Selected essays and monographs : translations and reprints from various sources.

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CONTENTS.

A CONTRIBUTION TO THE STUDY

OF

SYRINGOMYELIA.

BY

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Paris.

Translated, with Notes and Additions,

BY

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1896.

SYRINGOMYELIA.

By Isaac Bruhl, M.D.

CHAPTER I.

Historical Survey.

The word syringomyelia was originated by Ollivier d'Angers, who first used it in his "Treatise on the Spinal Cord and its Diseases" (1837). The term was applied in a general way to the existence of any canal or cavity within the spinal cord, for Ollivier d'Angers regarded a central canal as pathological, and expresses himself in his chapter dealing with the defects in the formation of the cord as follows:—

"Many anatomists have described a central canal in the spinal cord. Ch. Etienne, in his description of the cord, says that such a canal is always present, and that it is continued into the brain. This opinion is also held by Colombo, who compares the canal to that of a quill; it is likewise accepted by Piccolhomini, Bauhin, and Malpighi. I have, however, clearly demonstrated from the internal structure of the spinal cord that in its normal state it does not contain a central canal."

The literature of this period contained records of cavities in the cord which had greatly excited the curiosity of pathologists. In connection with this, it is of interest to peruse the writings of Morgagni,* Rachetti,† Portal,‡ Rullier,§ Hutin,‖ Nonat,¶ &c. Certain authors had even then endeavoured to explain these cavities. Calmeil,** for instance, put forward the

* Morgagni, *Adversar. anatom.*, VI.
† Rachetti, *Del. struttura del. Med. Spin.*, 1816.
‡ Portal, *Anatom. médicale*, T. IV., p. 117.
§ Rullier, *Journal de Physiologie expérimentale*, 1823.
‖ Hutin, *Nouvelle Bibliothèque méd.*, 1828.
¶ Nonat, *Archiv. général de Méd.*, 1838.
** Calmeil, *Journal des Progrès des Sciences et des Instit. méd.*, T. XI., 1828.

following explanation of their occurrence :—"I have stated that the posterior fissure, when the layer of tissue holding its adjacent borders together is removed, extends down to the central grey substance, and, when this substance is absent, even to the white commissure. This arrangement makes the existence of a central canal quite natural. Let us suppose, for an instant, that the lips of the great furrow, which, in the fœtus, extends along the whole posterior aspect of the cord, commence to approach each other at their free margins, but that their adhesion ceases at that point, and does not extend so far as the grey commissure; there will then remain at the centre of the organ a canal of greater or less size. If the grey commissure is absent, as in the cases cited above, the canal extends more deeply, and is limited in front by the anterior commissure." These statements, however, have now only an historical interest.

In 1859 there appeared an important memoir by Stilling, which dispelled all the erroneous ideas on the central canal that had been held up to that time. He established that this canal was always present, and persisted throughout life, and commenced the study of its development, which the works of Kölliker, and especially of Waldeyer, contributed so much to advance. These views are now generally known and accepted, and it therefore appears superfluous to recapitulate them.

The existence of a central canal being thus demonstrated and admitted, syringomyelia, in the sense used by Ollivier, had no longer any meaning, and the word fell into disuse. It was soon replaced by the term hydromyelia, which was made to include not only the congenital affection, but all the affections in which there exists a cavity in the cord.

According to Virchow and Leyden,* all medullary cavities should really be considered as offshoots of the central canal, and the changes, which may accompany hydromyelia, as secondary lesions only.

Hallopeau,† in 1869, took a different view of the question, and was the first to show that certain forms of myelitis may end in the formation of a cavity, and that the change in the cord, that is the sclerosis in the neighbourhood of the central canal, was the primary lesion, the cavity only secondary.

* Leyden, *Archiv de Virchow*, T. 68, 1876.
† Hallopeau, *Gazette médicale de Paris*, 1870.

The subject became still further complicated, when cavities in the cord were described, independent of the central canal and not communicating with it. Simon* in a very interesting work, which appeared in 1875, had the opportunity of dealing with a number of these cases; he was struck by the simultaneous occurrence of these intramedullary cavities with certain vascular tumours, to which he gave the name of telangiectatic gliomata; the cavity resulted, according to Simon, from the softening of these gliomata and absorption of the degenerated tissue.

In order to avoid the confusion to which the word hydromyelia gave rise, Simon proposed to reserve this term for the dilatation and distension of the central canal by fluid, and to apply the word syringomyelia to those cavities and cystic conditions which were independent of the central canal. A work by Westphal arriving at the same conclusions as those of Simon appeared at the same time.

There are, accordingly, three different ways of approaching this question:—

1. To believe with Virchow and Leyden, that syringomyelia is the remnant of an old hydromyelia.

2. To suppose with Hallopeau, that syringomyelia is secondary to an inflammatory condition in the neighbourhood of the central canal.

3. To agree with Simon and Westphal, who have established that the cavity may result from disintegration of a gliomatous tumour and be independent of the central canal.

The works of Simon and Westphal were the starting-point of a series of memoirs upon the pathological study of glioma, among which the works of Schultze† and Strümpell‡ may be particularly mentioned. Finally there appeared the thesis of Mdlle. Baümler, reproduced *in extenso* in the Deutsches Archiv für klinische Medicin, T. XL. (1887). Mdlle. Baümler has collected in that important work all the observations of medullary excavations which she found recorded in medical writings. She has thus been able to bring together 112 cases, which she divides into four groups:—

A. 66 cases with various symptoms of spinal disease and with autopsies.

* Simon, *Arch. f. Psychiatrie*, T. V., 1875.

† Schultze, *Arch. de Virchow*, T. 87, 1882.

‡ Strümpell, *Deutsches Archiv für klinische Med.*, T. 28, 1881.

B. 25 cases which were not discovered till the autopsy.
C. 10 cases observed clinically only.
D. Various cases.
(*a*) 6 with congenital spinabifida.
(*b*) 4 with double or multiple central canal.
(*c*) 2 of gliomata without cavities.

Mdlle. Baümler's work indicates that cavities in the spinal cord are far from rare.

Within recent years, however, the history of syringomyelia has entered on a new phase, one which we may call the clinical phase. During this period many monographs have appeared of much greater interest than their predecessors, since they have propounded the view that syringomyelia has a symptomatology of its own, and that in a number of cases the disease can be diagnosed at the bedside of the patient. This statement can be more readily accepted, as in several cases the diagnosis has been verified at the autopsy.

Professor Charcot* had long recognized that certain muscular atrophies were due to syringomyelia. Thus he enumerates hydromyelia or syringomyelia, certain forms of myelitis with cavities, gliomata, and sarcomata of the cord as among the causes of muscular atrophy consequent upon affections of both white and grey matter of the cord. But it should be acknowledged that it is to Professor Schultze† of Dorpat and Professor Kahler‡ of Prague that the honour belongs of having, as Charcot says in his lectures, "in a series of excellent publications, commencing in 1882, associated with the lesions of syringomyelia certain functional and organic disturbances which, when they make their appearance clinically, enable us to diagnose the existence of the disease and even to determine the chief points in relation to its extent, and its precise localization."

Amongst the German writers who have contributed most towards our knowledge of syringomyelia since the publications of Kahler and Schultze are Bernhardt,§ Remak,‖ Oppenheim,¶

* Charcot, *Maladies du Système nerveux*, T. II., p. 216.
† Schultze, *Zeitschrift für klinische Medicin*, T. XIII., 1888.
‡ Kahler, *Prager med. Wochenschrift*, 1882 and 1888.
§ Bernhardt, *Centralblatt f. Nervenheilkunde*, 1887.
‖ Remak, *Deutsch. med. Wochenschrift*, 1884.
¶ Oppenheim, *Charité Annalen*, T. XI., 1885.

Fürstner, and Zacher.* An excellent work by Roth, which appeared in the "Archives de Neurologie" (1887), should also be referred to.

Syringomyelia had scarcely attracted the attention of medical men in France till our distinguished teacher, M. Debove,† diagnosed the disease in one of his patients, who was made the subject of a highly interesting communication to the Société médicale des hôpitaux. Déjerine‡ showed at the same meeting of the Society a patient in whom the affection was equally typical, and who was the text for an important clinical demonstration.

The appearance of these two patients gave rise to a discussion on the nature of syringomyelia. Joffroy held that syringomyelia was the result of different processes, such as glioma and myelitis; Déjerine asserted that the gliomatosis of the cord was its sole cause. Debove thought it advisable to await the results of further autopsies before entering on the question. "Anatomically," he says, "syringomyelia is characterized by a destruction of the grey matter of the cord, a destruction which extends to a greater or less extent both transversely and longitudinally. Is this a condition which has its origin in the central canal or in gliomatosis, that is to say, in a destructive inflammation of the neuroglia? Both views have been advanced, but in the absence of the record of any recent autopsy I shall be careful in expressing an opinion."

Charcot devoted one lecture in the month of June, 1889,§ and two in November, 1889, to the consideration of this disease. He showed several patients with all the typical symptoms of syringomyelia, and brought into prominence a new feature by calling attention to the fact that certain cases of hysteria may simulate clinically the symptoms of syringomyelia. These valuable lectures by Professor Charcot will serve as our guide in the consideration of the symptoms of this malady.

This chapter would be incomplete did we not mention an affection which has recently been studied under the name of "Morvan's disease," and characterized by painless whitlows

* Fürstner and Zacher, *Arch. für Psychiatrie*, T. XIV., 1883.
† Debove, *Bulletins de la Société méd. des hôpitaux*, 22 Feb., 1889.
‡ Déjerine, *Semaine médicale*, June 12, 1889.
§ Charcot, *Bulletin médical*, 28 Juin, 1889.

with sensory and trophic disturbances. Some writers have endeavoured to identify Morvan's disease with syringomyelia, but in spite of their great similarity, we are still of opinion that they are two distinct affections.*

CHAPTER II.

Symptomatology.

It is only within a very few years that the possibility of giving a clinical picture of syringomyelia has been thought of. Nevertheless in perusing the writings of Duchenne of Boulogne,† one becomes convinced that this physician had made accurate observations on patients the subjects of this disease. Thus, in his chapter on progressive muscular atrophy, he lays stress on the sensory disturbances which he had met with in certain patients, and in the following passage he gives unwittingly an excellent description of syringomyelia. "All writers who have described progressive muscular atrophy say that sensation is always normal in this disease. Undoubtedly they were not in possession of a sufficient number of cases, for this proposition is not exact when formulated in so general a manner. I have ascertained in quite a third of the cases that the electro-muscular reactions were more or less affected, as also the cutaneous sensibility. This anæsthesia is sometimes so marked that the patients do not perceive the strongest faradic stimulation or the sensation of heat. I have noticed that they have allowed the anæsthetic parts to be deeply burned, because they did not feel the heat when vision had not warned them that they came into contact with it. This anæsthesia is generally to be observed in the superior extremity, and diminishes from the hand upwards towards the shoulder. Sometimes, however, its distribution is irregular, and not always in proportion to the degree of atrophy. Thus I have seen it limited to part of the trunk or to the shoulder; in other cases it was complete in the right upper limb, but very slight in the opposite

* *Cf.* page 64.

† Duchenne de Boulogne, *De l'électrisation localisée*, p. 493.

extremity, although this was much more atrophied. This muscular and cutaneous anæsthesia, as a rule, only supervenes in those patients who have experienced pain in the affected regions, which pain has been attributed to rheumatism. It will be shown that it is only a complication, or rather an extension of the anatomical lesion to the posterior horns of the cord."

From this quotation it is very evident that Duchenne had examined cases of syringomyelia, and his description, although incomplete, is still correct at the present day.

But since the time of Duchenne, several important observations, based upon a methodical examination of the various forms of sensation, permit us to study in a more perfect manner the symptomatology of this disease.

The following account is based on a large number of cases scattered throughout medical literature. We have collected the most characteristic at the end of the present work, adding to them eight cases of our own.

Syringomyelia generally makes its appearance in early life, and manifests itself by the disturbances of sensation, which are usually the earliest symptoms. These consist of loss of sensibility to pain and to temperature, with preservation of the sense of touch and of muscular sense. Professor Charcot proposes to give the name of "dissociation syringomyélique" to this group of sensory phenomena. We do not mean to infer that these symptoms are pathognomonic of syringomyelia; for instance, it is well known that they may be present in hysteria, but in no other well-recognized affection of the spinal cord are they to be met with in the same definite manner. It is only in rare cases, however, that one has the opportunity of observing this partial paralysis of sensation without complications. In such a case the patient is not conscious of his affliction; he experiences no inconvenience, he has no pain, and does not seek medical advice since he does not perceive that he is ill. On the other hand he is astonished on finding that he has burnt himself without experiencing pain, or that he has wounds, the origin of which he is ignorant, and of which he only becomes conscious by his other senses. The first symptoms which attract the attention of the patient and of the physician are those of progressive atrophy of muscles, beginning usually in the hand and making

slow but steady progress. In this way it resembles the progressive muscular atrophy of the Duchenne-Aran type, for which no doubt it has frequently been mistaken. This atrophy taken alone has no features specially characteristic of syringomyelia. It only becomes of significance when associated with the sensory troubles which may be considered as diagnostic. If to these two cardinal symptoms,—the "dissociation syringomyélique" and the muscular atrophy,—a series of trophic disturbances is added, such as abscesses, whitlows, pustules, indolent ulcers, anomalous eruptions, peculiar joint affections, fractures, and scoliosis, we have all the symptoms that characterize the disease. It can be readily understood that this type of the disease may be modified in an infinite variety of ways according to the seat and extent of the lesion. Certain symptoms may be wanting, still others may be added to those we have just mentioned. These complicate the clinical aspects of the case, and increase the difficulty of diagnosis; therefore, in addition to the typical cases, which are comparatively easy to determine, it should be remembered that anomalous, defaced, and atypical forms may occur. As Schultze says,* however, these difficulties can be overcome by the application of principles such as those which Charcot has laid down for the diagnosis of disseminated sclerosis.

In our study of the symptomatology of syringomyelia we will follow the divisions proposed by Charcot. The symptoms may be divided into two leading groups:—

I. *Specific Symptoms.*—In this group are included symptoms depending on lesions limited to the various regions of the central grey matter of the cord.

These may be divided into the following classes:—

A. Symptoms depending on lesions of the anterior horns,—for instance, advancing muscular atrophy of the Duchenne-Aran type.

B. Symptoms depending on lesions of the posterior horns such as anæsthesia to pain, to heat and cold, with the preservation of the sense of touch and muscular sense.

C. Symptoms depending on lesions of the median grey matter,—a group of symptoms as yet very hypothetical in character, but including trophic disturbances apart from those related to the muscular system.

* Schultze, *Zeitschrift für klinische Medicin*, T. XIII., 1888.

II. *Associated Symptoms.*—In this group are included symptoms which do not belong properly to gliomatous syringomyelia, but which often co-exist with it. They arise from the extension of the lesion to the white substance of the cord, and from the resultant secondary degenerations.

These may be subdivided as follows:—

A. Symptoms of inflammation of the lateral columns, such as paresis or paralysis of the spastic type.

B. Symptoms of inflammation of the posterior columns, such as various tabetic phenomena, and disturbances of tactile sensation.

I.—Specific Symptoms.

A. *Symptoms depending on lesions of the posterior horns.*

The credit of having first drawn special attention to the sensory changes in syringomyelia belongs, as already stated, to Kahler and Schultze. Before their observations, however, the peculiar modifications of sensation in certain diseases of the spinal cord had attracted attention. For instance, a report by Schüppel* appeared in 1874 on a case of generalized anæsthesia, the examination of which after death revealed hydromyelia. This may possibly have been syringomyelia. In 1868 Landois and Mosler† published an investigation of the alterations of sensation in muscular atrophy. But it is in the recent works of Schultze and of Kahler that we find the first exact and methodical study of the sensory disturbances. These, which date from 1882, have had the merit of drawing attention to the importance of the examination of sensation in the diagnosis of syringomyelia. They have been followed by monographs by Bernhardt, Remak, Freud,‡ Oppenheim, and especially Roth; all of which have confirmed the phenomena brought into prominence by Schultze and Kahler. During the last two years the number of observations has been added to almost daily, so that it appears that "dissociation syringomyélique" is far from being a rare condition.

* Schüppel, *Archiv der Heilkunde*, T. VIII., 1874.

† Landois and Mosler, *Berliner klinische Wochenschrift*, 1868.

‡ Freud, *Wiener medicinishe Wochenschrift*, 1885.

Some authors contend that the sensory troubles appear earliest of the symptoms of syringomyelia. This view is in accord with what we know of its morbid anatomy, for the lesion which is primarily situated in the grey matter does not take long to invade the posterior horns. Still it is impossible in the majority of cases to specify the exact date at which these disorders appear. The sense of touch is sometimes intact during the whole course of the disease, or, if affected, does not appear so seriously interfered with as the other forms of sensation. So long as the sense of touch is preserved, the patient is not conscious of the sensory alterations which may be present, till a mere accident draws his attention to his condition. Most frequently this is a burn, sometimes a deep one, which has been painless and passed unnoticed; the resulting wound has only been revealed to him by vision. Or, again, it may be a blow or a fracture, which to the great astonishment of the patient is devoid of pain. If such accidents do not occur, the sensory troubles may remain unknown to the patient; it then falls to the physician to investigate and detect them. One is usually contented, when examining a patient, with touching or gently pinching him, and asking, "Do you feel what is being done to you?" If the reply is in the affirmative, the conclusion is drawn, very often wrongly, that sensation is intact. The want of a more searching examination has enabled the "dissociation syringomyélique" to escape the notice of clinicians for so long, and caused syringomyelia to be confused with conditions such as progressive muscular atrophy.

Thermo-anæsthesia.

We commence this section with the consideration of the thermo-anæsthesia, because certain authors, and especially Roth, contend that the temperature sense is the first affected. A detailed inquiry into the previous history of patients sometimes yields very interesting results. It may be elicited that they have occasionally burnt themselves without knowing it, and cicatrices due to burns, from which they had suffered years before, may be noticed. Thus one of Charcot's patients (Case II.), now 51 years of age, shows on his fingers cicatrices of burns due to

smoking cigarettes when he was 17, which had given rise to no pain; in this case the thermo-anæsthesia has lasted 34 years. In Déjerine's case it was readily established in a similar way that the patient had thermo-anæsthesia for 40 years. Our own patient (Case I.) in like manner presented cicatrices of burns dating many years back.

Distribution of the thermo-anæsthesia.—The regions of the skin affected by this disorder of sensation are of variable extent, and depend on the position and extent of the lesion.

Thus, the thermo-anæsthesia may be generalized over the whole body, as in Case I., in which the temperature sense was normal on the head only. This variety, however, is exceptional. More frequently it is hemiplegic in type, in which case it is sharply limited to one half of the body, and never encroaches beyond the median line—a characteristic which is also present in hysterical anæsthesia. Or again, as is most usually the case, it affects one extremity, or a portion of one extremity, and it is worthy of notice that the upper extremity is more often affected than the lower. When the thermal disturbance is limited to part of a limb, it is always defined by a horizontal circular line, perpendicular to the axis of the extremity, as depicted in all diagrams showing the state of sensation. This distribution is also shown in some of our diagrams, and may be compared to that form of hysterical anæsthesia designated by Charcot "en gigot."

The transition from the anæsthetic to the normal regions may be said to be almost abrupt, for it is only with difficulty that one is able to define a narrow limiting zone in which thermo-anæsthesia gradually disappears.

Not unfrequently the distribution is symmetrical, affecting both hands and forearms, or both upper extremities. In these cases it often spreads over the adjacent portions of the thoracic wall, and may extend on both sides right up to the middle line of the body; so that the patient presents an area of thermo-anæsthesia which may be compared to a vest. This is by no means an uncommon type. The inferior extremities (which are less frequently affected) may show all the forms we have just indicated. We must still mention, however, one peculiar mode of distribution. In this the disturbance of sensation is present in symmetrical segments of both upper and lower limbs.

In these cases the patient may be said to have "stockings and gloves" of thermo-anæsthesia.

