarded than in syphilis of the brain, at least so far as concerns absolute cure. In a large majority of cases, however, very great improvement of the patient can be obtained by treatment, and brilliant cures are not very rare; but even in these so-called cures, however, careful examination will often reveal the existence of permanent damage.

Section IV. Treatment.

The most important part of the treatment of spinal syphilis consists in the use of the iodides and the mercurials. The remarks which have already been made in regard to the proper employment of these drugs in brain syphilis, apply with equal force to specific disease of the cord or its membranes. It should always be remembered that it is essential in diseases of the cord to remove the gummatous lesion as rapidly as possible, lest by pressure, or by exciting inflammation, it produce irreparable damage. Consequently, unless distinct contra-indications exist, mercury should always be employed at once, and freely, the amount exhibited being suited to the exigencies of the individual case. In very many cases

during the antispecific medication, either absolute or partial rest should be enforced, to prevent spinal irritation or exhaustion. The proper use of the alternate hot and cold douche, massage, muscle beaters, and other remedial measures employed in spinal disease, is often advantageous, but of very slight importance compared with the specific medication.

In the present brochure, it does not seem necessary to discuss in elaborate detail the application of these subordinate remedial measures. They are applied to meet precisely the indications for which they are used in other spinal diseases. Concerning one or two of them, however, the reader may pardon a few words. The alternate cold and hot douche, properly applied, is sometimes of the greatest service when the limbs are cold, the muscles slowly wasting, or very sluggish in their action, and the peripheral circulation impaired. Under these circumstances, the patient should sit with the feet in a shallow tub of hot water, and then water as hot as can be borne should be poured down and over the legs for three or four minutes, and be immediately followed by a douche of water of the temperature of 40° F. for one minute; or, what is more effective, the legs should be rapidly rubbed with a large piece of ice for from one to two minutes. The hot douche may then be reapplied, and the ice rubbing again enforced. The effect of this treatment upon the circulation of the leg is usually immediate and pronounced.

A more important matter than the douche is the use of suspension in those cases in which, along with the tumor of the membranes, there is local tenderness due to an implication of the vertebræ. For many years it has been recognized that the great indication in the treatment of syphilitic or other forms of Pott's disease is, extension and removal of the superimposed weight from the diseased vertebra. Various devices for meeting this indication of extension have been from time to time suggested, and the value of the plaster jacket as a means of making permanent the temporary extension gained by hanging up a patient, is universally recognized. The effectiveness of this jacket depends upon the fact that the general shape of the human body is that of two opposed cones, which are placed in such a position that the base of one is the shoulders, and that of the other the pelvis.

It occurred to me that it might be possible to use the upper cone of the body as the basis for suspension; for this purpose the plaster jacket being made with loops over the shoulder and the patient hung by means of the tripod, the J. K. Mitchell chair, a properly constructed wheel crutch, or other device suited to the individual needs. I have found that an upward pull upon the jacket of 80 pounds does not disturb its position, even when maintained for several hours, and that the pressure is uniformly spread over the surface, so that no pain or discomfort is caused. In order to make the extension as complete as possible, it has

been found advisable to add to the jacket an ordinary head-strap, so that when the patient is supported there is some pull upon the head as well as upon the jacket, care being exercised not to draw up the head sufficiently to cause discomfort.

I have tried several methods for making the loops in the spinal jacket, but the one which I first suggested has proved most satisfactory. It is as follows:

After the first layer of the jacket is upon the patient, a piece of webbing, linen bandage, or other strong material, *well wetted*, has one end applied to the edge of the jacket, in front and on one side. The webbing or bandage is then carried up over the shoulders, upon which it rests very loosely, and brought back of the jacket to the lower edge behind. A similar bandage is then put upon the opposite side of the jacket; then the external layers of the jacket are put in place. In this way the strips which are used for the shoulder-loops are so incorporated with the jacket that they cannot be pulled out; at the same time there is no tendency for the jacket to be broken or crumpled up when the extension is applied.

The ordinary method of using the plaster jacket simply secures, more or less completely, a permanence of the extension which has followed the suspension of only a few moments; but I have found that there is a great advantage in acute cases, in frequently changing the spinal jacket, and putting it on each time after the patient has been hung in the old jacket

for several hours, so as to get a progressively increased extension, and to hold such extension as obtained.

If from tenderness of the projecting vertebræ, or from the presence of a wound, surgical or otherwise, it is desired to avoid pressure upon the vertebræ, or to have access to the affected part, all that is necessary is, to cut an opening in the jacket immediately over the diseased portion of the body, care being taken that this fenestrum shall not be so large as to interfere with the strength of the jacket.

CHAPTER IV.

THE PERIPHERAL NERVES.

It is a comparatively rare circumstance for syphilis directly or indirectly to affect the motor or sensory nerve trunks, but nevertheless such implication does occur: for the purposes of our study, the cases may very natually be divided into three sets. First, *Pressure Neurites*, including those cases in which the nerve trunk is affected simply by pressure, the alterations not being in any proper sense specific: Second, *Secondary Syphilitic Infiltration*, including those cases in which the nerve trunk is involved in a syphilitic deposit which has commenced in a neighboring organ, and has secondarily infiltrated the nerve with gummatous tissue: Third, *Primary Nerve-Syphilis*, including those cases in which the lesion is distinctly specific and primary.

Pressure Neuritis.—A syphilitic neoplasm if properly placed, is of course, liable to produce pressure upon a nerve trunk, which pressure leads to irritation and then to inflammation, and finally to destruction of the nerve itself. The effects of such pressure are more marked where the gummatous tumor is so situated that it forces the nerve against a bone or other hard tissue. That these secondary changes may, however, occur outside, as well as inside, the cranium, is shown by a case reported by

Zambaco, in which the syphilitic tumor, situated in the left nates, underneath the muscles, compressed and destroyed the sciatic nerve. In any such case the affected nerve is found either slightly reddened, softened, and its sheath thickened, or it may be smaller at the point of compression, or completely atrophic and reduced to a thin translucent band.

Secondary Syphilitic Infiltration.—A contiguous gumma may so encroach upon and involve a nerve as to cause a secondary infiltration of the nerve with syphilitic cells. Heubner is probably correct in believing that this is only possible where the nerve is not surrounded by a dense sheath, as near the points of the origin of a nerve, and especially at the chiasm and the adjoining parts of the optic nerves. At the latter place, not very rarely a tumor extending from its starting point in the pia mater along the vessels to the chiasm, forces its way into the latter so that it becomes impossible to draw a sharp line of demarcation between the nerve and the new growth of the pia mater —the whole neighborhood being involved in a grayish-red, gray, or yellowish-caseous, material.

Primary Nerve Syphilis.—There are two distinct affections of the nerve trunks which require to be considered under the present heading. In the first of these it still remains doubtful whether the disease ought really to be considered as syphilitic; while in the second form, the presence of characteristic gummatous material marks with certainity the nature of the lesion.

I have occasionally noted, in cases in which there was evident specific disease of the nerve centres, a co-incident tenderness of nerve trunks indicating that the latter were in a condition of inflammation, but have always been very doubtful as to whether such neuritis should be considered as due directly to the specific poison, or whether it was simply a secondary inflammation propagated along the nerve trunk irritated by a gumma somewhere in its course. A case published in the *Wien. Med. Blatter* for 1886, by Dr. S. Erhmann, makes it probable, however, that the syphilitic poison may act like the rheumatic, the alcoholic, the plumbic, and kindred poisons in producing wide spread polyneuritis. A man thirty years old, about nine months after infection, was taken with paræsthesia, pain and loss of power affecting the left forearm and hand, and especially marked in the region supplied by the ulnar nerve, and not apparent in the territory of the radial. The ulnar nerve was exceedingly sensitive to pressure; the median nerve much less sensitive, but still much more so than normal; and the radial was entirely free from tenderness. The electrical excitability of the ulnar and median nerves was distinctly altered, and there was wasting of the muscles, disturbance of the sensibility of the skin, and of the vaso-motor system in the tributary territory. Later in the attacks, the nerves of the leg became tender, although there were never any very pronounced paralytic or pain phenomena, and there were no indications

of disease of the nerve centres. Under active syphilitic treatment with the iodide, and local measures, a cure was obtained.