On the trunk the dimensions and shape of the anæsthetic areas are much more variable. The anterior and posterior surfaces of the neck are frequently affected by this loss of sensation. In this region the patches of thermo-anæsthesia are limited anteriorly by the lower border of the inferior maxilla, posteriorly by the line of the hairy scalp. In the same way the skin of the face supplied by the fifth nerve may be similarly affected. The first division of the nerve is very commonly involved by the central lesion. Lastly, the occipital and temporal regions, and the skin of the ear, that is to say the areas supplied by the great and small occipital nerves and the auricular nerve, may share in the disturbance of sensation.

The distribution of the thermo-anæsthesia on the limbs shows that it cannot be due to a neuritis, but rather appears to depend upon a lesion of a particular segment of the spinal cord.

The thermo-anæsthesia appear, first of all, at the extremities of one of the upper limbs, that is, in the fingers and the hand, and may remain so located for a longer or shorter period. It next gradually extends to the forearm, the arm, the shoulder, and finally to the thorax. Some authors (Landois and Mosler, Roth) have been able to follow the progress of the disease for several years, and have remarked that the thermo-anæsthesia has an onward course and a tendency to become generalized and more accentuated.

Degree of the thermo-anæsthesia.—There are two methods for investigating the temperature sense. One may ask the patient to distinguish whether a body is hot or cold, or if possible obtain from him an appreciation of the difference in temperature between two bodies. Generally the first method is sufficiently accurate, as in syringomyelia the thermo-anæsthesia is always readily made out.

But the thermo-anæsthesia may vary greatly in degree; in certain cases it may be absolute, that is to say the extremes of temperature, say 0° C. and 100° C., do not produce any sensation of cold or heat. Under such circumstances the condition obtrudes itself upon the attention of the physician. But it is exceptional to find, at least at the commencement of the disease, a total loss of appreciation of a very high or very low tempera-

ture. Roth has observed quite correctly, and has laid great stress on the point, that the moderate temperatures are the first to be confused; the patient is not then able to distinguish between temperatures of 20° C. and 30° C.

It is interesting to bear in mind that, in the physiological state, all parts of the body are not equally sensible to slight alterations of temperature, at any rate so long as moderate temperatures of from 10° C. to 46° C. are employed. Above and below these points, pure thermal sensations are complicated by the sensations of pain. Weber has found that the appreciation of different temperatures is most acute at the tips of the fingers, where a difference of two-fifths of a degree may be distinguished. Nothnagel* has demonstrated that a difference of even one-fifth of a degree can be appreciated, if temperatures of 27° C. and 33° C. are made use of. But to obtain such results apparatus of extreme delicacy must be employed. Weber, Nothnagel, Eulenburg,† and Roth have devised special instruments for such investigations. We shall not, however, enter into a description of these instruments, named thermo-æsthesiometers; they are undoubtedly of interest to the physiologist, but are of little practical value to the clinician.

For the examination of the thermal sense we made use of a small glass flask, about half filled with water, and closed by a perforated stopper, through which passed a thermometer, the bulb of which was immersed in the liquid. The flask is heated over a spirit lamp, and the temperature of the contents can be seen at any moment. In this way a temperature of about 100° is obtained. Having made the patient close his eyes, the flask is placed upon various parts of the body, the patient in the meantime indicating if he feels the heat. When a patient cannot feel a temperature of 95° it is advisable not to keep the flask too long in contact with the skin lest a burn, which may prove serious, be produced.

Charcot makes use of a surface thermometer with a flat reservoir, having the lower end of the stem and the reservoir enclosed in two metallic cylinders, which glide smoothly over each other. The outer cylinder can be removed so that the bulb may be seen to be in its proper position and uninjured.

* Nothnagel, *Deutsches Archiv f. klin. Medicin*, 1867.
† Eulenburg, *Zeitschrift f. klin. Med.*, T. IX.

The internal cylinder is filled with copper filings, which serves to keep the bulb at a fixed temperature for at least a short time. A screw, situated at the upper part of the cylinder, keeps the thermometer in position and prevents movements of the stem. The thermometer is graduated up to 115°. When using the instrument it is necessary to heat the metallic cylinder very gently over a spirit lamp, taking care to avoid sudden elevations of temperature so as not to break the capillary tube.

Other instruments have been invented, but they are applicable in special cases only. For instance, when the thermo-anæsthesia is limited to the hand, the extremity may be plunged into jars containing water at different temperatures, and the impressions which the patient experiences in dipping his hand successively into the different vessels may be noted.

The thermo-anæsthesia is not always equally marked all over the anæsthetic area. As a matter of fact, in some regions where the thermal sense is entirely wanting, areas may be met with where this anæsthesia is not absolute. For example, in the upper limbs we have on several occasions made out bands of partial thermo-anæsthesia situated at the inner aspect of the forearm, sometimes also of the arms. This fact has been confirmed in other cases. Islands of normal sensation may also be met with.

In some areas thermo-anæsthesia may be replaced by actual hyper-æsthesia. We have observed this phenomenon well defined (Case I.). In this case the skin of the right side of the thorax appreciated in an exaggerated manner thermal impressions, and these were always accompanied by sensations of pain. Schultze had already noted this peculiarity in one of his patients, and several writers have had the opportunity of corroborating the fact.

It has also been noticed that the thermo-anæsthesia is not always persistent in its distribution—a point on which Charcot particularly insists. It may vary, within narrow limits it is true, from day to day, or even from hour to hour, so that diagrams made at short intervals show quite appreciable differences. We were able to establish this in the case of the patient B—— (Case I.). He passed from the care of M. Debove in order to enter the Salpêtrière. According to the diagrams made some months after at the Salpêtrière, the area of thermal

hyper-æsthesia had completely disappeared, and was replaced by a region of normal sensation on the chest, and a zone of thermo-anæsthesia on the back. Nor does the degree of thermo-anæsthesia remain the same; a patient who one day is insensible to a temperature of 80° C., for instance, may the next day appreciate one of 60° C. So far we have dealt chiefly with the appreciation of heat.

The observations we have already made are almost equally applicable to the appreciation of cold. In the majority of cases, when a patient cannot feel a very high temperature, say 90°, he is nearly always insensible to the application of ice. Speaking generally, the same areas are anæsthetic to heat and to cold, although their boundaries do not exactly correspond. There is often a slight difference in the contour of the regions affected. It is sufficient to glance at the diagrams added to our cases to see that a special diagram of the sensibility to cold is sometimes useful.

Since the zones of anæsthesia to heat and to cold do not exactly correspond, it may be asked if there are not in the cord two distinct tracts for the conduction of heat and of cold, and if the view of Herzen,* that the temperature sense is composed of two distinct *senses*, is admissible. Physiologists have not as yet settled this question. It is probable, from what the clinical study of syringomyelia teaches us, that, if there are two separate conducting tracts in the cord, they are at any rate very near each other.

Anæsthesia to cold may be tested by means of a piece of ice moved over the skin. If more precise results are desired a flask with a thermometer immersed in it may be employed, similar to the apparatus made use of in examining insensibility to heat. The water is cooled by gradually adding to it pieces of ice, or pounded ice may be introduced into the flask. A refrigerating mixture, which enables one to test the thermal sense for temperatures below 0°, may be employed if preferred.

An idea of the degree of anæsthesia to cold can thus be obtained, and in some cases an actual hyper-æsthesia to cold, similar to the hyper-æsthesia to heat, may be made out. One of Charcot's patients (Case II.) showed this condition in an unmistakable manner.

* Herzen, *Archiv de Pflüger*, T. XXXVIII.

It is of interest to remark that in certain cases an actual perversion of the thermal sensations may exist; cold objects may produce the impression of warmth, and *vice versa*.

The temperature sense of the mucous membranes has not yet been investigated, except in a very few cases; it appears, however, to be much more rarely affected than the skin. Schultze has recorded thermo-anæsthesia of the buccal mucous membrane, and in Case I. we were also able to establish a slight thermo-anæsthesia in this situation. Still, the patient could pay sufficient attention to the temperature of his food as never to burn his tongue.

Thermo-anæsthesia is usually accompanied by other disturbances of sensation, but may exist independently of other sensory changes. Roth records two cases in which thermo-anæsthesia alone existed for 13 years in one case, and for 6 years in the other. It is only in certain cases that, after the lapse of several years, other disturbances of sensation make their appearance. With the exception of hysteria, syringomyelia is almost the only affection in which thermo-anæsthesia is manifested; it is one of the most important signs of this disease, and it led Roth to the diagnosis of syringomyelia in his two patients.

A further point seems of interest. The patients whom we have had the opportunity of interrogating have a perfectly accurate perception of the temperature of their surroundings; in spite of the thermo-anæsthesia they feel cold in winter and warm in summer. One of them mentioned that for several years he had been greatly inconvenienced by the heat.

Analgesia.

The symptom of analgesia almost always accompanies thermo-anæsthesia. Many years ago it attracted attention, for on glancing over the old accounts of gliomatosis of the cord this symptom is found definitely mentioned in a large number of cases. One of the most interesting and remarkable cases was that observed by Schüppel* and Späth, in which analgesia was present over the entire body. The patient had undergone amputations of several fingers and incision of several abscesses without experiencing the slightest pain.

* Schüppel, *Archiv der Heilkunde*, 1874.

Analgesia is often absolute, that is to say, the patient is unconscious of any painful sensation. The skin may be pricked, severely pinched, or transfixed with a pin, and the sensation of contact alone is appreciated. Or again, the anæsthesia may be less complete, the pain is diminished, and quite bearable, but still a slight feeling of pain is felt.

The analgesia is not only superficial; it involves more than the skin; just as in the case of thermo-anæsthesia it may extend to the deeper structures. In Case I. the patient unwittingly received two very deep burns, and although cicatrization extended over several months, he never experienced pain in the wounds. Inflammatory complications, such as abscesses and whitlows, so common in sufferers from this disease, run a painless course, and surgical intervention, such as incision or even amputation, does not give rise to any suffering. This analgesia extends even to the bones, and a number of painless fractures have been recorded in patients suffering from syringomyelia.

What then is the distribution of the analgesia? First of all, it may be generalized over the whole skin; this was so in our own patient B—— (Case I.), and has also been recorded by Schüppel and Späth, but this form is very exceptional. More often it assumes a hemiplegic type, and is limited very exactly by the median line, a condition corresponding to what we have indicated when speaking of thermo-anæsthesia. It is distributed most usually, however, on one of the upper limbs with the adjacent portion of the thorax, sometimes on both upper limbs and thoracic wall, in the form of a "vest," as already described of the thermal disturbance.

The analgesia usually takes the following course. Beginning in one of the superior extremities, say in the hand, it may confine itself to this region for a very considerable time. Then it extends gradually to the forearm and the arm, occupying on them segments which are bounded above by an even circular line, perpendicular to the axis of the extremity; it then reaches the shoulder, and rapidly invading the thorax, the half of the chest on the corresponding side, both behind and in front, soon becomes involved. About this time, or sometimes prior to it, the extremity of the opposite side also becomes involved; and in the course of time the analgesia is completely symmetrical, the patient then showing the "analgesic vest" so commonly

represented in diagrams. On the thorax the analgesia extends downwards, so that the abdominal walls often participate. The inferior extremities may likewise be analgesic—it is only a question of the seat of the lesion. Beginning at the periphery it passes from the feet to the legs, the thighs, and the adjacent abdominal wall. As in the upper limb, it is rarely arrested at the level of an articulation, but considerably above or below one, a characteristic which is also common to hysterical anæsthesia. Lastly, the analgesia may extend to the head, the face—innervated by the trigeminus,—the occipital and temporal regions and the ear—supplied by the great and small occipital nerves,—being the parts affected.

Analgesia of certain mucous membranes should also be mentioned. Schultze recorded in one case absolute insensibility of the tongue, which could be transfixed from side to side with a needle.

What are the relations of analgesia and thermo-anæsthesia? Usually the two conditions, as regards distribution, coincide, and in the regions of absolute thermo-anæsthesia there is almost always analgesia. The same areas are at the same time anæsthetic to both heat and cold and pain, though it may happen that their boundaries overlap each other. The conditions which regulate this arrangement are not yet understood; sometimes the analgesic area extends a little beyond the thermo-anæsthetic, sometimes it is the reverse.

It is still an open question with physiologists as to the exact relation between the conducting tracts of painful and thermal sensations in the posterior cornua. Have they the same paths, or are they distinct one from the other? The latter view seems the more probable, if one bears in mind that while the analgesia may be widely spread, the thermo-anæsthesia may be distinctly limited.

Are the two symptoms contemporaneous in their appearance? It is very difficult to decide this point at present, the number of cases in which the sensibility has been carefully studied being still insufficient. The observations of Roth point to the conclusion that thermo-anæsthesia may exist by itself, even for a very long time. Analgesia has been recorded in a number of cases, but as there was no inquiry into the condition of temperature sense we have no right to infer that this sense was intact.

Under such circumstances the examination of sensation has very possibly been imperfect.

Instead of analgesia the subjects of syringomyelia may present hyper-æsthesia. According to Charcot its occurrence can possibly be explained by the presence of an irritative lesion preceding the period of destruction. This symptom is usually best marked on the lower limbs (Case II.) ; in another patient we have recorded the presence of a zone of hyper-æsthesia at the lower part of the thorax and the right hypochondrium. This hyper-æsthesia has been specially studied by de Renz and Wichmann,* who attach great importance to its bearing upon the extent of the lesion. These authors suggest that at the limits of the lesion there is a true irritative process, in all respects comparable to the inflammation which takes place round a foreign body, and that this irritation manifests itself by hyper-æsthesia of the corresponding zones of the skin. In one of Wichmann's cases there were two zones of hyper-æsthesia, the one corresponding to the area supplied by the fourth pair of cervical nerves, the other to that innervated by the first pair of lumbar nerves ; throughout the whole of the intermediate surface there existed diminution of sensation. From these facts de Renz made the inference that the lesion in the cord should occupy the space between the origins of the fourth cervical pair, and the first lumbar pair of nerves. The autopsy confirmed in every point de Renz's diagnosis. The same authorities have had opportunities of observing a slight band of hyper-æsthesia at the limits of the anæsthetic areas in other cases.

It should be noticed, however, that the outlines of analgesia, just like those of thermo-anæsthesia, are not absolutely fixed, and may undergo slight variations from day to day.

To complete the consideration of the disturbances of sensation and to have a perfect realization of the symptom "dissociation syringomyélique," it is necessary to notice in this place one negative symptom, namely *the unaltered character of the tactile sense*. This negative sign ought to be included in the chapter dealing with alterations of the posterior cornua—if one accepts Schiff's most probable hypothesis that impressions of pain and of temperature are conveyed through the posterior part of the

* Wichmann, *Geschwulst und Höhlen bildung im Rückenmark*, 1887.

grey matter only, while tactile sensations are transmitted by the posterior columns of white matter.

In a number of trustworthy observations it has been recorded that tactile sense was totally unimpaired, while the other forms of sensation had undergone marked alterations. The subject of syringomyelia should feel the slightest touch, and exactly locate it, and there should be no delay in its perception. It is also easy to be convinced of the integrity of muscular sense. He is always conscious of the position of his limbs; he recognizes the form of objects and appreciates exactly changes in weight and pressure. In some cases, however, more or less alteration in tactile sensation has been recorded; a touch with a camel's hair brush may not be perceived, while any stronger stimulus is appreciated, and there is little doubt that in the majority of instances tactile sensation is dulled. These changes in the sense of touch are found usually in the areas involved in analgesia and thermo-anæsthesia, and are due to alterations in the white substance, to which we shall again have occasion to refer. Judging, however, from the most authoritative observations we have little hesitation in coming to the conclusion that the sense of touch is only rarely seriously involved; and it is this dissociation of the various forms of sensation that gives the peculiar character to the symptomatology of syringomyelia.

B.—*Symptoms depending on lesions of the anterior horns.*

The motor disturbances must be considered side by side with the alterations in sensation. Although less characteristic, they are not less common, and are due to involvement of the anterior cornua. It is quite conceivable, however, that spinal gliomatosis may not affect the anterior horns, and thus muscular atrophy may be absent in certain cases of syringomyelia, as shown by the case observed by Bernhardt.

As a rule, however, symptoms of anterior poliomyelitis are present in syringomyelia, and make themselves manifest, first of all by slight impairment of muscular power affecting generally the extremities, and more often the upper than the lower limbs. The hands first become awkward and readily fatigued, and this weakness often first attracts the attention of the patient.

This loss of power is rarely preceded by symptoms of pain.

These have, however, been recorded in some cases, but are exceptional. The patient usually complains of numbness, tingling, and sometimes of peculiar sensations resembling those produced by extreme cold or burning; then after some time he is struck by the emaciation of his hand. This emaciation is accompanied, from the first, by diminution of muscular power, a fact readily verified by the dynamo-meter. The enfeeblement makes gradual progress, and leads to inability to use the limb, when the patient, dreading some serious condition, seeks the advice of the physician for the first time. On examination the disappearance of certain muscles or groups of muscles is then discovered. In the great majority of cases there is atrophy of the small muscles of the hand, certain prominences have disappeared, and the order of their disappearance may be elicited on questioning the patient. Very often the atrophy first shows itself in the thenar, at other times it commences in the hypothenar eminence, bringing about flexion of the little finger; sometimes the interossei are first affected, the interosseous spaces becoming deeper and the metacarpal bones standing out under the skin. Deformities of the hand, corresponding to the groups of muscles affected, at last make their appearance, giving rise to the claw-hand, *i.e.*, flexion of the phalanges upon each other, and extension of the fingers on the metacarpal bones—("main simienne," "main de prédicateur").

This affection thus resembles the muscular atrophy of Duchenne-Aran, for which it has undoubtedly been frequently mistaken.

The atrophy of muscles makes gradual progress, passing from the hand to the forearm, where it is most noticeable in the lower half. It then usually remains stationary for a number of years, or at least undergoes only slight variations in that time. But on the side opposite to that first affected the same phenomena develop, though this may take place only after some years. The atrophy is located in a similar way, the same muscles being one by one attacked, and thus a symmetrical distribution is assumed. It is, however, often more pronounced on one side, although this may not necessarily be the side first affected. The arms usually appear to escape, but the muscles of the shoulder, particularly the deltoid, are attacked in time, causing difficulty in movements of the shoulder joint. At the

same time atrophy of the trapezius, latissimus dorsi, rhomboideus, supra and infra-spinatus, that is to say, the muscles of the shoulder girdle, may also be observed. In some cases the atrophy has been known to make its first appearance in the muscles of the shoulder, thus assuming the scapulo-humeral type. In other cases it extends or even commences in the lower extremities. Indeed, according to the statistics of Wichmann the lower extremities are more often involved than the upper; but this, however, is in opposition to our own observations, as muscular atrophy of the Duchenne-Aran type is much the most common in syringomyelia. Moreover it is among the sufferers from muscular atrophy that cases of syringomyelia which have escaped recognition are most frequently met with. Lastly, atrophy of the abdominal muscles has been recorded in a very few cases.

The muscles of the face are almost always intact; but Westphal, Schultze, and Grasset have each observed a case of facial atrophy.

The motor disturbance appears sometimes late, sometimes early. As already stated, it varies from weakness or fatigue of certain fingers, of a hand, or of a limb—that is, from a condition of paresis—to complete paralysis of certain muscles or groups of muscles, and is always proportional to the degree of atrophy.

The atrophied muscles show very marked fibrillar contractions—a character common to all muscular atrophies of spinal origin. The tendon reflexes of the upper extremity, especially the "olecranon" reflex, are diminished, sometimes abolished, but never exaggerated. Electrical examination of the muscles usually gives a quantitative change only; there is diminution and sometimes complete abolition of electrical excitability; and the muscular contraction is proportional to the strength of the current employed. Total or partial reaction of degeneration has been noted in some cases, but this is by no means the rule in the muscular atrophy of syringomyelia.

This atrophy always progresses slowly. Sometimes it makes its appearance in adolescence, and remains for a long time limited to the same group of muscles; it is rarely accompanied by contracture or rigidity, and has little tendency to become generalized. The nuclei of the medulla oblongata are rarely involved in the pathological change.

Tremors may be appropriately mentioned among motor derangements. They have been frequently observed, and are most evident in the fingers. In Case VIII. the tremors showed certain peculiarities. They did not appear when the patient was at rest or walking, but the slightest mechanical stimulus, such as gently stroking the hand, caused the appearance of severe widely spread oscillations, which could be arrested on forcibly striking the patient; when he was seated they were even more manifest.

C.—*Symptoms depending on lesions of the median grey matter.*

It is our intention in this chapter to describe certain symptoms which occur in syringomyelia, and are very probably the result of an alteration in the central grey substance of the cord. The above title is made use of for the sake of symmetry in our method of description, as the localization of certain of the symptoms to be described is no doubt hypothetical, and will require further research for its confirmation. It is a difficult matter to make a rational classification of these symptoms; some are satisfactorily explained by the areas of cord which undergo degeneration, others are most debatable as to their cause. We shall enumerate them in the following order, under six heads:—

1. Trophic disturbances.
2. Alterations in curvature of the vertebral column.
3. Vaso-motor abnormalities.
4. Interference with the function of the sphincters.
5. Alterations in the oculo-pupillary phenomena.
6. Symptoms due to the spread of the lesion along the cord.

1. *Trophic disturbances.*

As in many chronic diseases of the cord, there has been observed in syringomyelia a series of phenomena which may be placed in this category. These disturbances are of the most diverse characters, and have no common resemblances; they assume appearances so various that it is well to classify them in four sub-divisions. We shall consider these symptoms therefore as they affect (*a*) cutaneous, (*b*) subcutaneous, (*c*) articular, and (*d*) osseous structures.

(*a*) Trophic disturbances affecting cutaneous structures.

*Alterations in the skin are of common occurrence in syringomyelia, and affect usually the extremities. The regions affected by muscular atrophy, or showing signs of disturbance of sensation, are commonly affected, and according to certain authors they are said to occur only in the anæsthetic areas. In the case of the fingers, thickening of the skin so as to give rise to the aspect of actual hypertrophy of the epidermis has been observed; the hand also may be affected by a similar condition and becomes quite horny. This thickened epidermis has a great tendency to crack, and sometimes there may be seen deep fissures which become the point of origin of chronic ulcers, which are very

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* The following account is abstracted from the exhaustive description given by Schlesinger :—

Many skin affections may appear simultaneously during the course of syringomyelia, but for purposes of description they may be classified under the divisions which follow :—

1.—Hyperæmiæ Cutaneæ.

Acute hyperæmia shows itself as red patches of variable extent, the colour disappearing on pressure; swelling has not been noted, but a slight rise of temperature in the affected areas is sometimes present. In one of Schlesinger's cases a bright erythema was observed, sometimes on the chest, sometimes on the arms, lasting for several hours or days, and vanishing just as suddenly as it had made its appearance. Sometimes its occurrence might certainly have been due to various tactile and thermal irritants, as in the cases recorded by Neuhaus, Lenz, and Hoffmann.

Passive hyperæmia.—If the patient is bed-ridden dark red patches may appear over the bony prominences. They arise from mechanical obstruction to the circulation, and from vascular paresis, and represent merely the initial stage of gangrene. These vasomotor disturbances are frequently late in showing themselves, the patient being confined to bed for weeks or for years before signs of hyperæmia appear.

A second form of passive hyperæmia, characterized by a bluish-red or dark blue discoloration of the skin, may occur. It becomes pale on pressure, but there is usually slight swelling of the part, while the temperature is reduced. Sometimes it represents a stage of Raynaud's disease, and may last for a considerable time without showing appreciable change.

2.—Anæmiæ Cutaneæ.

As syringomyelia does not of itself tend to produce anæmia, any blanching of the skin must be considered as being due to a complicating

slow to heal. In other cases, however, the skin becomes atrophied, changes its colour, assuming a red or violet tinge, and has a shining appearance resembling an onion scale. The skin affected in this way well merits the name of "peau lisse," the "glossy skin" of English authors. All the folds and furrows observed in health disappear, and the skin being closely applied to the subjacent structures seems too tight to contain them.

Diseased conditions of the nails have also been described, such as hyerkeratinization, cracked nails, furrows occurring either longitudinally or transversely, finally actual shedding of the nails.

In certain cases, as in that described by Kahler (1882), a

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cause. Areas of anæmia may be said to come within the category of Raynaud's disease.

Coleman and Carrol record a case in which one hand was very œdematous, cold, anæsthetic, and white.

3.—Anomaliæ secretionis cutaneæ et glandularum cutanearum.

Alteration in the secretion of sweat, either by increase or decrease, has frequently been observed in syringomyelia. It may appear as an early symptom; in other cases muscular atrophy may be well advanced and other trophic disturbances of the skin present before it occurs; or, again, severe symptoms may have appeared, and the sweat secretion remain perfectly normal. These changes may be confined to the areas supplied by certain nerves, to one extremity, or to one side of the body, but the entire surface is rarely affected. As a rule they are to be found in the regions which show altered sensation, the secretions being usually increased in the anæsthetic areas, but occasionally diminished. The disturbance may last for years, or may be only temporary.

While in some cases the hyperhidrosis seems to depend upon indirect nervous influences, in others it would appear to be secondary to the condition of vascular paresis and hyperæmia. Schlesinger quotes cases in support of both hypotheses.

Marked alteration in the secretion of sweat has been recorded in cases in which both the clinical signs and the post-mortem results have shown that the lesion did not extend to the medulla, indicating that hyperhidrosis and anhidrosis might arise from changes in the cord itself. This fact supports the theory of Luchsinger,* who holds that there are centres for the secretion of sweat in the cord, while other authorities—Traube, Nawrocki, and Schwimmer—locate them in

* Luchsinger, Zur Innervation der Schweissdrusen; *Centralblatt f. med. Wissensch*, 1873, Nos. 1 and 2.

primary gangrene of the skin has been described. This spontaneous destruction proceeds from the surface towards the deeper tissues, resulting in a loss of substance, of irregularly rounded outline and considerable extent, and in which the process of healing is slow. When this process is complete there remains a white wrinkled cicatrice which may be the origin of keloid, as actually occurred in Kahler's case. Jacquet* has recently reported a case of syringomyelia in which the nutrition of the skin was so much altered that the application of acetic acid on the side affected by anæsthesia brought about a chronic ulceration with a tendency to increase in extent, while

* Jacquet, *Note sur un cas de Syringomyélie, Société de Biologie* (Janvier, 1890).

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the medulla oblongata. The researches of Rendall and Luchsinger* show that changes in sweat secretion need not be associated with disturbances in the circulation. The centres are situated at the head of the posterior cornua, close to the vasomotor and sensory tracts, *i.e.*, in the position previously attributed to them by Charcot.

Schlesinger finds no record of abnormal secretion of sebum. Areas showing a dry, cracked surface and a thickened, brittle condition of the skin have been observed chiefly on the hands and arms. They arise from deficient lubrication (asteatosis cutis), and represent the early stage of deeper changes.

4.—Dermatoses Inflammatoriæ.

A.—*Acute exudative dermatites.*

Hebra and Kaposi classify these in three groups, the first showing inflammatory processes dependent on vasomotor disturbances and vascular engorgement (angioneurosen of Eulenburg and Landois), the second characterized by the formation of vesicles, and the third by extreme inflammation.

(1) This group is distinguished clinically by dilatation of the smaller blood vessels and capillaries with consequent hyperæmia.

Erythematous eruptions characterized by redness and swelling, and sometimes also by the formation of papules and vesicles, have frequently been recorded in syringomyelia. They appear on various parts of the body, may last for hours or for days, but have neither a typical distribution nor peculiar course. Urticaria is much more common; it appears as rose-red wheals the size of a linseed, or larger, on the parts of the body showing symptoms of syringomyelia. Not unfrequently it is accompanied by violent itching, even though sensory disturbances are already present over the affected areas. The skin of

* *Archiv für die gesammte Physiologie*, 1876, page 212.

a similar application on the healthy side left the skin uninjured. This same patient suffered in addition from ulcers of spontaneous origin at first on the ear, then scattered throughout the distribution of both the cervical and the brachial plexus. The ear, neck, shoulder, and arm came in time to be affected by one regular open sore, extending deeply, and very slow of healing. At last the sufferer succumbed owing to the effects of hæmorrhage from a vessel which became ulcerated through by the sore.

There has also been described a number of cutaneous affections which are dependent on the lesion in the cord. Such are eczema, especially of the dry varieties, accompanied by desquamation of the epidermis, and obstinately resisting treatment,

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these regions may also be in a condition of hyperexcitability, factitious urticaria being capable of being produced at will. If the irritability of the skin is very pronounced, considerable exudation of serum may take place beneath the epidermis of the wheals, transforming them into vesicles.

The urticaria of syringomyelia may be distinguished by its distribution from the ordinary forms. While the latter extend over the entire body, the former affect either the anæsthetic areas only, or are distributed where sensation is normal, leaving the anæsthetic regions intact.

(2) The true vesicular eruptions are represented by herpes zoster, which shows merely the usual characters, and is by no means common.

(3) *True inflammations of the skin.*—These so frequently involve the subcutaneous tissue as well as the skin, that from a clinical point of view it is advisable to include the changes in the subcutaneous tissue in their description. Auspitz and von Winiwarter classify them as follows:—

(*a*) *Serous inflammations of a destructive character.*—To this belong forms of erythema resulting from mechanical irritants. Repeated irritation exercised in one place will give rise to a traumatic dermatitis, especially if any interruption of continuity is caused in the epidermis. Many patients think that their symptoms may be relieved by the application of ethereal oils, sinapisms, blisters, &c., and the irritation so produced is often the origin of more severe inflammation.

Dermatitis resulting from burns and frost-bite has frequently been recorded, the hands, forearms, and back being the more common situations. Patients are apt to refer their mutilations to the occurrence of frost-bite, when they are in reality the result of the changes in the cord.

The condition known as "glossy skin" or "lioderma essentialis" is also included in this subdivision.

pruriginous eruptions, urticaria, but chiefly certain vesicular affections. The last-mentioned appear to occur by far the most frequently. There have been observed small vesicles, resembling those of herpes, appearing rapidly, without appreciable cause, then becoming dry, and vanishing; in other cases true eruptions of zona have been described situated on the shoulder and even on the eyelids. In the majority of cases there are present bullæ or blebs, the liquid contents of which, at first limpid and serous, become later turbid and purulent; these vesicles rupture, leaving the skin raw, and a small ulcer results. Occasionally alterations in the pigmentation of the skin have been observed; thus two cases of vitiligo have been noted.

(*b*) *Phlegmonous inflammations.*—Phlegmonous inflammations are of frequent occurrence in syringomyelia, their most common situations being the hands and feet. Both the superficial and the deep varieties differ considerably from ordinary abscesses in that the processes of inflammation do not give rise to pain.

The deep abscesses are usually of great extent, and lead to necrosis of the cellular tissue, tendons, and bones. Operative measures give rise to little or no suffering, but the process of healing is very protracted, even under appropriate treatment. As a rule the inflammation remains localized to the original focus, although one might, from its protracted course, expect it to spread.

The changes in the cord undoubtedly create a predisposition to inflammatory processes, and slight forms of irritation and infection are apt to set up much severer changes than in normal individuals. But nervous influence alone, without the entrance of micro-organisms, is not sufficient to account for the lesions produced.

Relapses are common, and as the deeper inflammations rarely run their course without extensive destruction of tissue, deformities gradually develop, and may advance to an extreme degree. The cicatrices also give rise to contraction and distortion of the skin, so that the affected limbs become still more unshapely.

Diffuse phlegmonous inflammation has also been observed in a few cases of syringomyelia. It has a marked tendency to spread both deeply and superficially, and rapidly leads to the breaking down of tissue, and the formation of very fœtid pus. The general phenomena are extremely severe, the fever high, exhaustion pronounced, and lead in a short time to septicæmia and death.

Furunculi are the only noteworthy affection of the skin glands. They show merely the usual characters.

(3) *Forms of gangrene of the skin and subcutaneous tissue.*—Gangrene due to pressure is very seldom seen in syringomyelia, and, as a rule,

In several cases there has been described a small punched out ulcer, having indurated raised edges and a red or greyish, moist floor; this is situated usually in the neighbourhood of the bases of the fingers, in the interdigital cleft, and persists for a very long time.

These ulcers possess all the characters of perforating ulcers, as, for example, when they occur on the sole of the foot in the neighbourhood of the metatarso-phalangeal articulation of the great toe; in that case they fully merit the appellation of perforating, as they actually penetrate into the articulation.

In Case No. VIII. there will be found a detailed description of a case of this character.

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occurs only when the disease is far advanced. After attacking the superficial structures it may extend more deeply and involve all the tissues down to the bones. Its distribution bears no relation to the state of sensation, but usually corresponds to the situations subject to pressure, such as the trochanter, sacral region, and scapula. When once developed, septic processes may set in and rapidly bring about a fatal issue.

An acute variety, also due to pressure, sometimes supervenes. This is characterized by rapid development, with the absence of inflammatory phenomena. It may appear in those who have been bed-ridden for years without previously having suffered from bed sores, or may suddenly supervene upon an apparently stationary gangrene. In one of Fellinger's patients the gangrene suddenly spread to such an extent that in two days it involved the whole region from the trochanter to the scapula. In one of Gerlach's cases it covered an area of 10 by 14 cm. in five days, and eroded the bones. In fat subjects an extensive ichorous destruction of the tissues may ensue. In thin individuals the gangrene shows a tendency to dryness and mummification, the skin becoming black, dry, and gradually cast off.

The condition known as Raynaud's disease rarely occurs in syringomyelia.

Gilles de la Tourette and Zaguelmann have recorded in a case of syringomyelia a peculiar form of gangrene, which seems to belong to the category of Raynaud's disease. It appeared every year on the tips of all the fingers for twenty successive years.

B.—*Chronic Inflammatory Skin Affections.*

A chronic eczematous condition frequently develops on the hands and feet, and may last for months or for years. The hands, and especially the fingers, become scaly, less frequently covered with crusts and fissures, and ultimately show some thickening of the skin. It

(*b*) Trophic disturbances of the subcutaneous structures.

The connective tissue may also be involved in a number of changes, of which the most interesting are those of a phlegmonous character. It has been stated that whitlow is frequently found in syringomyelia. This affection is painless when it occurs in an anæsthetic area, but in certain cases it has been noted that the whitlow has been painful. In the latter case the symptom is characteristic of the commencement of the spinal affection, and precedes the sensory disturbances. This form of whitlow has certain peculiar features; it tends to recur, for it may affect in succession the different fingers, first of one hand, then of the other, and thus attain a symmetrical distribution;

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occasionally is found on the forearm, but rarely on the trunk. Itching is not usually present.

Repeated eruptions of vesicles constitute one of the most common skin phenomena. They may be divided into two forms—one characterized by crops of vesicles in certain nerve areas, and another variety which has all the appearances of pemphigus.

The former is the much more common. Repeated eruptions of vesicles, isolated or in groups, take place on certain parts of the body. Occasionally there is but one outbreak. They usually occur on the hands and arms; less commonly on the chest, back, abdomen, and legs, and very seldom on the scalp and face. The vesicles are rarely numerous, and vary from the size of a lentil to that of a bean, but with the relapses their size may increase so that they have been recorded as large as a walnut. Schlesinger finds that the eruption affects only the superficial layers of the rete mucosum. The contents are at first clear, colourless, albuminous, and of a specific gravity of 1·015 to 1·018. The vesicles usually remain for a few days and dry up, or their contents become turbid and assume a yellowish green colour. The covering of epidermis bursts, falls off, and exposes a discoloured and non-granulating surface. The process then commonly extends to the deeper layers, giving rise to destruction of these tissues.

This condition is one of the most common skin affections found in syringomyelia, and seems directly dependent upon the changes in the spinal cord. The eruption is usually painless, and very frequently confined to the analgesic regions; it does not tend to become generalized.

The second variety of vesicular eruption has been recorded once by Schlesinger and twice by Neugebauer, and was considered to be pemphigus.

In Schlesinger's case it extended over the entire surface of the body as a typical pemphigus foliaceus.

ultimately it may bring about necrosis of the phalanx, and thus cause extensive deformity. It is, however, necessary to emphasize the point that whitlow may never occur in a case of syringomyelia. This fact is evident from the cases we have put on record, and when it does occur it rarely brings about those serious conditions, those mutilations which appear to belong especially to "Morvan's disease,"* an affection which appears to be quite distinct from syringomyelia. Roth has described the occurrence of whitlow in four out of six cases observed by him.

Inflammations of a gangrenous character may also occur, and are situated especially in the hand, in the forearm, and in the

* *Cf.* page 64.

Neugebauer believed his first case to be pemphigus neuroticus. It was characterized by bullæ on the arm, thorax, and face.

In his second case, yellowish, pus-covered patches appeared on the tongue, palate, lips, and gums. Neugebauer regarded it as pemphigus of the mucous membrane, this view being supported by the presence of a vesicular eruption on the hands and feet.

5.—Hæmorrhagiæ Cutaneæ.

In syringomyelia the blood vessels of the skin sometimes appear to be affected, as considerable extravasation of blood may take place from them after slight injuries. Stein observed in one of his cases extensive suggilation after each prick with a needle. The case of hæmoglobinuria recorded by Bernhardt may represent a corresponding condition.

6.—Hypertrophiæ.

A horny thickening of the skin of the hands sometimes occurs, even when the patient is not of the labouring class. It is most noticeable on the palms and fingers, and reappears after removal by macerating applications. Sometimes it also occurs on the extensor aspects of the fingers, and may destroy any mobility that remains.

Warts have in some cases been recorded on the regions of the body affected by the lesion in the cord.

True scleroderma has also been observed in several cases. Schlesinger records a case which showed the typical changes of syringomyelia with well-marked scleroderma of the upper extremities and of the extensor aspects of the lower. This has obviously an important bearing as indicating the relationship between scleroderma and the nervous system, to which attention has been recently directed by Hutchinson, Kaposi, and others.

7.—Atrophiæ.

Vitiligo has been described by several writers.

Schlesinger reports a case of syringomyelia which showed on the

axilla. They make their appearance frequently with all the symptoms of a serious septic infection, and occasionally it may even become necessary to have recourse to so serious a measure as amputation to arrest the extension of the disease. It must be remembered, however (and we shall have occasion to return to this point), that patients suffering from syringomyelia appear to be unable to resist infective processes, and therefore, as in the case recorded by Schultze, surgical intervention has frequently a fatal result.

Finally, ordinary abscesses and collections of pus have been described as supervening without appreciable cause, perhaps, however, as the result of an injury which has escaped notice

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arm most affected by the muscular atrophy an apparent idiopathic atrophy of the skin in the form of depressed patches of considerable size and of a dull glistening appearance.

8.—Neoplasmata Benigna.

New growth of the connective tissue of the skin is comparatively common in syringomyelia. As its histological properties have not yet been fully investigated, it is impossible to say whether there exists a true keloid in syringomyelia or merely hypertrophy of cicatrices and a cicatricial keloid. The excessive development of cicatrices after injuries of the skin has frequently been observed, and occurs quite as often on the trunk as on the extremities.

Schlesinger has recently reported a case showing numerous cicatricial ridges, of a brownish-red colour, crossing each other, and projecting 4 to 5 mm. above the level of the skin. This keloid degeneration was entirely confined to the anæsthetic region; injuries of other parts of the body healed normally.

Occasionally the cicatrices seem to undergo atrophy, in which case they are on a lower level than the surrounding tissue, and sometimes show deep contractions, corresponding to the orifices of sebaceous and sweat glands.

9.—Ulcera Cutanea.

Attention has already been drawn to the badly healing tendency of the skin and to the destruction of tissue on the slightest irritation in syringomyelia. The immediate cause is frequently an injury, with or without interruption of continuity of the surface. Sometimes no direct cause can be found.

Almost all the forms of ulceration are characterized by the breaking down of the tissues in the neighbourhood of the original lesion, and may extend to great depth. The ulcer is commonly crater-shaped,

on account of analgesia. The progress of these varies, but usually they heal up after the lapse of a period of more than usual duration. One variety of these abscesses has for its seat the palm of the hand; from these collections of pus sinuses burrow towards the interdigital cleft, where they open and give rise to fistulous tracks which heal slowly. These sinuses on healing leave as their result circumscribed scars, depressed in the centre and folded at the edges, which have little power of resistance, and may frequently break down and become the point of origin of a new sinus.