The case reported by Ehrmann has no exact parallel that I know of in medical literature, although a collection of somewhat similar instances is given by Erhmann at the conclusion of his article. All of these cases, however, are open to grave objections, and we must still consider it somewhat doubtful whether syphilis can produce an acute multiple neuritis.

Primary gummatous syphilis of those portions of the peripheral nerves which are situated outside of the bony envelopes, is excessively rare. I have never seen such a case, and, at present writing, can only refer to the one reported by Esmarch and Jessen (quoted by Heubner), in which the right oculo-motor nerve was degenerated externally to the skull, while the left oculo-motor was similarly affected within the cranial cavity. The nerve-roots, or the nerve-trunks, within the bony envelopes, are more frequently attacked; they may be the seat of numerous minute gummatous tumors, or of an isolated gummatous growth; commonly, but not always, in the great majority of these cases larger gummatous can be found in the neighboring nerve centres.

According to the research of Prof. O. Kahler (Zeitschrift für Heilkunde, 1887), the gumma appears always to spring from the minute vessels which supply the nerve, an origin which is confirmed by our knowledge of syphilis of the nerve centres.

The first change is an infiltration of the wall and immediate neighborhood of the vessel, with minute cells. As the process continues, the vessels become more and more enlarged and tortuous, and the infiltration forces itself away through the trabeculæ of the nerve whilst the nerve-bundles themselves gradually disappear, and often can be seen in various parts of the preparation undergoing degeneration. When the process is complete, the blood vessels themselves have been destroyed, and the position of the obliterated arteries will be seen, in the syphilitic product, occupied by spindle-form cells and the evidences of fibroid structure. The epineurima, or sheath of the nerve, is usually distended or spread out over the growth, but very rarely is it completely destroyed.

The *symptoms* which are produced by nerve-gumma, are almost always intermingled with those which are due to implication of the nerve centres, since it is extremely rare for nerve gumma to exist as an early single lesion. As has been stated in the chapter upon spinal syphilis, pain, spasm, and perhaps even paraplegia, are not infrequently the outcome of disease of the nerve roots, rather than of the cord itself; but it is very unusual for the disease of the nerve roots to go so far as to entirely abolish their functions. Thus, pain of a most atrocious character following the distribution of the nerve trunks, is much more frequently seen, than is anæsthesia; and very infrequently does a motor nerve have

its power so absolutely destroyed that the muscle supplied by it wastes decidedly, or offers the electrical reaction of degeneration.

The typical headache of cerebral syphilis is not due to an immediate, direct, syphilitic alteration of the trigeminal nerve; for when a gumma directly attacks this nerve, agonizing pains, which are shooting, darting, resembling those commonly spoken of as neuralgic, replace the characteristic headache of cerebral syphilis. I have seen the most frightful *tic douleureux* involving the whole external distribution of the trigeminal nerves, and in some of its explosions accompanied by facial contortions, as an early manifestation of intra-cranial syphilis, of which the only other symptoms were failure of health and of intellectual activity —a failure which might well have been ascribed, and may really have been due, to the excessive pain and loss of rest. The true nature of such a case as this is liable to be overlooked. There is, however, almost invariably, a peculiar indefiniteness of the symptoms—some little departure from the ordinary type of a *tic douleureux*—which ought to arrest the attention of the practitioner. In the case under my care just alluded to, such indefiniteness or atypical character of the symptoms, led to an examination of the person of the patient, and the finding of distinct signs of previous syphilis, which in turn caused the exhibition of antisyphilitic remedies with the result of complete recovery.

The treatment of syphilis of a nerve does not differ from that of specific disease of a nerve centre, and therefore does not seem to require further discussion.

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