(*c*) Trophic disturbances of the joints.

Joint affections are also found in the course of syringomyelia; they are accompanied frequently by great deformities of the articulation, by increase of the bony structures, sometimes even

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with a rounded outline; the surrounding tissue shows either no reaction, or only slight inflammatory infiltration. The discharge is sometimes very abundant; should the quantity be small, the ulcer is frequently covered with dirty brown or greenish crusts.

An ulceration showing all the characters of perforating ulcer of the sole of the foot has been frequently observed. A callosity first forms on some part of the foot subject to pressure; inflammation and suppuration take place; the thickened epidermis is thrown off, and a rounded funnel-shaped ulcer, surrounded by swollen epithelium, results. The floor of the ulcer consists of ragged granulations, and secretes an unhealthy discharge. The process gradually extends deeper, bones undergo necrosis, and the condition may last for years.

It is still a matter of doubt whether, in syringomyelia at least, this ulceration is purely of nervous origin, as believed by Fischer, Duplay, Moral, and others, or is an ulcer occurring in a special situation and due to pressure, as Winiwarter and Lephal affirm.

Changes in the Nails.

The nails often show considerable change either in the form of atrophy, hypertrophy, or anomalous position. They are frequently long, curved, markedly sideways and forwards, and thickened at the points. In other cases they are short, broad, and well arched. The surface is furrowed and fissured; the substance is frequently brittle and readily exfoliates. In other cases they are small and thin; they may fall off and be restored merely as a rudimentary nail, or not restored at all. Occasionally they occupy peculiar positions. Schlesinger saw them in one case on the plantar aspects of the toes of both feet.

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by the presence of large, detached fragments of bone. They occur especially in the articulations of the upper extremity, where they may affect the small articulations of the fingers, the shoulder, or the elbow. In the department presided over by Professor Charcot there may be seen the elbow of a patient who died of syringomyelia. The clinical history of this case has been published by Berbez* without diagnosis. The description of this disease is as follows :—

"In April, 1884, the elbow was first affected; the patient noticed on the external aspect of the joint a small tumour which gradually increased in size, remaining quite free, and movable over the deeper parts; the elbow ultimately increased to a gigantic size. In June, 1885, the following note was made:—The joint has increased in size, having an ovoid configuration; the situation of the greatest swelling is at the middle of the articulation; the increase in size ascends for a distance of 12 centimètres above and for 6 centimètres below the line of articulation. Two larger projections are noted, one of which corresponds to the epicondyle, the other to the epitrochlea. The epicondylar projection is movable; it has the appearance of a large oval mass, which may be displaced on moving the joint; crepitation is readily felt. The epitrochlear eminence is not so large, and is not movable. The inferior extremity of the humerus presents larger knobs, which allow the enlarged olecranon process to fit in between the two main masses. Movement is still possible, but full extension and flexion are difficult."

There also occur arthropathies in the vertebral column to which have been ascribed the characteristic scoliosis of syringomyelia: we shall return to the consideration of this point. These changes in the joints predispose to dislocations. Schultze has recorded a luxation of the head of the radius from this cause. Along with the changes occurring in the synovial membranes of the joints, there should be mentioned the changes occurring in the synovial coverings of the tendons. These result in the formation of adhesions between the tendon and its sheath, and bring about both deformity and loss of movement.

(*d*) Trophic disturbances of bones.

Various changes in the structure of the bony tissue have

* Berbez, *Bulletins de la Société clinique*, 1885.

been described. Sometimes these result in the increase in size of an epiphysis, or the portion of bone in the neighbourhood of an epiphysis, causing true exostoses; the case reported by M. Déjerine* is an example of this condition. This patient had an exostosis on his right ulna the size of a pigeon's egg, its long axis corresponding to that of the limb. It had existed for 37 years, and had been pronounced not to be syphilitic in character by Ricord. Sometimes the change is of such a character as to bring about so great fragility that the bone becomes fractured as the result of slight injury or even spontaneously.

There are in such cases "spontaneous fractures" which are quite painless in character. Roth records the case of a patient whose clavicle was broken, but who remained in ignorance of the fact till the following day, when the shoulder commenced to swell. The same individual may be the subject of a series of fractures, as in the case of a baker reported by Schultze,† who sustained a fracture of the humerus, one of the radius, and two fractures of metacarpals all within the space of 3 years; these accidents happened while he was kneading dough, but he was able to continue his work, feeling no pain, and unaware that he had a fracture until the swelling of the part obliged him to cease work. In Schultze's case union occurred after the usual interval; sometimes, however, it is difficult to obtain, or the callus may be excessive; in still other cases there may be complete absence of union, and a false joint may result.

Holschewnikoff and Recklinghausen‡ have just added the symptom of acromegaly to the trophic disturbances which are ordinarily observed in syringomyelia. These observers have published a short clinical account of a carman who died in the hospital. They found at the autopsy well-marked gliomatous syringomyelia with degeneration of certain nerves, especially of the cervical and the brachial plexus. In addition their patient had very much enlarged hands and feet. These observers come to the conclusion that this was due to acromegaly, the result of the neuritis, which in its turn was due to the alteration in the spinal cord.

* *Société médicale des hôpitaux*, 22nd February, 1889.
† Schultze, *Arch. de Virchow*, T. CII., 1885.
‡ *Arch. de Virchow*, T. CXIX., 1890.

It appears difficult to conceive of acromegaly, as described by Marie, being due to a neuritis, and in Holschewnikoff's case it appears most likely to have been simply a coincidence. There does not seem to be any relationship, therefore, so far as can be ascertained, between acromegaly and syringomyelia.

2. *Deviations of the vertebral column.*

Deviations of the vertebral column are very frequently encountered in the course of syringomyelia, and in the majority of recent memoirs they have been noted. In the older records, such as that of Lancereaux* on a case of hypertrophy of the ependyma, scoliosis was remarked. But in those cases where mention is not made of the condition of the vertebral column a change in the column is by no means absolutely excluded; the authors have simply not drawn attention to the fact, thinking it was merely a coincidence. Bernhardt† in a recent work has insisted on the frequent occurrence of scoliosis in syringomyelia; he says that it has occurred 18 times in 70 cases which he has collated, that is in a proportion of nearly 25 per cent. Bernhardt's statement, in our opinion, is below the actual number; deviations of the column are much more frequent, since we have noted it 17 times in the 36 cases appended to this work, that is in a proportion of 50 per cent. It is, perhaps, interesting to add that in the 8 cases which came under our personal observation scoliosis existed 7 times, that is in 87 per cent. One is naturally reminded by this form of scoliosis of that described in Friedreich's disease,‡ in which it is found with almost the same frequency.

These deviations are occasionally preceded by painful sensations, which are elicited and increased by percussion of the spinous processes. When this symptom occurs in the neighbourhood of one or several spines, it becomes necessary to give it special consideration, for it may suggest a localization of the spinal lesion; but it is not an easy matter to interpret these painful phenomena, and we are forced to invent hypotheses to account for them. They may be due to a concurrent spinal meningitis, but, as we have seen, meningitis is an exceptional event in

* Lancereaux, *Bulletins de la Société de Biologie*, 1861.
† Bernhardt, *Centralblatt für Nervenheilkunde*, 1889.
‡ Soca, *De la maladie de Friedreich*, *Th. de Paris*, 1888.

syringomyelia, although it has been observed by Simon and Schultze. On the other hand, it may with plausibility be referred to the irritative lesions which occur around the growth in the cord.

In addition to this pain there occurs fixation of the corresponding part of the vertebral column; there appears to be a sort of reflex *contracture* also, which is not without its relation to the development of the scoliosis. In any case this contracture causes a somewhat peculiar position, and at last it may be to a deviation of the vertebral column.

By far the most common form of deviation is *scoliosis*. It may be present in various degrees; sometimes it is only slightly marked, and can only be discovered by the inspection of the naked body, in other cases it brings about marked deformity. It occurs throughout a variable extent of the vertebral column; the seat of election is, however, the dorsal region, whence it sometimes encroaches on the cervical or on the lumbar regions. This symptom brings in its train the appearance of the usual compensatory curves of the spine. Lordosis has been observed but rarely; we have found it in one case only, where it appeared in the lumbar region. On the other hand, kyphosis occurs frequently, either by itself or associated with scoliosis; this deformity is most obvious in the cervical region, although the examination of the column behind the pharynx gives always negative results. When kyphosis accompanies scoliosis, as in Schultze's case, in that of Déjerine, and in ours, a peculiar attitude results, which much resembles that observed in cervical pachymeningitis; the patient is arched forwards, with high shoulders, and quite rigid; the head, projecting in front, is sunk between the shoulders, and the chin comes almost in contact with the sternum.

At what period does scoliosis make its appearance? The dates are not forthcoming to give a precise answer to this question. In certain cases it appears very early—in the case referred to it was perhaps the first noticeable sign of syringomyelia; in other cases it appears later, and does not develop till an advanced period of the disease. It becomes established almost unknown to the patient, and having reached its period of complete evolution it remains in a stationary condition for a very long time.

How is it possible to account for the occurrence of scoliosis? It is without doubt of too great frequency to be simply a coincidence, and there is nothing to lead one to suspect that it is the cause of the syringomyelia, on the other hand it appears much more reasonable to admit that it is a result of the spinal gliomatosis. Several hypotheses have been formed to explain the origin of this deviation. Kroenig,* in a memoir especially devoted to the study of deviations of the vertebral column in the subjects of tabes, comes to the conclusion that the changes that occur in the long bones may also be found in the short bones, and attributes the scoliosis to a vertebral polyarthritis. If it is admitted that Kroenig's theory is competent to explain deformities of slight extent, to which the term *local* may be applied, it gives no explanation of the occurrence of an extensive scoliosis. Roth has propounded another theory, that the scoliosis is of muscular origin; he has observed that the musculi transverso-spinales are frequently atrophied, even from the commencement of the disease, and this atrophy might induce the appearance of scoliosis. In this way it may be explained why sometimes this deformity is an early manifestation of the malady. We quote finally the theory that Morvan† has proposed in explanation of the scoliosis in the disease that bears his name. He says, "It is necessary to admit the possibility of trophic troubles without changes in the nerves of movement and sensation. . . . We must explain the scoliosis by a disturbance of the central trophic innervation." Indeed, according to Morvan scoliosis forms one of the group of trophic disturbances depending on the alterations in the central grey substance.

We agree with this opinion that scoliosis forms one of the group of trophic troubles; its development is aided, no doubt, by the muscular atrophy, and especially by the contracture to which has been ascribed so important a rôle in the scoliosis of Friedreich's disease.

3. *Vaso-motor disturbances.*

These have also been commonly observed during the course of syringomyelia. They are of the nature of circulatory

* Kroenig, *Zeitschrift f. klin. Med.*, T. XIV., 1888.
† Morvan, *Gazette hebdomadaire*, 1889.

disturbances, manifesting themselves by a slowing of the peripheral circulation and coldness of the extremities, so that the use of the thermometer proves the lowering of the local temperature to the extent of about one degree; at the same time the extremities are swollen, cyanosed, with a violet tint, showing the signs of local asphyxia. In other cases, on the contrary, intense redness of the extremities has been noted, with swelling, especially well-marked in the fingers, and accompanied by elevation of local temperature. It is to these circulatory troubles that we must doubtless attribute the strange sensations which the patients experience. Some experience a constant feeling of cold, limited either to a single region of the body, or extending over a large area of the skin; others experience sensations of heat, or even smarting of the most painful character. These alterations in the temperature sensation may be very changeable even in the same individual, and are especially common among the early symptoms of syringomyelia.

At a slightly more advanced stage vaso-motor paralysis produces a lasting redness of the skin as a consequence of even insignificant mechanical irritation, a phenomenon which is naturally comparable to the erythema so distinctive of meningeal inflammation. The cutaneous irritability is sometimes so striking that characters drawn on the skin with a blunt point are reproduced in relief, and may continue for several hours. This phenomenon has been observed by Schultze, Fürstner, and twice by Roth, and is quite analogous to what Dujardin-Beaumetz has described under the name of "l'homme autographique." With this knowledge of the condition of the vaso-motor nervous system it may be readily understood how patients suffering from syringomyelia must be predisposed to certain erythemata, to irritation of the skin, and to various urticarial eruptions.

There has also been described the occurrence of conditions of œdema, and these have been studied especially by Remak.* This writer makes the observation that œdema is not an uncommon occurrence in various forms of paralysis, in fact that, so far as œdema of nervous origin is concerned, it is rarely found in the absence of paralysis. This phenomenon has, however, been

* Remak, *Berliner klin. Wochenschrift*, 1889.

noted in a certain number of cases of syringomyelia by Strümpell,* Schultze, Fürstner, and Zacher, in three cases by Roth, and by Remak. This œdema, usually painless in character, has been observed especially on the back of the hand, whenever it may extend to the lower part of the forearm. The affected skin, although preserving its normal colour, pits readily on pressure; the depressions so caused, however, are not of great depth, and they do not continue long. From these facts Remak forms the conclusion that the œdema is both cutaneous and subcutaneous. The local temperature appears to be a little higher than normal; for instance in Remak's case the temperature of the affected area was 38° C., while taken in the axilla it was only 37·5° C. This œdema may last for many weeks or months without reddening of the skin, and does not depend on any cardiac affection, nor Bright's disease, nor on compression of a large vein in the affected member.

As to the nature of the œdema, it may indeed be of inflammatory origin and belong to the class of affection that Virchow has named "leucophlegmasia non dolens." But Remak has observed that although this form of œdema has been noted in cases of acute myelitis, it has never been met with in progressive muscular atrophy, nor in infantile paralysis, nor in amyotrophic lateral sclerosis, all affections involving the anterior horns. It appears therefore more probable that this œdema depends on changes in the sensory portion of the cord (posterior horns). Why should not these surclings be attributed to alterations in the central grey matter where the vaso-motor nerves take their origin?

In addition to this form of œdema, Roth has shown the possibility of the existence of doughy surclings, of œdematous consistence, non-fluctuating, and situated in the subcutaneous tissue; the skin is quite normal in their neighbourhood, and after persisting for an indefinite period they become absorbed.

In this group of symptoms we would also include the disturbances in the sweat secretion, which have been so frequently noted in the course of syringomyelia; but we shall not stop to discuss the physiological question whether there is any connection between the vaso-motor and the sweat-secreting innervation.

The modifications of the sweat secretion may be most variable in character. For instance, Schultze observed the following

* Strümpell, *Deutsches Arch. f. klin. Med.*, T. XXVIII.

phenomenon. On making his patient have a hot hand bath, after an interval of 5 to 10 minutes he saw abundant perspiration over the right half of the face, neck, and chest down to the level of the sixth rib. Over the remainder of the right side the perspiration was less abundant than on the left; but there was total suppression of secretion over the left half of the face, neck, and thorax to the level of the sixth rib; hyperhidrosis also occurred in the seventh and eighth intercostal spaces.

The sweat secretion may therefore be modified either by being increased or diminished. It is however more frequently increased, especially in the anæsthetic regions. Schultze quotes an exception to this rule, having noted suppression of sweat in the anæsthetic and atrophic areas. Some of these patients perspire abundantly on very slight exertion; sometimes even on making the smallest movement profuse general sweating has been observed, and it sometimes occurs as if in regular crises, as in the case mentioned by Glaser.* The distribution of these sweatings is very variable: they may be limited to one half of the body (Fürstner and Zacher) or to one hand; in Strümpell's case the abdomen and the right leg were the site of these outbursts of perspiration.

A number of attempts had been made to stimulate the secretion of sweat by means of injections of pilocarpine, but in nearly every case an appreciable retardation in the action of the drug has resulted. Thus Déjerine† reports that the sweat does not appear till 12 to 15 minutes after injection, but that it is much more abundant in the analgesic regions than on other parts of the body.

4. *Disturbances of the functions of the sphincters.*

When one thinks of the extent of the gliomatous lesion and of the size of the excavations which can exist in the cord, one cannot refrain from being surprised at the infrequence and small importance of disturbance of the sphincters. In numerous cases with a fatal termination, no mention is made of troubles of micturition, and in the majority of our cases it is expressly stated that there had been complete absence of failure of the sphincters. In exceptional cases only has incontinence or retention of urine

* Glaser, *Arch. für Psychiatrie*, T. XVI., 1885.
† Déjerine, *Semaine médicale*, 1889.

been recorded. We do not deny the possibility of the existence of bladder troubles, for we have seen them occur in some cases; they are characterized especially by symptoms of cystitis, which are due, however, rather to defective nutrition of the bladder than to a disturbance of the vesico-spinal reflex centre. This form of cystitis, so commonly seen in chronic diseases of the cord, evidences itself by frequent and urgent micturition, by weakness of the bladder-wall, requiring an energetic effort to expel the first drops of urine, and finally by the occurrence of ammoniacal and purulent urine. Occasionally it causes little trouble; for example, the patient in our first case had cystitis for more than a year, and, notwithstanding, his general condition remained satisfactory. At other times it serves as the point of origin of ascending pyonephritis, which must be kept in mind as a possible cause of death in syringomyelia.

One of the patients under the care of Charcot died from perforation of the bladder subsequent to a simple ulcer,* and this certainly cannot be put down as a consequence of defect of the sphincters. This symptom, as a matter of fact, occurs only in the last stage of the disease; when the patient becomes helpless, then paralysis of the sphincters becomes developed.

The disturbance of the rectal functions is shown by more or less obstinate constipation, but constipation is so very common, especially amongst the bed-ridden, that it is scarcely necessary to make the hypothesis of a disturbance in the action of the ano-spinal reflex centre. In several cases incontinence of fæces has been observed, but the patients had become quite helpless, and had passed completely into the condition of nervous cachexia.

Finally, there have been recorded a certain number of alterations in the genital functions. In the female sex, suppression of menstruation has been noted in two cases. The number of cases is still too small to permit us to form any idea of the relations between syringomyelia and pregnancy. In the male the sexual desire may remain practically unaltered; occasionally, however, it suffers diminution, and in other cases impotence (Simon) supervenes. In a case reported by Wichmann, the patient suffered from painful nocturnal emissions.

According to de Renz, changes in the sphincter-functions occur, or should occur early, for the ano-uro-genital nerve fibres

* Blocq, *Bulletins de la Société anatomique*, 1887.

ascend in the middle of the cord to the centres in the cerebrum, so that, says de Renz, "the early onset of disturbance of the urinary, rectal, and genital functions may be used as an argument in support of the diagnosis of intra-medullary tumour."

5. **Disturbances of the eye.*

As physiology teaches that the cilio-spinal centre is situated in the cervico-dorsal enlargement of the cord, one may readily appreciate that pupillary disturbances have been remarked in the course of a disease, the site of which is precisely in this region. According to Erb and Goltz, it is approximately in the lower part of the cervical region, and in the upper part of the dorsal region, that the centre exists that

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EYE SYMPTOMS OF SYRINGOMYELIA.

* The following description of the eye symptoms recorded in this disease has been largely taken from Schlesinger's work:—

Primary optic atrophy has been observed in several cases of syringomyelia and not accompanied by the manifestations of tabes dorsalis. It is, however, much less common than in other affections of the brain and cord. Not unfrequently it appears in cases complicated by tabes, and total permanent blindness has been recorded. Atrophy secondary to pupillitis is more common. Schlesinger found no record of partial discoloration of the disk, the loss of colour always being complete.

The condition of the visual field has recently been the subject of much contention. Déjerine and Tuilant first drew attention to it in 1890; in seven cases they found concentric contraction, especially for green. Morvan found the visual field contracted in five out of eight cases. Rouffinet has within the last year again examined Déjerine's cases, and fully confirms his results, so that the condition was not merely transitory. Charcot and his school are disinclined to regard contraction of the visual field as a symptom of syringomyelia. Brianceau, one of his pupils, in a thesis dealing with this subject, comes to the following conclusions:—"In the majority of cases of syringomyelia the visual field is normal. When contracted, the reason thereof must be some other than a cavity of the spinal cord. Hysteria is very commonly associated with syringomyelia, and is the sole cause of contraction of the field of vision, except in those cases in which distinct ophthalmoscopic changes have been found; contraction of the field of vision cannot therefore be looked upon as a symptom of syringomyelia." Hoffmann is essentially of the same opinion.

Schlesinger made an analysis of a series of cases in which a perimetric examination had been conducted. Out of ninety-four cases he found the visual field to be normal in sixty-seven, and contracted in twenty-seven. In twenty of the latter there was an

influences the pupillary movements. An irritative lesion in this centre will produce dilatation, its destruction, on the contrary, will produce contraction of the pupil. Hence one of the symptoms of syringomyelia will be inequality of the pupils; sometimes the right pupil has been remarked as being larger than the left, sometimes the reverse. This phenomenon has been noted twice by Bernhardt,* twice by Roth, by Kahler, Hebold,† Eickholt,‡ Schultze, &c.; in our 36 cases it has been observed 10 times. As a rule the pupil continues to react normally to light and on accommodation.

* Bernhardt, *Centralblatt f. Nervenheilkunde*, 1887.
† Hebold, *Arch. f. Psychiatrie*, T. XV., 1884.
‡ Eickholt, *Arch. f. Psychiatrie*, T. X., 1880.

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entire absence of hysteria, while in seven hysteria was either present or probably so. Schlesinger and Rouffinet both found on careful examination that the contraction of the visual field was not usually a generalized contraction, but, as a rule, consisted of a peripheral defect for colours, especially for green.

Schlesinger's figures lead him to the following conclusions:—

1. In the great majority of cases of syringomyelia the visual field is normal.

2. Contraction of the visual field, when it occurs, may depend upon associated hysteria.

3. In a small proportion of cases, uncomplicated by hysteria, there exists a comparatively small contraction of the visual field, especially for colour (green).

Scotomata have not yet been recorded.

Defects of vision do not as a rule develop till the disease is well advanced, and the lesion has extended towards the cerebrum.

Oculo-motor disturbances may be classified as follows:—1. Nystagmus or nystagmic movements. 2. Paralysis of extrinsic eye muscles. 3. Paralysis of the intrinsic eye muscles.

1. A considerable percentage of the subjects of syringomyelia present, as Kahler pointed out, nystagmus and nystagmic movements. According to Charcot, Friedreich, A. Graefe, and others, nystagmus and nystagmic movements are to be distinguished from each other. The latter consist, according to Uhthoff, of jerky movements of the eye on extreme lateral movement, while the former is represented by oscillatory movements on both sides of a stationary point.

True nystagmus may occur both in the early and in the late stages of syringomyelia, and as a rule both eyes are simultaneously affected. Actual disturbance of sight has been recorded in a few cases: one of Kretz's patients observed oscillation of fixed objects. Taylor's patient noticed the same thing. Of thirty-two cases under the observa-

Certain authors have been struck by a narrowing of the palpebral fissure, which is usually unilateral. Hallopeau was the first to remark this fact, which has since been observed in syringomyelia by Kahler, Remak, and Charcot. This narrowing of the palpebral opening does not depend on ptosis merely, but it is associated with retraction of the eyeball, and sometimes, as Hallopeau recognized, by a slight degree of internal strabismus; the eye then seems to be buried in its orbit. Now, physiology gives us an explanation of this phenomenon: the muscle, composed of unstriped fibres, described by Müller, is paralyzed by the destruction of the cervical sympathetic, and is no longer able to oppose the

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tion of Schlesinger, true nystagmus was found in three, and nystagmic movements in six. He thinks that the frequency of nystagmus in syringomyelia as compared with other diseases of the brain and cord, excepting multiple sclerosis, ought to be of assistance in forming a diagnosis.

The anatomical grounds for the existence of the nystagmus and nystagmic movements are still very doubtful. Kahler supposes them due to a chronic ependymitis; Roth to a legion of the aqueduct of Sylvius. Kretz draws attention to the fact that Landois produced nystagmus in animals by injuring the restiform body, and that in Hallopeau's case the cavity extended under the fourth ventricle to the right restiform body. In one of Schlesinger's cases, in which nystagmus was very noticeable, the restiform body was involved.

The occurrence of nystagmus as a symptom of the disease has been called in question by Neuhaus and Hoffmann.

2.—*External Ocular Paralysis.*

In the records of 200 cases of syringomyelia Schlesinger found paralysis of the extrinsic muscles of the eye mentioned twenty-four times, *i.e.*, in 12 per cent. According to Uhthoff it is comparatively less frequent than in tabes—20 per cent., and multiple sclerosis—17 per cent. It sometimes occurs early in the disease, and may be transitory. The sixth nerve is the one usually affected. Ptosis as a result of external ocular paralysis is rare. Paralysis of the associated movements of the eye appears to be very uncommon.

In most cases ocular paralysis occurs late in the disease, along with other bulbar symptoms. A single muscle, a particular group, or very rarely several muscles may be affected. Long duration of the paralysis may lead to fixation and contraction of the affected muscles. Occasionally the majority of the muscles are successively attacked. The early occurrence of abduceus paralysis is to be explained by the position of

retraction of the eyeball by the action of the recti muscles which are left unopposed.

The series of symptoms which we have just described—inequality of the pupils, diminution of the palpebral opening, retraction of the eyeball—is precisely the result from section of the cervical sympathetic; by these symptoms we may infer the destruction of the place of origin of these sympathetic fibres, and thus help to localize the medullary lesion.

6. *Symptoms due to the advance of the lesion along the course of the cord.*

We have to enumerate in this chapter a series of symptoms which may occur in syringomyelia, and which may be explained by the extension of the lesion along the cord and to the encephalon.

Among the complications that may be attributed to the invasion of the medulla oblongata, troubles in deglutition must first be mentioned. These have been noted in the observations of Leyden,* of Schultze, and of Westphal.† In one of our cases these disturbances were transitory and intermittent; they came on in crises, and caused a form of spasm of the pharynx,

* Leyden, *Klinik der Rückenmarkskrankheiten*, T. II.

† Westphal, *Arch. f. Psychiatrie*, T. V., 1875.

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its nucleus, which is situated in the medulla oblongata below the nuclei of all the other eye muscles. It would thus be the first involved by an ascending lesion. The frequency of abduceus paralysis as compared with that of the other eye muscles is analogous to what occurs in multiple sclerosis, while in tabes, paralysis of the third nerve is the most prevalent.

3.—*Internal Ocular Paralysis.*

Absence of the pupillary reaction is one of the most commonly recorded symptoms. The majority of cases, however, have been complicated by the presence of tabes or lateral sclerosis. It has been found in a few cases—not, however, verified post mortem—unassociated with these conditions.

Sudden paralysis of one pupil to accommodation and convergence has been mentioned in several cases (Raichline, Cohen).

Inequality of the pupils is of frequent occurrence, as pointed out by Kahler, and again more recently by Hoffmann. In the records of 200 cases examined by Schlesinger, inequality of the pupils, independent of sympathetic paralysis, was mentioned twenty-four times; taking also into account the cases of sympathetic origin, inequality of the pupils was found in fifty-three cases, or about 25 per cent. The

which rendered deglutition impossible. These facts may be explained by the prolongation of the cavity into the bulb, and their intermission may be produced by the variations of pressure that the contained fluid exercises on the surrounding parts. Klebs* and Krauss† have described the occurrence of nausea and of vomiting as functional troubles having to do with irritation of the glosso-pharyngeal nerve. It is to some alteration in this nerve that we must ascribe alterations in taste, as in the case described by Grasset,‡ where taste was absent on one half of the tongue.

The troubles of hearing and the humming in the ears described by Schultze must be put down to invasion of auditory nucleus, while irritation of the pneumogastric nerve may possibly be the reason of the attacks of dyspnœa, and of sudden death, one of the possible terminations of the disease.

These have also been described—vertigo, changes of the voice with difficulty in phonation, and elevation of the general temperature. The last mentioned symptom, according to

* Klebs, *Prager Vierteljahrschrift*, T. CXXXIII., 1877.
† Krauss, *Arch. de Virchow*, T. C., 1885.
‡ Grasset, *Syndrome bulbo-medullaire*, 1889.

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sympathetic variety can be recognized by the pupil invariably retaining its reaction to light and accommodation. Iridoplegia with inequality of the pupils has been recorded in syringomyelia and tumours of the cord (Glaser, Schultze, Homen, Bruttau, Tornow, Oppenheim). This condition is similar to what occurs in tabes and progressive paralysis, and indeed is usually accompanied by one or other of these changes. In the 200 cases analyzed by Schlesinger it was found in six cases unassociated with either tabes or progressive paralysis.

Paralysis of the ocular sympathetic is comparatively common. Schlesinger found it recorded twenty-nine times in 200 cases, *i.e.*, in about 15 per cent. It gives rise to the three symptoms described in Bruhl's work, namely, myosis, narrowing of the palpebral fissure, and recession of the bulbus oculi. Sympathetic paralysis is usually unilateral, and as a rule occurs on that side on which the muscular atrophy is the more pronounced. It is also usually an early symptom of the disease, especially when the lesion affects the cervical portion of the cord.

An increase and a diminution of lachrymal secretion have occasionally been recorded.

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Renz and Wichmann, must be looked on as one of the certain signs of the spread of disease along the cord. Westphal and Schultze have recorded two cases of facial paralysis, a lesion which Grasset also found present in his patient. Finally, it is not uncommon to see disturbances in the region of the trigeminal nerve, either in the form of neuralgia or as anæsthesia. We have already noted the involvement of the face while considering troubles of sensation, and we would refer the reader to that chapter for more ample details.

By the side of these facts, it may be convenient to place the polyuria described by Krauss and Westphal. The patient, under the care of Krauss, suffered both from polyuria and frequent micturition; Westphal's patient had simple polyuria, and passed about five litres of urine every day, of pale colour and low density. In spite of this series of symptoms indicating invasion of the medulla oblongata, one rarely sees a case with the signs of bulbar-paralysis; most commonly they show only some degree of paresis. It has been observed also that in a certain number of cases these symptoms appear intermittently, sometimes suddenly, to disappear without leaving a trace behind. This intermission may be explained, as we have already said, by alterations in the pressure exerted by the fluid contained in the prolongation of the cavity into the bulb, or the surrounding parts.

Finally, in very rare cases there have been described symptoms indicating an extension of the lesion to the mosencephalon, and even to the brain. Thus nystagmus has been observed by Hallopeau, Joffroy and Achard,* and by Professor Charcot. Certain authors, among whom may be quoted Simon, Schultze, Westphal, Fürstner, Zacher, Eickholt, and Glaser, have observed amblyopia, or amaurosis, the result of changes in the optic nerve; Schüle† has even observed a case of amaurosis with double optic atrophy. As a general rule, however, the cranial nerves remain intact in syringomyelia.

One point of great importance remains to be noted, namely, the absence of physical disturbance; this fact is of the utmost importance, aiding to establishing the diagnosis between syringomyelia and hysteria.

* Joffroy et Achard, *Archives de Physiologie*, 1887.

† Schüle, *Deutsches Arch. f. klin. Med.*, T. XX., 1877.

II.—Associated Symptoms.

We shall deal briefly with the subject of this chapter, as it is of accessory interest only in an account of syringomyelia. These symptoms are not peculiar to syringomyelia due to gliomatosis, but are not infrequently associated with it. They arise from changes in the white matter of the cord, and consequently Charcot has proposed to call them "symptoms of inflammation of the white substance." From whatever cause they originate, they complicate the clinical picture of the malady, and increase the difficulties of its diagnosis.

All the columns of the cord may become affected to a greater or less degree. The changes observed arise in certain cases from actual invasion of the posterior columns, or of the pyramidal tracts, or of both by the gliomatous tissue; or they may be due to pressure of the neoplasm upon these fasciculi. The pressure may give rise to true systematic degenerations, ascending or descending, according to the direction of the affected fibres; but these do not present any features peculiar to syringomyelia.

Charcot has divided this class of symptoms into those due to implication of the *lateral tracts* and those having their origin in the *posterior columns*.

The former are comparatively frequent. When present, they show themselves chiefly as paralysis of the spastic type, passing on from simple paresis with slight rigidity to complete paralysis with contracture. It is associated with great exaggeration of the patellar reflexes and convulsive tremors of the feet. Sometimes they take the form of spastic paraplegia, as in Strümpell's case, or of amyotrophic lateral sclerosis, as observed by Kahler, Schultze, and Rumpf.*

The symptoms of degeneration of the posterior columns manifest themselves by a series of tabetic phenomena, motor inco-ordination, Romberg's sign, lightning pains, and abolition of patellar reflex. These tabetic symptoms are, however, uncommon in syringomyelia, notwithstanding that, according to Wichmann, the posterior columns are affected in 62 per cent. of cases. How can this apparent discrepancy be accounted for? The spastic symptoms are certainly quite common; one has only to glance through the recorded cases to be assured of this, and

* Rumpf, *Neurolog. Centralblatt*, 1889.

they clearly arise from descending degeneration of the pyramidal tracts. On the other hand, there is not usually an ascending lesion of the posterior column, but merely an invasion of the column, the anterior part of which bounds the central region of the cord, by the gliomatous tissue. This peculiar change appears to show itself rather by disturbances of tactile sensation than by tabetic symptoms. In a considerable number of cases, alteration in tactile sense has been noted, and this circumstance appears sometimes to destroy the characteristics of the "dissociation syringomyélique." When the tactile sense is methodically investigated in the manner advised by Rumpf, one is urged to the conclusion that it is very seldom entirely abolished. It is only partially affected, and if the touch of a fine brush cannot be felt, gentle pressure exercised with a blunt point is readily perceived, and its locality correctly appreciated. The muscular sense also is nearly always intact. As we have already mentioned, the distribution of the associated symptoms may be very irregular. Thus (Case I.), exaggeration of the patellar tendon reflex on one side, and total abolition of it on the other, is recorded, pointing to the degeneration of one lateral tract and invasion of the posterior column of the opposite side.

Speaking generally, we may say that no law regulates the condition of the reflexes in syringomyelia. They vary greatly, with the exception of the olecranon reflex, which appears to be almost constantly abolished or diminished in the atrophied limb. The variations in the cutaneous reflexes—plantar, cremasteric, and abdominal—are not less marked.

Mental Condition.

This disease has a decided influence on the emotional condition of the patient predisposing to neurasthenia, hysteria, and hypochondriasis. Fürstner and Zacher have notified the occurrence of general paralysis along with syringomyelia. The intellect, however, is almost always undisturbed, and the patient may attend to business matters so long as he is not actually infirm. There is often considerable irritability and depression of spirits, but this is only a natural consequence in patients whose bodies are infirm while the brain is unaffected.

III.—The Varieties of Syringomyelia.

An attempt to describe varieties of this disease is at present premature, for the number of carefully observed cases is somewhat limited. It is possible, however, to differentiate certain types.

In the first place, can an acute form of the disease be said to exist? If, as we hold, syringomyelia is, in the huge majority of cases, due to gliomatosis of the spinal cord, there can be no acute variety. Harcken,* however, has described an acute form, of which he distinguishes three modifications:—

1. It may occur after a period of irritation, as a rapidly advancing paraplegia, chiefly of the lower limbs, and with few disturbances of sensation.

2. As a bulbar form, showing glosso-labio-laryngeal paralysis.

3. As a form of acute ascending paralysis.

But none of these varieties recalls to one's mind the clinical appearances of syringomyelia, and the acute form may be considered to have no existence.

A latent form of the malady may occur, that is to say, the lesion is accidentally discovered at the autopsy, but such cases are becoming more and more rare. The two cases reported by Mlle. Bäumler may be appropriately included in this category. In these, during life, there were no symptoms indicating an affection of the spinal cord; but as no mention is made of the condition of sensation, dissociation of sensation may have existed and not been recognized. It is, however, quite reasonable to suppose that syringomyelia may be latent for a very long time; Mlle. Bäumler's two patients were young women in whom the symptoms of the disease, in all probability, had not had sufficient time to develop.

Certain cases also are described by Roth, in which sensation alone is involved, and thermo-anæsthesia may be the only symptom of syringomyelia present for a considerable time.

Perhaps the latent forms might have been found to belong to this group had a more thorough examination of sensation been made.

The usual type, which we may call "classical," is characterized

* Harcken, *Thesis for Kiel Univ.*, 1883.

by dissociation of sensation, by muscular atrophy (Duchenne-Aran), by scoliosis, and by various trophic disturbances. This form, which is by far the most common, includes many varieties. Blocq* has recently endeavoured to separate these into two main groups, based on our knowledge of the area of the cord affected. "In the one group," he says, "the disease begins as an atrophy of the muscles supplied by the ulnar nerve, in the other it commences in the muscles innervated by the radial. The former is accompanied by spastic contractions, the latter by tabetic symptoms in the lower extremities. Now in the cervical enlargement, which is the usual point of origin of the gliomatosis, the centre for flexion of the upper extremities is situated more peripherally than the centre for extension. As a consequence, if the spinal centre of the ulnar nerve is attacked, the lesion will affect the area of white substance nearest to it, that is the lateral columns; similarly, if the spinal centre of the radial is involved, the nearest white substance, namely, the posterior columns, will undergo secondary sclerosis. It is thus possible, at least at the commencement of the disease, for three leading types to exist: the first, which we have described, characterized by a general involvement of the muscles of the hand—claw-hand of Duchenne-Aran—and by various affections of the lower limbs, sometimes exaggeration of the patellar reflex on one side and diminution on the opposite side; the second, 'cubito-spasmodique,' distinguished by atrophy of the muscles of the hypothenar eminence—the contraction of extensor muscles—and accompanied by increase of the patellar reflexes; the third—radio-tabétique—characterized by atrophy of the muscles innervated by the radial—the contraction of flexor muscles—and associated with the diminution or abolition of patellar reflexes."

This classification is of considerable interest, and is specially important when opportunity is afforded of examining the patient at an early period of the disease. The impression formed from the literature of this subject is that the spastic variety is comparatively common, while the radio-tabetic type is rarely met with.

Kahler,† of Prague, distinguishes two forms of syringomyelia,

* Blocq, *Gaz. des hôpitaux*, 189 .

† Kahler, *Prager med. Woch.*, *No.* 63, *p.* 8, 1888.

one originating in the central canal of the cord, forming merely a variety of hydromyelia, and the other due to glioma, with or without excavation. He attributes to these two forms almost the same symptoms, but differentiates them clinically by the fact that the former is more slow in its course and develops gradually, while the glioma is characterized by greater pain. On the other hand it has been suggested that glioma, owing to the situation which it usually occupies, may give rise to the "dissociation syringomyélique," but that hydromyelia, on account of its localization, cannot produce this symptom, but may give rise to trophic disturbances. In our opinion it is advisable at present to leave this question open.

Charcot* distinguishes two forms of syringomyelia, the one due to gliomatosis the other to myelitis, without taking hydromyelia into account. "It is to the gliomatous form," he says, "that all the cases diagnosed during life and verified by post-mortem examination have belonged. We do not mean to make the inference from this fact that the other varieties of spinal cavity will not some day, in their turn, come within the reach of clinical diagnosis. It is indeed probable that they will be recognized clinically, and one can foresee that their symptomatology will not differ greatly from that of the gliomatous form, and will then constitute a difficulty in the way of diagnosis."

As to the variety arising from myelitis—the myélite cavitaire of Joffroy—Charcot says, "The desire to give this special diagnostic peculiarities is a purely unwarranted assumption on the part even of the best informed."

Charcot is disposed to attribute to a central myelitis cases characterized by certain symptoms which we record in one case. The following are the peculiarities :—Slow onset of the disease at about the age of 40 ; somewhat rapid development of all the symptoms which in 2 years brought about the condition described ; for several years the condition of the patient has remained quite stationary ; the affection is entirely confined to the upper extremities and the adjacent part of the trunk ; the patient has a "vest" of analgesia, and of thermo-anæsthesia, accompanied by atrophy of the muscles of the upper limbs ; at the onset he experienced a certain amount of pain in

* Charcot, *Leçons du Mardi* (21 leçon), 1889.

the nape of the neck. Cases marked by symptoms similar to this suggest a chronic cervical myelitis.

Lastly, certain cases have been related in which the clinical features differ so widely from those usually described, that it is almost impossible to recognize in them the same disease. But as, in dealing with the spinal cord, the symptoms are the expression of the situation of the lesion and not of its nature, it is possible to conceive an infinite variety in the modifications of syringomyelia.

IV.—Course—Duration—Terminations.

The course of syringomyelia is essentially a chronic one: it makes its appearance in youth, and the subjects of the disease may live to a great age.

Onset.

The malady commences in early life—Charcot insists on this point—the first symptoms appearing about 15 or 20 years of age. Usually disturbances of sensation, such as the occurrence of painless burns, or trophic disturbances, or scoliosis, are first observed. Feelings of pain in the nape of the neck, radiating down the extremities, may also, though rarely, constitute the earliest signs of the disease; but more often tingling and numbness in the hand are noted.

The patient may also complain of peculiar sensations, especially of cold, although occasionally also of smarting. For a considerable period the phenomena of the disease may be limited to these derangements, and the patient pays little regard to his condition. It is only on the appearance of muscular atrophy—which in some cases seems to be the first symptom—and the subsequent inconvenience and impairment of function that the disease really obtrudes itself on the patient himself. At this stage, however, it is already well developed.

This condition may last a long time, even for 40 years or more. During this period the gradual development of muscular atrophy, beginning in the hand and extending to the forearm, the arm, shoulder, and trunk, may be observed, and at the same time the extension of sensory troubles may be noted. Sometimes during this period apoplectiform seizures simulating regular "strokes" may supervene. It is important to bear in

mind the possibility of these seizures, for the patient often states that the disease commenced with one of these attacks, that is to say, began quite suddenly; careful enquiry, however, will show that the onset of the disease was really antecedent to the "stroke." These seizures are sometimes accompanied by rapid aggravation of symptoms with complete cervical paraplegia; but in the course of a few days this gradually vanishes. How are these seizures, which as a rule are only intercurrent incidents, to be accounted for? The most probable hypothesis is that they arise from spinal hæmorrhages, induced by the changes in the cord. It is well known also, as has already been shown by Lancereaux,* that certain gliomata are very vascular and are prone to be affected by hæmorrhages. Sudden variations of tension in the fluid contained in the cavity may, in some cases, be the cause of these seizures.

It has been noticed that the progress of syringomyelia is influenced by the atmospheric conditions. Cold and moisture aggravate the condition of the patient; fine weather, on the other hand, is favourable, and in explanation of this point Wichmann has suggested that the temperature may have an influence on the vaso-motor mechanism.

Another circumstance somewhat characteristic of syringomyelia is its peculiarly intermittent course, during which each exacerbation is followed by a period of remission with improvement in certain of the symptoms. According to de Renz these remissions are characteristic of intra-medullary tumours, and should be remembered in the differential diagnosis of intra- and extra-medullary tumours. Schultze, Simon, Krauss, Oppenheim, and Strümpell have all observed such cases. De Renz has accounted for them by diminution in the tension of the fluid within the cavities, as it may be absorbed through the lymphatics.

Terminations.

Is recovery from this disease possible? Roth appears to think so. "We have seen," he says, "that many of the symptoms may improve considerably, and that the malady may not make noticeable progress during so long a period as 10 years. In view of these circumstances we may admit the possibility of the

* Lancereaux, *Bulletin de la Soc. de Biologie*, 1861.

arrest of the disease, and of considerable amelioration or perhaps even disappearance of the symptoms."

Charcot throws doubt upon the possibility of its cure, and asks if in such a case there has not been an error of diagnosis, as a case of hysteria may have been mistaken for one of syringomyelia. We shall see, when we come to consider diagnosis, how much these two affections may resemble each other.

The malady therefore, when developed, may be considered to have invariably a fatal termination. This result may occur as a natural consequence of the disease. The patient becomes bed-ridden, bed-sores appear, and death follows the cachexia which is thus established.

More often, however, death is brought about by an intercurrent affection. The subjects of syringomyelia are capable of only slight resistance to external influences, as is readily intelligible if the condition of the central grey matter of the cord is borne in mind. They can ill withstand the attack of infectious diseases, which in them assume the most severe forms. Very few have been able to recover from enteric fever, pneumonia, small-pox, or erysipelas, and tuberculosis especially find in these patients a very suitable soil.

Inflammatory troubles also are attended by very serious consequences; and surgical intervention—incisions, amputations, &c.—are apt to lead to pyæmia and a fatal issue. One of Schultze's patients succumbed to an operation for strangulated hernia, although it was performed under very favourable conditions.

Vesical affections, cystitis for example, may supervene in the course of the disease and may hasten the issue, the patient succumbing to an ascending pyonephritis. Cases of sudden death, due to paralysis of the diaphragm, have also been recorded, when the neoplasm is at the level of the fourth pair of cervical nerves; thus in Wichmann's case, sudden death was predicted owing to the locality of the lesion having been diagnosed. That this termination has, in a number of cases, arisen from extension of the disease to the bulbar nuclei is proved by cases put on record by Westphal, Simon, Leyden, Schultze, Eickholt, and Stadelmann.*

* Stadelmann, *Deutsch. Archiv f. klin. Med.*, T. XXXIII., 1883.

CHAPTER III.

Diagnosis.

It is only within the last few years that the diagnosis of syringomyelia has been considered possible. In 1878 Erb was still justified in writing: "The cavity in the spinal cord, so far as the excavation itself is concerned, gives rise to no special symptoms. In many cases it is accidentally revealed at the autopsy; in others it occasions certain vague symptoms—paresis, paralysis, muscular atrophy, disturbances of sensation, ataxy, paralysis of the sphincters, &c. There are no symptoms particularly indicative of the disease, nor has it any special course. We have therefore no means of diagnosing syringomyelia during the life of the patient, and can only suspect its presence in a very vague fashion."

We are now far in advance of this opinion, and it is to the very interesting works of Kahler and of Schultze, as already remarked, that we are indebted for our knowledge that certain special symptoms point to this organic lesion, and even enable us to determine the particulars as to the seat and extent of the spinal changes. In certain cases the symptoms of syringomyelia are so well defined that the diagnosis becomes comparatively easy. When a patient is brought suffering from such symptoms as "dissociation syringomyélique" and muscular atrophy of the Aran-Duchenne type, and trophic derangements, the most frequent of which is scoliosis, one has almost certainly to deal with a case of gliomatous syringomyelia. And this series of symptoms forms no exceptional feature in the general laws of spinal pathology. It does not depend on the nature of the lesion but upon its situation. To occasion such associated phenomena a lesion must be situated in the central grey matter of the cord and involve the posterior and the anterior cornua, while leaving intact the surrounding white substance; and this is exactly the usual situation of spinal gliomatosis.

In the case of an old patient who entered the infirmary at the Salpêtrière and died of pneumonia, the diagnosis of syringomyelia was arrived at owing to the presence of these symptoms; and the accuracy of this opinion was verified at the autopsy. Déjerine has also shown the spinal cord of a patient, whom he had demonstrated as a typical example of the disease at his

clinical lecture, and who subsequently died while still under his care in the Bicêtre.

We may therefore consider that one may be able to diagnose syringomyelia. Far be it from us to assert it is always possible to do so, for we must bear in mind that certain forms may be complicated or disguised by accompanying symptoms, due to extension of the lesion or secondary degenerations. In reviewing the symptoms which we have described, it will be noticed that neither the trophic troubles nor the muscular atrophy have special features peculiar to this disease. On the other hand the sensory disturbances are very characteristic, if not pathognomonic. The peculiar dissociation characterized by preservation of the sense of touch is accounted for, according to Schiff, by integrity of the posterior columns, while the loss of sensibility to pain and temperature results from changes in the posterior cornua of the grey matter. These symptoms are strikingly distinct and play a most important part in the diagnosis.

It will be necessary therefore, in the future, to think of the possibility of syringomyelia, in all cases where the presence of muscular atrophy is established. Progressive muscular atrophy of the Duchenne-Aran type is distinguished from syringomyelia by the absence of sensory disturbances. It makes its appearance in patients more advanced in years than the subjects of syringomyelia, in whom the disease first appears in youth. Duchenne has indeed remarked that in some cases progressive muscular atrophy is accompanied by altered sensations, but at the present day such cases would be regarded as examples of syringomyelia.

It should be laid down as an invariable rule to investigate carefully the condition of sensation in patients affected with muscular atrophy, for it is undoubtedly among such sufferers that syringomyelia passes undetected.

The *primary muscular atrophies* have usually a characteristic distribution, while fibrillary muscular contractions are not seen and sensation remains intact. *Amyotrophic lateral sclerosis* possesses greater similarity to muscular atrophy than to spastic paraplegia, and both of these conditions may also be present in syringomyelia; but the absence of sensory troubles and the comparatively rapid advance of "Charcot's disease," which almost

always ends fatally in three or four years from bulbar complications, distinguish it from syringomyelia, which runs a very chronic course.

Cervical pachymeningitis gives rise to paraplegia with muscular atrophy, producing the characteristic "main de prédicateur" and spastic paraplegia of the lower extremities.

But it can be distinguished from syringomyelia by the painful sensation in the neck, radiating into the arms, by stiffness of the neck, by the occurrence of contracture, by the absence of the peculiar dissociation of sensation, and by its more rapid course.

Disseminated sclerosis has a well-defined symptomatology of its own; the characteristic tremors, the affection of speech, the usual integrity of sensation, give grounds for a correct diagnosis, even in the exceptional cases where the disease is accompanied by muscular atrophy.

Progressive locomotor ataxia is more apt to cause confusion, for it may be associated with various derangements of sensation, such as areas of thermo-anæsthesia and trophic troubles. The absence of patellar reflexes, the lightning pains, and inco-ordination of movement are not sufficient to determine the diagnosis, for all these symptoms may be met with during the course of syringomyelia. On the other hand, the visceral crises, the ocular symptoms, the cerebral complications, also the occurrence of the long pre-ataxic period with its characteristic pains, the absence of paralysis and atrophy till late in the disease, and the early loss of patellar and papillary reflexes are all peculiar to tabes. The disturbances of sensation, however, rarely lead to confusion; the sense of touch, as a rule, is much disturbed in tabetics, while the distribution of anæsthesia in small irregular patches bears no similarity to what one usually observes in syringomyelia.

Chronic cervical and dorso-cervical myelitis involves the white before the grey matter; it is characterized particularly by motor phenomena; and if any sensory troubles be present, the dissociation symptoms of syringomyelia have not, up to the present at least, been recorded among them.

Gradual compression of the cord by an extra-medullary growth or from alterations in the spinal column, as for instance in Potts' disease, gives rise to rather variable symptoms, but especially to those of a painful and paralytic character. The

scoliosis of syringomyelia must not of course be mistaken for the curvature of Potts' disease.

The cardinal difference between syringomyelia and the spinal and peri-spinal affections which we have just enumerated is therefore the dissociation of the sensory phenomena. We shall now endeavour to differentiate from syringomyelia a number of diseases characterized chiefly by sensory changes, namely, the forms of neuritis, leprosy, and hysteria.

Neuritis is, on the whole, easily differentiated from syringomyelia. It shows itself largely by altered sensation, but the sensation of contact is invariably the one most affected. There is, therefore, no *dissociation*, and neuritis can never give rise to this sensory change so characteristic of syringomyelia. Moreover, the anæsthesia is confined to areas, which correspond to the distribution of the affected nerves, while we have strongly insisted on the fact that in syringomyelia it involves regular, defined segments, a distribution recalling much more forcibly what is observed in hysteria. In certain cases, when the analgesia appears to be generalized, all the peripheral nerves of the body must be involved. Muscular atrophy is also present in neuritis; but there is likewise tenderness on pressure over the affected nerve, and the atrophy is much more rapid in its course. The very gradual development of syringomyelia is in striking contrast to the rapid course of neuritis. Finally, an etiological factor, which is invariably wanting in syringomyelia, will suggest a neuritis. The forms of neuritis that follow infectious disease, cold, or exposure are attended with pain and run almost an acute course; while the neuritis of chronic alcoholism, lead, or arsenical poisoning has usually a typical distribution, which is invariably the same for each form of poisoning.

The anæsthetic form of leprosy, "lèpre systématisée nerveuse" of Leloir, may present a clinical picture very analogous to that of syringomyelia. Muscular atrophy often of the Aran-Duchenne type, marked disturbances of sensation, and cutaneous trophic changes, often associated with considerable mutilation, may all occur in this disease.

Cases have been recorded by Steudener,* Langhaus,† and

* Steudener, *Contrib. à l'étude de la lèpre.* Erlangen, 1867.

† Langhaus, *Arch. Virchow*, T. LXIV., 1875.

Rosenbach,* in which the diagnosis was extremely difficult; Langhaus has published a case, which was diagnosed as leprosy, but which was found to be one of syringomyelia at the autopsy. Leloir† has also reported several cases, in which the diagnosis would have been absolutely impossible, had not the previous manifestations of tubercular leprosy and the presence of this specific cause accounted for the various nervous phenomena presented. In such cases our knowledge of the etiology is a factor of the utmost importance in diagnosis.

The chief points of difference in the two diseases lie in the sensory derangements. In lepra nervosa the lesion has the characters of a true neuritis; that is to say, tactile sense is affected along with the other forms of sensation. In the exceptional cases, as in that of Rosenbach, in which the tactile sense is preserved while sensibility to pain and temperature are altered, the neuritis of leprosy may still be recognized by the following characters. The areas of anæsthesia and thermo-anæsthesia are irregularly distributed in patches, and the transition from affected to non-affected regions is very abrupt. Moreover the islands of anæsthesia are surrounded by a reddish border, slightly elevated and rather sinuous, the appearance being comparable to outlines on a map. In syringomyelia the condition is very different, the anæsthetic regions occupying large surfaces and being bounded by well-defined lines.

Morvan, of Lannilis, has recently described, under the name of "panaris analgésique," or "parésie analgésique à panaris" of the upper extremities, a curious affection characterized by the presence of deranged sensation and paresis of the affected limb. This disease is at first limited to one hand, but in course of time affects the other also. The subjects of Morvan's disease may exhibit other trophic changes, such as fissures on or between the fingers which cicatrize with difficulty, bullous eruptions, joint affections, and in about one-half of the cases either scoliosis or kyphosis. The progress of this disease is also very slow.

The clinical appearance of this affection is, therefore, strikingly similar to that of syringomyelia, and certain authorities, among whom Bernhardt, Roth, and Brocan may be mentioned,

* Rosenbach, *Neurolog. Centralblatt*, 1884.
† Leloir, *Traité de la lèpre.*

are inclined to consider them the same disease: our opinion, however, inclines to that of Charcot, Déjerine, and Morvan, who uphold that they are two distinct affections, and that they should be clearly differentiated.* In Morvan's disease there can be no doubt that there occur changes in the peripheral nerves, a fact attested by Gombault, who found extensive changes in the digital nerves in one of Monod's patients, and again by the same observer, who has recently reported at the Société médicale des Hôpitaux the results of an autopsy at which changes were observed, both in the peripheral nerves and in the cord; the latter showed sclerotic changes in the cortical zone and thickening of the vascular walls.

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*THE RELATIONSHIP BETWEEN MORVAN'S DISEASE AND SYRINGOMYELIA.

In the year 1890, when Dr. Bruhl published the monograph which forms the basis of the present contribution to the library of the New Sydenham Society, Dr. Morvan, of Lannilis, in Brittany, had just completed the series of papers dealing with the disease which has since borne his name.* Morvan's disease at that time was considered not only by its original investigator, but by the majority of French physicians, as well as by many in other countries, to be a distinct affection, although it had already been observed that its symptoms had certain close resemblances to those of syringomyelia. Dr. Bruhl strongly upheld this position, and states while discussing the question (p. 72 in the original text), "we believe with Professor Charcot, with Déjerine, and with Morvan, that these two maladies are quite distinct, and ought to be clearly distinguished." Further, as a result of the observations of M. Zambaco mainly,† it was considered that Morvan's disease was much more closely connected with leprosy than with any other affection. But very soon the opinions of those who held that Morvan's disease was nothing more than a form of syringomyelia, in which the trophic lesions are very manifest, received remarkable and powerful confirmation in a paper by MM. Joffroy and Achard,‡ who recorded a case with well-marked symptoms of Morvan's disease, in which the characteristic lesions of syringomyelia were found after death in the spinal cord, and in which also the peripheral nerves showed the signs of interstitial neuritis, accounting in some degree for symptoms which might well be mistaken for those occurring in the course of maculo-anæsthetic leprosy. As a result of this and similar important observations, opinions as to the relations of syringomyelia

* Morvan, *Gazette Hebdomad. de Méd. et de Chir.*, 1883 to 1889.
† *Acad. de Méd.*, 23rd Aug., 1882, 9th May, 1883.
‡ Joffroy and Achard, *Arch. de Méd.*, experiment, 1880.

From the clinical point of view the perception of temperature and of pain is much affected in Morvan's disease, but in nearly all the published cases tactile sensation has been found to be equally disturbed. There is thus no dissociation of sensation, a fact that might have been expected since neuritis is the predominant lesion. In addition, whitlow is far from being always present in syringomyelia—it has occurred in four cases only in our own experience—and according to Roth it occurs in only half the cases of the disease; further, the whitlow rarely leads to the serious deformity met with in Morvan's disease.

In a recent memoir* Morvan has strongly insisted on the

* Morvan, *Gaz. hebdomad.*, 1889.

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and Morvan's disease rapidly changed, and therefore it will bring the matter more up to date if, as at Dr. Bruhl's own suggestion, we state the opinions expressed by him in his more recent contribution on the subject, published in Debove and Achard's Manual of Medicine (vol. iii., p. 636; Paris, Rueff et Cie., 1894).

Bruhl remarks that from the period when the discovery of cavities in the spinal cord was regarded as a matter of pathological curiosity only, the study of the disease had passed through two stages. The first was the result of more accurate anatomical investigation, and might be called the anatomical and pathological stage; the second, commencing with the possibility of recognizing the disease during life from its peculiar symptoms, was the clinical. A still more thorough study enabled us to recognize the existence of separate types of the disease, of which one especially had been the subject of much discussion, viz., that described by Morvan. This was described by Morvan in the first instance as a perfectly distinct disease, but it is now well known that a form of syringomyelia may exist which displays exactly the symptoms he describes, even although it may be admitted that it is still premature to say that all cases of Morvan's disease are really examples of syringomyelia.

In speaking of the nerve lesions which may be found in syringomyelia, Bruhl remarks:—

"Nerve lesions in this disease are not always present; the spinal roots are usually intact; occasionally, however, they suffer atrophy. Various forms of peripheral neuritis have been described, and these alterations in the nerves have been most commonly observed in Morvan's type of the affection. In these cases there has been evidenced thickening of the nerves due to interstitial neuritis, with increase of the interfascicular connective tissue. Little nodules have also been observed growing from the inner surface of the perineurium, and these were found to consist of connective tissue."

separate nature of the two diseases, and finishes his paper with the following conclusions:—

1. "Pareso-analgesia," in addition to being differentiated anatomically from syringomyelia, may also be distinguished from it clinically partly by means of the prominence of the trophic disturbances in the former affection, but especially by the condition of the sense of touch which is affected in "pareso-analgesia," but unimpaired in syringomyelia.

2. "Pareso-analgesia" is primarily a lesion of the trophic centres in the cord. By extension from the central region of the cord to the anterior columns it occasions muscular atrophy; by encroaching on the posterior columns gives rise to analgesia and the other forms of anæsthesia.

Respecting the etiology of the disease, he says:—

"The actual cause of all cases of syringomyelia is as yet unknown. The relations between syringomyelia and Morvan's disease are still under discussion, although the tendency is to bring the two affections under the same category. Morvan's disease has a somewhat remarkable geographical distribution. Without being actually limited to certain parts of Brittany, it is met with there with comparative frequency. Recently M. Zambaco* maintained that both syringomyelia and Morvan's disease are nothing more than results of affections of the nervous system due to leprosy, and that Morvan's disease especially is to be observed in the natives of that province, among the descendants of leprous persons who are still living in regions where leprosy was at one time endemic. M. Pitres† has been able to demonstrate the bacillus lepræ in a portion of nerve from a patient whom he had previously considered to be a sufferer from syringomyelia. It is, therefore, impossible yet to state anything positive respecting the relations of syringomyelia and leprosy, as the cause of the disease in the cord is in all cases still unknown to us."‡

The evidence which has more recently accumulated lends no support to the views enunciated by Zambaco, and these views are not now believed in. Commenting on the different types of the disease, Bruhl makes the following remarks:—

"The type simulating amyotrophic lateral sclerosis is fairly common in these cases. In addition to the symptoms which are usually prominent in this affection (such as muscular atrophy and spasmodic paraplegia) there are seen not unfrequently disturbances of sensation,

* *Loc. cit.*

† Acad. de Méd., November, 1893.

‡ *Cf.* Gombault, Mal de Morvan, Syringomyélie et Lèpre (*Rev. nevrol.*, 1893, p. 373); and Cagney, Syringomyelia and Leprosy (*Brit. Jour. of Dermatology*, 1894, p. 375).

It should, however, be kept in mind that syringomyelia may sometimes at its commencement present the symptom of painless whitlow. This possibility has been established by Mader.* Schultze mentions the case of a man who had had two whitlows of the left hand five years before symptoms developed, while sensation was still normal. Subsequently sensory disturbances, muscular atrophy, and spastic paraplegia made their appearance, and at the autopsy a central cavity was found in the cord, surrounded by gliomatous tissue.

Owing to the dissociation symptom of syringomyelia the two diseases can usually be distinguished, still we are not quite

* Mader, *Wiener med. Blätter*, 1885.

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and occasionally trophic phenomena, which never appear in the typical disease as described by Charcot."

The "trophic type" of the disease is distinguished by the occurrence of the latter symptoms. It is in this category in which it is advisable to include those cases of syringomyelia which are of Morvan's type, and indeed, according to the opinion of the majority, Morvan's disease itself, for the latter, after all, appears to be nothing more than a clinical type of syringomyelia. It was described by Morvan in 1883 under the descriptive title of "analgesic paresis accompanied by whitlows," or "pareso-analgesia of the upper extremities." This affection presents a series of symptoms almost identical with those of syringomyelia, and it is beyond dispute, as has been shown by the results of many autopsies, that patients who have suffered from Morvan's disease have also had lesions in the spinal cord characteristic of syringomyelia, although we may not be justified as yet in upholding that all cases of Morvan's disease are really examples of syringomyelia.

Whatever may be its pathological nature, clinically one observes in Morvan's disease symptoms of motor derangement, the result of muscular enfeeblement of the upper extremities, accompanied by only a slight degree of atrophy. This loss of power is associated, on the other hand, rather with the occurrence of deformities. At the same time there are found disturbances of sensation, analgesia and thermo-anæsthesia remaining more unaffected than tactile anæsthesia, so that the dissociation of sensations characteristic of syringomyelia is not a pronounced symptom; at times anæsthesia in this disease is complete, a phenomenon which is in all probability related to the concomitant changes which occur in the nerves.

But the symptom giving to Morvan's disease its special characteristic is the occurrence of whitlows. Sometimes these may be painful at their commencement, but they soon become so insensible that when it is necessary to treat the affected fingers surgically there is not the

convinced that among the cases described as Morvan's disease some are not actually cases of syringomyelia.

Charcot has quite recently drawn attention to the differential diagnosis of syringomyelia and hysteria, "that great imitator of organic affections of the nervous system," and attaches to it great importance, for hysteria may, in certain cases, exactly simulate the appearance of syringomyelia. The peculiar dissociation of the various forms of sensation, so important as a clinical characteristic of syringomyelia, may also be met with in hysteria; it may be present as an idiosyncrasy of the patient, or it may be produced artificially by suggestion, while the patient is in the hypnotic state. In seventeen cases of hysteria investigated from this point of view by Charcot, four presented the dissociation of syringomyelia, two of them as a natural peculiarity, and two as the result of suggestion. If in addition it is borne in mind that in syringomyelia anæsthesia may be distributed on the surface of the body, just as in hysteria, in geometrically defined areas, over sections of limbs, or in a hemiplegic fashion, the difficulties of diagnosis under such circumstances can be readily appreciated. It is important also

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slightest feeling of pain. The whitlows are multiple and show a tendency to recur; thus in one case no less than nine whitlows were counted. They may recur at considerable intervals of time, attacking successively several fingers of one hand, then of the other, so that at last an appearance of symmetry is imparted. They nearly always cause necrosis of the phalanges, so that permanent deformity occurs, and occasionally great mutilation. The condition ought therefore to be named a dactylitis rather than simply a whitlow. When one adds to this description that various curious affections of the skin and of the nails may occur, and also that scoliosis may exist, it will be readily noted that the account given is very similar to that of syringomyelia.

It may be gathered from the views which have been given above that Dr. Bruhl has modified his opinion expressed in 1890, when the evidence was still far from being complete as to the relations of Morvan's disease and syringomyelia, and although he still makes the reservation, that perhaps we are not yet justified in considering all cases of Morvan's as being really cases of syringomyelia, he leans evidently to the opinion that the two diseases are really expressions of similar pathological lesions, and in this opinion he will be strongly supported by the majority of observers, not only in other countries, but in France itself.

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to bear in mind the possibility of hysterical muscular atrophies described by Charcot and Babinski, and the trophic troubles, vaso-motor disturbances, and hysterical œdema mentioned by Weir Mitchell. It can thus be readily seen how closely hysteria may simulate syringomyelia.

Nevertheless it is quite possible to have grounds for differential diagnosis. First of all, disturbances of the special senses are absent in syringomyelia; sight, hearing, taste, and smell are in no way altered. On the contrary, as is well known, these disturbances are the rule in hysteria; some of them are always present, the most common being retraction of the visual field. Moreover, in hysteria paralytic phenomena are rapid—almost sudden—in their onset, while in syringomyelia they take a slowly progressive course. Hysteria may be cured suddenly and unexpectedly; true recovery, and especially sudden cure, are quite unknown in syringomyelia. Charcot records a case in support of this opinion; the patient, on the death of his wife and one of his children, became subject to attacks of vertigo and flushes of heat in the face; he was then suddenly affected with paralysis of the wrist, both of flexion and extension, and with œdematous swelling of the back of the hand, accompanied by purple discoloration and a relatively lower temperature. Tactile impressions were normally perceived, but sensations of pain, cold, and heat were totally abolished on the hand, wrist, and lower part of the forearm.

All these symptoms point to the diagnosis of syringomyelia, but it was distinguished by the fact that the paralysis of the hand, which had lasted three years, came on suddenly during sleep; then one day the patient, forgetting for a moment his inability to move, endeavoured to take up a glass and carry it to his lips, and was suddenly cured of his paralysis. "If I had been at Lourdes," said he in recalling the circumstance, "I would have regarded it as a miracle." One of the characteristics of hysteria was present in his case in the marked loss of the sense of taste in the right half of the tongue. Subsequently he suffered from severe attacks of ordinary hysteria.

To sum up, we may say that hysteria may simulate syringomyelia, but that the presence of disturbances of special senses, the sudden appearance of symptoms brought about by emotional causes in those liable to hysteria, and the equally sudden disap-

pearance of these phenomena, enable us in the great majority of cases to separate hysteria from syringomyelia. Charcot, indeed, believes that among the cases classified as syringomyelia some are really to be considered as hysteria. Bernhardt has taken care to specify that the cases which presented dissociation of sensation, and which he considered to be syringomyelia, did not present any of the characteristics of hysteria.

Lastly, it should be mentioned that hysteria may develop in a patient already suffering from progressive muscular atrophy or some other trophic lesion of the muscles.

Is it possible, then, to differentiate by clinical phenomena the various forms of disease due to the formation of cavities in the cord? For such a task the records at our disposal are not yet sufficient. Hydromyelia still admits of no recognition clinically. Charcot, in speaking of myelitis giving rise to a central cavity, indicates that it will probably one day be recognized clinically, as follows, "in all likelihood this will take place, and one can foresee that its symptomatology will not differ greatly from the condition which arises from gliomatosis." It is to be expected that two diseases affecting similar areas of the spinal cord will reveal themselves by analogous symptoms. The elements of a differential diagnosis will therefore rest in the method of onset and course of the disease.

There is no means of separating clinically syringomyelia arising from glioma and glioma of the cord; they are in fact the same affection, for it is not the existence of a cavity that gives rise to the peculiar symptoms.

Nevertheless an outline of the differential diagnosis of the various forms of syringomyelia has already been attempted. Thus, Kahler believes that a very slow course and a gradual development of the morbid manifestations occur more frequently in dilatation of the central canal, and that the more painful phenomena are largely characteristic of central glioma. Eickholt had already made the observation that hydromyelia, owing to its site, should not give rise to trophic disturbances.

Charcot has sketched out the points which seem to characterize that variety of the disease which results from myelitis, thus:—Onset at a comparatively later age, often with shooting pains; more rapid course of the disease, which in two or three

years reaches its point of greatest severity, and is followed by an absolutely stationary period lasting a great many years. As Charcot says, however, it is advisable to exercise some reserve until a sufficient number of autopsies have verified these features of diagnosis.

The position of the lesion has been diagnosed in a number of cases, thanks to what we know of the situation of the spinal centres. The case of de Renz, recorded by Wichmann, is extremely interesting from this point of view. De Renz was able to determine very precisely the superior and inferior limits of the lesion, owing to the existence of two zones of hyperæsthesia. Schultze was likewise able to foretell with a certain degree of accuracy the extent of a glioma. Such a diagnosis, however, will not become possible till we have more numerous and precise data of the position of the spinal centres.

CHAPTER IV.

Morbid Anatomy.

The morbid anatomy of syringomyelia has been known for a much longer time than its clinical characters. It has been the subject of numerous memoirs, in which the most varied opinions and theories have been expressed. So far as its etymology is concerned, syringomyelia signifies a hollow cord, a tubular cord, or a cord with a cavity in its centre, having its greatest extent in a longitudinal direction. This word should be confined to those cavities which are independent of the central canal, since the term hydromyelia could be very correctly applied to the dilatation of this canal. Theoretically such a distinction is quite legitimate, and would be unanimously accepted, if several eminent authorities had not held the opinion that the cavity was usually dependent on a normal or pathological central canal.

The word syringomyelia, defined in this way, does not specify a particular lesion, but rather the effect of various pathological processes.

Kahler has described two varieties,—the one being originally

a dilatation of the central canal, around which are observed destructive changes in the nervous tissue, in all respects analogous to the ordinary sclerosis of nervous centres; the other being due to a growth of neuroglia (gliomatosis), which may or may not contain a cavity, but in either case giving rise to the same symptomatology.

Charcot adopts the following sub-divisions:—

1. We are now able to classify in a special group the cavities formed as a result of a malformation or dilatation of the central canal. For such cases Mlle. Bäumler proposes to reserve the name of hydromyelia.

2. Next come the cavities resulting from disintegration of the grey matter of the cord as a result of a previous chronic inflammatory process. This condition was described in 1869 by Hallopeau under the name of "sclérose périépendymaire," and at the same time by Joffroy and myself as "myélite cavitaire." The former has again quite recently published a valuable memoir on this subject. I am well aware that recently there has been a desire on the part of some observers to erase this latter variety from the classification, and to transfer it to the group that comes next in order, but until further evidence is advanced this must be regarded as an unwarranted pretension. The observers who have described "myélite cavitaire" are those who have also laid the foundations of the modern views of the morbid anatomy of the spinal cord, and it is at least probable that they are not likely to fail in the recognition of the distinguishing points between gliomatosis and chronic inflammatory change.

3. A third variety is rightly classified as the result of gliomatosis, and is dependent on a neoplasm formed most frequently at the expense of the central grey matter, but also in other regions of the grey substance, chiefly however the posterior cornua.

The syringomyelia resulting from gliomatosis is the only variety which we have had the opportunity of studying personally, in specimens which we owe to the kindness of MM. Marie and Onanoff, and in the preparations which our respected teacher Déjerine has kindly placed at our disposal. It is accordingly to the syringomyelia resulting from gliomatosis that we shall devote this chapter.

I.—Naked-eye Appearances.

A.—*External aspect of the Cord.*

A spinal cord affected by syringomyelia, when seen on the post-mortem table before any incision has been made into it, presents an appearance so characteristic that the lesion may be diagnosed merely on inspection. The cord, in place of being cylindrical, is flattened—one might almost say ribbon-like. It resembles a large blood vessel moderately distended with fluid; it may also be compared to a very elongated sac of rather irregular shape, and showing tremulous movement, owing to the obviously fluid character of its contents.

We have been able, moreover, to demonstrate in a specimen in our possession certain furrows or grooves, consisting of slight depressions on the surface of the organ. These furrows extend along the length of the cord, and are most noticeable on the anterior aspect, one occupying the position of the anterior fissure, so that the cord resembles a double-barrelled fowling-piece. These grooves, however, are not found throughout the entire extent of the organ, as they are present only when a cavity of considerable size exists.

This appearance, therefore, is very characteristic. At the same time the shape of the cord may vary considerably owing to its modification in size in various regions: the cervical enlargement, the favourite seat of the lesion, sometimes presents a considerable increase in size, almost taking up the whole of the vertebral canal; above and below this enlargement the cord appears flattened out; towards the lower part of the dorsal region the rounded form tends to return, and the appearance of the lumbar portion is usually normal.

On palpating a cord affected by syringomyelia, the change in its consistence becomes very evident; it is soft and fluctuates, indicating fluid contents. If the cavity is insignificant in proportion to the size of the new growth, a firm, hard substance is felt, giving the sensation of a rigid body implanted in the cord; this particular consistence belongs specially to gliomatosis, which in this case constitutes a true tumour.

B.—*The Cavity.*

On making a transverse section of the cord the existence of a cavity at once becomes evident. In order to study its shape

and extent, it is necessary to make a number of transverse sections at various points.

1. *Number.*—As a rule there is one cavity only, and this is generally of considerable size and readily seen with the naked eye. Not infrequently, however, there are two or even three cavities; they may exist quite independently of each other, or they may communicate one with the other, and they are often situated in different regions of the cord. We do not here include the slight excavations which are present in large or small numbers throughout the gliomatous tissue. These can only be made out on microscopic examination.

2. *Shape.*—The shape of the cavity is equally variable. At its commencement it is sometimes rounded, and therefore bearing a resemblance to the central canal; more frequently it is like an elongated cleft, which, running in an oblique direction, gradually increases in width, and then diminishes again to terminate as it commenced, after traversing a considerable extent of the cord.

The cavity at its widest part is usually elliptical in shape, the long diameter being parallel to the transverse diameter of the cord. When the liquid which it contains has escaped, it is often so flattened that it is reduced to a mere slit, its anterior surface almost coming in contact with the posterior. In such cases an approximation of the anterior and posterior surfaces has sometimes been noticed, so that the cavity takes the form of a figure of 8 lying transversely, or of an hour-glass placed horizontally. Such a regular shape is, however, exceptional; the cavity may present three or four sinuous or angular prolongations. Some of these diverticula may make their way through the entire thickness of the cord, and even reach the surface.

3. *Dimensions.*—(*a*) Transverse. The cavity varies considerably in size. Sometimes its diameter does not measure more than half a millimetre; sometimes it will admit a knitting needle or the point of a sound; sometimes a pencil can be readily introduced into it, or the end of the little finger. As a rule the transverse diameter is the greatest, and may measure 6 to 8 millimetres, or even a centimetre, while the antero-posterior diameter does not exceed 2 or 3 millimetres. The greatest dimensions are to be found in the cervico-dorsal region.

(*b*) Vertical. The vertical dimensions show even greater variation than the transverse.

In some cases the cavity may be followed throughout the entire extent of the cord; it may even be continued into the medulla oblongata, passing beneath the floor of the fourth ventricle or opening into it. It is, however, very unusual for the cavity to extend so high. As a rule it is limited in extent, and its election is in the cervical enlargement, where it traverses the lower third of the cervical and the upper two-thirds of the dorsal part of the cord. In some cases the cavity is confined to the lumbar enlargement.

When the tumour is visible to the naked eye, as very often happens, one can form an idea of the relative sizes of the cavity and of the glioma. In some cases they are of the same length, but as a rule the cavity is shorter than the tumour. Wichmann states that when the tumour is in the cervical region the cavity extends in the downward direction only; when in the dorsal region the cavity extends upwards; in some cases it extends both above and below the tumour.

4. *Diverticula.*—As the cavity extends it may give rise to diverticula, which as they increase in length are deflected and become parallel to the original cavity in either an upward or downward direction. Thus, on making sections at different levels, 2 or even 3 separate cavities may be made out.

5. *Seat.*—The cavity is more especially situated in the central grey substance of the cord, which may have entirely disappeared; it may compress the white matter or encroach upon it, reaching even to the periphery of the cord and coming in contact with the pia-mater, and only a small quantity of nervous tissue may remain to form the wall of the cavity.

Its primary situation is almost always in the vicinity of the central canal, that is to say in the periependyma. The cavity is most frequently found behind the central canal, occupying the place of the grey commissure, subsequently invading the posterior cornua and the anterior part of the posterior columns, and extending in front into the anterior cornua. The anterior commissure and the anterior columns are usually intact. The minuter details of the topography of the lesion will be described later.

6. *Contents.*—The cavity usually contains a clear, limpid

fluid, resembling the cerebro-spinal fluid in its physical characters. It may vary in quality even from day to day, so that the pressure exercised by the liquid contents upon the surrounding structures may give rise to great differences in tension. Sometimes the liquid, instead of being clear, is more or less cloudy, sometimes even of a brownish red colour owing to the admixture of a certain quantity of blood. It is usually of the consistence of serum, but may become viscid and thick. Gelatinous masses have been described in the position of the subsequent cavity, as in the case recorded by Strümpell, where a mass of soft gelatinous material was found in the centre of a glioma, which had not yet undergone excavation.

7. *Walls.*—Even with the naked eye one can see that the cavity is lined by a membrane of considerable thickness, sharply defined, of fibrous appearance, and often capable of being readily distinguished from the cord substance. In some cases, as we have just seen, this wall is formed of the tumour itself, which is a true new growth. The thickness of the wall appears to be inversely proportional to the size of the cavity. When the cavity is of considerable size the wall is thin and reduced to a narrow border, the rest of the cord substance having undergone absorption. When the cavity is rudimentary, the glioma is more in evidence; in such cases the limiting membrane may be wanting or be replaced by the glioma itself. The wall may give rise to "papillæ," which project into the cavity.

8. *Glioma.*—The glioma is quite easily seen with the naked eye; as a rule it has the appearance of a foreign body or elongated tumour imbedded in the centre of the cord, and is readily distinguished from the cord substance by its colour and consistence.

II.—Microscopic Appearances.

The histology of the tumour may with advantage be commenced by examining under a low power sections of the cord, treated by Weigert's method.

This section may be considered in three divisions:—

A.—Topography of syringomyelia.

B.—Relationship of the cavity and the central canal.

C.—Structure of the glioma.

A.—*Topography of Syringomyelia.*

When an endeavour is made to localize the lesion in syringomyelia arising from gliomatosis it is easily seen that the lesion is primarily an affection of the grey matter of the cord. It commences, as we have already stated, towards the centre of the cord; developing most frequently behind, and close to the central canal, in the periependyma, a locality very rich in neuroglia. It may also originate in any corresponding region in which the neuroglia preponderates, as in the substantia gelatinosa of Rolando, and the ascending root of the trigeminus; sometimes the hyperplesia extends even to the nucleus of the hypoglossal and the olivary body.

The lesion gradually involves all parts of the grey substance. It pushes aside, compresses, and finally destroys the cornua of the cord and Clarke's columns, attaching the posterior cornua more often than the anterior. Mlle. Bäumler, by making use of all the post mortem reports given in sufficient detail, has been able to draw up the following table regarding the seat of the cavity:—The cavity involved both posterior horns in 21 cases; both anterior horns in 14 cases; the right anterior horn in 5 cases; the right posterior horn in 5 cases; the left anterior horn in 5 cases; the left posterior horn in 6 cases.

The grey commissure is almost always destroyed by the neoplasm, while the anterior commissure is very seldom involved; still Schultze, Simon, and Schüppel record cases where the anterior commissure participated in the lesion.

The white columns of the cord are affected in the way to be mentioned. The anterior columns are almost always left intact; degeneration of the lateral columns, especially of the pyramidal tracts, has been recorded not infrequently; moreover, symptoms of spastic paraplegia have been found in a number of cases, so that the symptoms of amyotrophic lateral sclerosis afford clinical evidence of changes in the pyramidal tracts.

The posterior columns are the most often affected by the lesion. Their anterior extremities, being in contact with the grey commissure, are very liable to early invasion. Wichmann in his work, which is founded on the analysis of 32 cases, arrives at the conclusion that the posterior columns were involved in 18 out of the 32, *i.e.*, in 60 per cent. of the cases.

B.—*Relation of the cavity to the central canal.*

It is very important to bear in mind the relationship of the cavity to the central canal. The situation of the lesion in the vicinity of the central canal, and the comparatively regular shape of the cavity in some cases, have naturally led the majority of investigators to regard the cavity as the central canal itself or as a part of the canal, dilated or abnormally developed. This method of looking at the question has given rise to the confusion between hydromyelia and syringomyelia.

We are now in a position to agree with Chiari* that dilatation of the canal is the primary phenomenon in hydromyelia, while in syringomyelia the cavity is the result of changes in the grey matter of the cord. Even at the present day the connection between the cavity and the canal is still a matter of discussion, and it should be borne in mind that there are still many points which require elucidation.

Nevertheless, in syringomyelia resulting from gliomatosis a large number of investigators have clearly demonstrated the entire absence of relation between the cavity and the central canal. This important fact has been established particularly by the works of Westphal and Simon, which date so far back as 1875. Both writers have shown that the canal may remain distinct throughout, in spite of the existence of a cavity of considerable size; in addition, it has been observed that the canal is always situated in front of the cavity. Sometimes it occupies its normal position, sometimes it is pushed out of its usual situation and compressed against the side of the cavity; occasionally there are two canals, the result of abnormal development; or again its lumen may be obliterated, and a mass of epithelial débris be found in the position of the canal. The calibre and shape of the canal may likewise undergo modification, becoming irregular, and showing alternately dilations and contractions, giving it the appearance of a rosary.

Instead of being rounded or elliptical in shape it may become altered owing to the pressure of the surrounding tissue; its anterior wall is pushed in against the posterior, so that on transverse section it appears kidney-shaped; the compression

* Chiari, *Zeitschrift f. Heilkunde* (Prague), 1888.

may be so complete that an actual partition is formed dividing the canal into two parallel tubes.

It not infrequently happens that no trace of the central canal can be found, the proliferation of the neuroglia cells having led to its obliteration and total disappearance. This takes place most frequently when a cavity of considerable size is present, leading to alterations in the shape of the organ. At other times, traces of the canal, in the form of a slit lined with epithelial cells, are to be found, or there may be aggregations of cylindrical cells at the spot where the central canal should have been.

The important point, however, to bear in mind is that Westphal, Simon, Bäumler, and Schultze have all been able to establish the integrity of the central canal and its entire independence of the cavity.

It follows that the central canal is not a factor requisite to explain the origin of the cavity.

In some cases, however, the fusion of the canal and the cavity has been recorded, the one opens into the other, and they are united for some distance. We have been able to investigate the manner in which this fusion occurs in certain preparations. Microscopic examination, as will be shown later on, enables one to distinguish what portion belongs to each cavity.

In short, in syringomyelia the central canal may occupy its usual place, or deviate considerably from the normal position, being pushed towards the side of the cord. It is almost always situated in front of the cavity, of which it is quite independent, or with which it may unite for a greater or less extent; it then accidentally comes to form part of the walls of the cavity.

C.—*The Glioma.*

According to some authors, glioma is so intimately associated with syringomyelia that the two terms have become almost synonymous.

But, in the first place, what is meant by glioma? It is well to remember that authorities are far from being agreed as to what this term should signify. Its origin and nature are still a matter of dispute. Should it be placed in the class of neoplasms, or is it an inflammatory product? The classical

treatise on histological pathology and the encyclopædic dictionaries contain almost no information on this point.

Cornil and Ranvier place it among the tumours under the heading of sarcomata, and apply to it the term "sarcome névroglique." "Virchow has given the name glioma to these tumours owing to their consistence being like that of glue, and he differentiated them from sarcomata, because he found them to be composed of tissue similar to neuroglia, the connective tissue of the central nervous system. Nevertheless, he fully acknowledged their analogy to sarcoma when he established the varieties of gliosarcoma and sarcoglioma."

After describing the elements of glioma, they conclude as follows:—"Gliomata are therefore simply sarcomata whose structure have the tendency to develop into neuroglia. The centre of these tumours usually undergoes fatty degeneration. . . Like all sarcomata, the '*sarcomes névrogliques*' frequently show mucoid degeneration, which may give rise to the formation of false cysts."

Schultze considers glioma the result of a pathological condition peculiar to neuroglia, leading to the hyperplesia of that tissue.

Klebs* likewise believes that the structure of glioma is very closely allied to that of nervous tissue; in his opinion the same relationship exists between glioma and normal neuroglia as between elephantiasis and the tissues of the extremities.

We believe that a more accurate conception of glioma will be obtained by having in the first place a clear idea of the nature of the neuroglia. Three leading views have been enunciated:—

1. Robin considers neuroglia to be an amorphous tissue.

2. The great majority of authorities, among whom Virchow, Kölliker, and Fry may be mentioned, look upon neuroglia as a variety of connective tissue.

3. The third view, held long ago by Deiters and accepted by Ranvier and Renaut, is that the neuroglia has the same origin as the nerve tissue itself.

Renaut,† in particular, has supported this idea by certain facts gathered from embryology and comparative anatomy.

The last theory seems to us to be the most likely. Neuroglia

* Klebs, *Prager Vierteljahrschrift*, T. CXXXIII.

† Renaut, *Archives de Physiologie*, 1882.

differs completely from ordinary connective tissue in its origin; connective tissue is derived from the mesoblast, while neuroglia originates from the epiblast. It is developed chiefly in the region of the future central canal, and it is found in the greatest quantity in this locality, but is also present in the grey matter, and to a less extent in the white matter of the nervous system. It is formed by differentiation of the epithelial cells of the ependyma, and the fibrils of which it is composed, as we shall have the opportunity of showing, are in all respects comparable to the protoplasmic filaments which Ranvier has described in the malpighian layer of the epidermis. Such a comparison is permissible seeing that we are dealing with two derivatives of the epiblast. Renaut has carried his investigation even further; he has proved that the epithelial cells of the ependyma do not differ practically from nerve cells. On consideration, the relationship will be found to be very near, for they may become transformed into nerve cells and under certain conditions may take the place of nerve cells; in short, to make use of Renaut's expression, they are really "nerve cells in the latent condition." Neuroglia is therefore not merely connective tissue, for it differs in its origin and in its properties.

This view has received further confirmation in a work by Chaslin,* which quite recently made its appearance. In the course of his researches on cerebral glioma Chaslin has had occasion to show that the two tissues, by their histo-chemical reactions, admit of differentiation. "In conclusion," he writes, "the cell elements, in sections prepared by hardening in potassium bichromate, resist successfully the action of a 40 per cent. potash solution; after washing in water, and then in concentrated acetic acid, they retain the red stain of picrocarmine, and they are not destroyed by the action of formic glycerine. Connective tissue treated in the same way swells up and loses the colour. A section of the spinal cord similarly treated shows the pia mater swollen and colourless, while the neuroglia remains unaffected; and after the action of a 33 per cent. solution of alcohol, its fibres remained stained with carmine, while all other varieties of connective tissue that we have experimented with lose the colour."

We have repeated the series of chemical reactions indicated

* Chaslin, *Journ. des connaissances médicales*, No. 12, 1889.

by Chaslin on sections of syringomyelia, and are able to corroborate his observations; a 40 per cent. solution of potash does not alter the glioma and does not prevent its staining.

If, then, neuroglia is distinct from connective tissue in its embryonic origin and histo-chemical characters, it is easy to conceive that it should have different methods of reaction in other directions, and that its pathological changes should also be different.

Gliomatosis should therefore be considered, as Schultze says, a special affection of neuroglia. It is without doubt both a hyperplesia and a hypertrophy of the neuroglia. In a classification of the tumours, it should be placed under the heading of the epitheliomata rather than under that of the sarcomata. When it assumes the diffuse form, it may be readily understood that it presents the appearance of a sclerosis, that is to say, of a chronic inflammation of the connective tissue. Schultze has proposed to give the name gliosis to this condition in order to show its analogy to inflammatory processes. Just as Chaslin has demonstrated in his work that certain cerebral scleroses are in reality glioses, so we believe that certain affections described as central sclerosis of the spinal cord are in reality due to gliomatosis.

Structure of the Glioma.

When a section of a cord affected with syringomyelia is treated with picrocarmine and examined, it is seen that the glioma, notwithstanding its uniform appearance, really presents a fibrillar structure. If a fragment is teased out, one sees that it is composed of a number of extremely fine fibrils closely matted together, and presenting small cells at their point of crossing.

These cells may assume various forms; they are frequently rounded; sometimes they have an irregularly triangular or polyhedral outline, and the amount of protoplasm surrounding the nucleus is scanty and finely granular. They usually present all the characters of spider cells, with numerous prolongations spreading out from them. At their centre is a rounded nucleus of considerable size, sometimes with a nucleolus in its interior; there may also be two nuclei. These cells, therefore, may be readily recognized as being similar to those present in neuroglia,

with this distinction, that they are much more numerous than in normal neuroglia. The fibrils which separate the cells vary greatly in number and in length. They may be followed in suitable preparations for a great distance, and their direction may be straight, sinuous, or occasionally even retrograde. According to Ranvier* these fibres neither branch nor anastomose, and are of protoplasmic origin, being direct prolongations from a cell. Ranvier compares them to the protoplasmic filaments which he describes in the skin. These fibres, viewed as a whole, form a complicated network, crossing each other in all directions, and small nodosities are to be seen at the point of crossing; these, perhaps, represent cells reduced to their nucleus, or may be true nuclear bodies.

In addition to the very fine fibrils, which are much the more plentiful, there may be seen, in certain sections, fibres of much greater thickness, for they can be distinguished with a low magnifying power. These fibres do not seem to occupy any special situation, but are scattered throughout the growth, and may even be found in the vicinity of the central excavation. They are at least four or five times the diameter of the finer fibrils, and are arranged in elongated, sinuous bundles, irregularly twisted on their axes, exactly resembling fragments of twisted tow.

All these fibres enclose small elongated spaces or very small clefts containing liquid, granular débris, and sometimes fine, isolated fibrils.

Besides these, the special elements of the glioma, there are blood vessels arising from the large vessels, which normally exist in the vicinity of the central canal. According to Mlle. Bäumler there is a principal artery in the glioma, running in a longitudinal direction, and giving rise to branches, and ultimately to capillaries, which are arranged in horizontal planes; these ramify and anastomose with each other so as to form a rich network of blood vessels in the tumour. In some cases, according to Mlle. Bäumler, these vessels are absolutely healthy, but in a great number of cases they show alterations in the form of considerable thickening of their walls, especially of the tunica externa. Arteritis obliterans has not been mentioned by any writer. The vessels appear less numerous in the neighbourhood

* Ranvier, *Bullet. de l'Académie des Sciences*, 5 Juin, 1882.

of the cavity, while they are more abundant at the periphery of the glioma.

Several varieties of glioma have been described, according to the predominance of the various elements of the glioma. Thus, when the fibrilated structure is most in evidence, the growth is called a glioma or neuroglioma; when, on the other hand, the cellular element is the chief characteristic, the name gliosarcoma is applied; when the vessels are abnormally developed the glioma becomes nævoid; lastly, in some cases, areas showing softening may be found in it, and it is then called myxoglioma. These different forms may be found simultaneously in the same cord.

Schultze* has described two chief varieties of glioma.

In the first, the infiltrating or diffuse form, there is marked hyperplesia of the elements of the neuroglia, but it does not undergo contraction. If the close resemblance between neuroglia and connective tissue is recollected, it is intelligible that some authors may have taken this peculiar proliferation of the neuroglia for sclerosis. In order to emphasize the analogy of this variety to a chronic inflammatory lesion, Schultze has proposed to name it "gliosis." At the same time he has demonstrated the histological distinctions between sclerosis of the nervous centres and gliosis; in sclerosis, the proliferation of the cellular structures is not so noticeable, while increase of the fibrous elements predominates; numerous granular and amyloid bodies are also present; lastly, the phenomena of invasion and compression of the nerve structures, the tendency to necrosis, and the formation of cavities are wanting.

If one reads carefully the description which Hallopeau† gives of sclerosis affecting the ependyma, one is astonished at the close similarity between this sclerosis and gliosis. "We have to deal with," says Hallopeau, "a newly formed tissue, analogous in its structure to that which normally exists around the central canal of the spinal cord. It is composed of tracts of extremely fine fibrils, crossing each other in various directions. Nuclei, about 5 micromillimetres in diameter, are scattered throughout the network, some of them being surrounded by a branching protoplasmic border. In some preparations we have distinctly

* Schultze, *Archiv de Virchow*, T. LXXXVII., 1882.

† Hallopeau, *Gazette médicale de Paris*, 1870.

seen the prolongations from the cells continuous with the fibres of the reticulum. To this variety of tissues we have given the name of 'scléreux réticulé.' The difference evidently exists between the two varieties of tissue in name only."

The second form, described by Schultze, is much more typical. The elements of the neuroglia increase in mass, and compress and destroy all the nerve structures, and in course of time occupy their place: this process leads to the formation of a kind of foreign body, *i.e.*, a true neoplasm, which in some cases has all the aspects of a tumour. It is to this form that Schultze confines the name gliomatosis; it is in reality a glioma.

Under the name of hypertrophy of the ependyma, Lancereaux,* in 1861, gave a wonderfully exact description of glioma. "On making a section of the cord, one finds at its centre a greyish, cylindrical, and very resistant body, about the thickness of a penholder or pencil. This column extends from the upper part of the cervical region to the lower portion of the lumbar region, where it terminates in a pointed extremity. It is readily separated from the substance of the cord which surrounds it on all sides."

In a typical case the glioma has the form of an elongated tumour; its vertical dimensions greatly exceed the transverse and anteroposterior: it has therefore with good reason been compared to a rod imbedded in the centre of the cord. This elongated form has attracted the attention of writers; but if it is recognized that the glioma has its origin in the ependyma, it is not difficult to see that it may retain the form of the tissue from which it arises, and thus assume an elongated appearance.

On cross section the glioma sometimes shows a rounded form; at other times it appears to have mainly developed transversely, and sent out prolongations towards the periphery of the cord. It varies greatly in extent; sometimes it traverses the entire length of the cord, giving rise to a firm core. Far more commonly, however, it is located in the cervical enlargement. Reisinger† has explained its choice of this locality in the following way. The cervical region is much the most subject to slight but repeated injuries, because the cervical portion of the spinal column is the most mobile; it thus becomes

* Lancereaux, *Bullet. de la Soc. de Biologie*, 1861.

† Reisinger, *Virch. Arch.*, B. XCVIII., 1884.

a "locus minoris resistentiæ," and is rendered liable to changes of all kinds.

From the cervical enlargement the glioma extends into the cervical portion of the cord, and may even be continued into the medulla oblongata, and may also pass into the dorsal region for a greater or less extent. The lumbar enlargement is sometimes the seat of the glioma, which may confine itself to this locality, but it is far less often seen in this situation than in the cervico-dorsal region.

Sometimes the glioma is so resistant that it may be made out on palpating the cord. The colour is usually grey, but may sometimes be yellowish, or if it contains much pigment it assumes a brownish shade. It is so clearly marked off from the rest of the cord that in certain typical cases the idea of a new growth is at once conveyed on looking at a section, even when in the fresh state. Under such circumstances the cylindrical mass of glioma is not only sharply marked off from the cord substance by its physical characters, but it may be made to alter its position slightly within the cord, on account of the loose character of its bonds of union. Sometimes it may even be enucleated, and on cutting sections of the cord the gliomatous area may be seen to detach itself from the rest of the section.

As a general rule the gliomatosis develops first of all in the neighbourhood of the central canal, in the grey commissure, that is to say, in the tissue, so abundant in neuroglia, which surrounds the central canal and which is called the peri-ependyma. At the commencement, the cell proliferation takes place round the central canal, and masses of cell filaments pass out which invade the neighbouring portions of the cord—the grey commissure, the posterior cornua and columns. In exceptional cases, however, the glioma may arise from the neuroglia of the white substance. In this way the tumour gradually develops; but while extending peripherally, according to Schultze, it undergoes softening at its centre, and on section one can see with the naked eye first a thinning of the newly formed tissue, then clefts, and ultimately the cavity, which results from the breaking down of the tumour. The formation of the cavity is not necessarily fatal, and it does not at first occupy the whole extent of the glioma. It will thus be seen that in a cord affected with syringomyelia, one can follow all

the steps in the evolution of the glioma, the full development of the tumour, and the formation of a cavity, which gradually enlarges and which brings about a gradual collapse of the cord. This cavity, whose origin has given rise to so many theories, is surrounded by neuroglia which has the appearance of a smooth membrane, fibrous in character, of varying thickness, and considered by many authorities to be of the nature of connective tissue. At first sight this membrane appears uniform in structure, but closer examination reveals that the part next to the cavity is distinctly fibrillar, and that the fibres have been compressed together so as to assume the appearance of a membrane. When the cavity is still only a simple cleft, fibrils may be seen crossing it, entering it, and terminating in a free extremity.

The boundary wall of the cavity is thus a membrane of a yellowish colour, staining badly with picrocarmine. It is smooth, or at least appears so, on its inner surface; externally its structure becomes gradually looser, and is continuous with the tissue of the neoplasm. This lining membrane is irregularly sinuous in its outline, and gives rise to little papillomatous projections, sometimes visible to the naked eye, which extend into the interior of the cavity. If one examines the membrane with care its presence may be made out even before the cavity is formed. It appears like a wavy or plaited membrane, encompassing the portions of the glioma which are beginning to degenerate. Further researches are, however, necessary to clear up this point. But it is readily noticed, when the cavity is formed, that a portion of the membrane may become detached as a wavy line—just as the epidermis may become detached from the true skin—and float off within the cavity. One need not, however, attach great importance to this circumstance, for it may be due merely to an accident in preparing the specimen.

The wall of the cavity is also fibrillated; it has the character of neuroglia undergoing proliferation, and does not really differ from the rest of the growth; and although it has certain distinguishing characters, these are in a great measure due to the liquid exuded into the cavity exercising eccentric pressure upon the tissue constituting its wall, and thereby rendering it more compact.

Some investigators have found cylindrical epithelium lining

the cavity, and we have been able to verify this in a considerable number of sections. At the same time it is almost universally stated that the epithelium occurs on a portion of the wall only, and this is on the anterior segment, an observation which we have been able to corroborate. The most plausible explanation is that the cavity has united with the central canal. At a certain point of its development the cavity extended up to the central canal, and then joined with it, so that the portion lined with epithelium really belongs to the central canal; and it is by accident, therefore, that the canal contributes to form part of the wall of the cavity. Moreover, the characters of the epithelia show that they are identical with those which normally line the central canal. It should also be remembered that the central canal frequently gives rise to diverticula. One of these may open into the cavity, and it may then be possible to observe, as we have had opportunity to confirm, a portion of the cavity wall lined with epithelia, and yet the central canal, slightly distorted and lined with its own epithelia, at the side or in front of the cavity. On examining a series of sections one is able to follow the gradual approach of the two cavities and their ultimate union.

Raymond* has even asserted that the epithelium may proliferate, and expresses himself on this point as follows:—"The part played by the epithelium in the development of the neoplasm is difficult to determine. This is certain, however, that when preserved it is found to be much increased. The cells in the first three or four layers still retain the cylindrical form, but the others become more or less rounded, and extend into the substance of the neoplasm."

Our explanation of the presence of the epithelium appears to be well founded, but it is not difficult to imagine that the epithelium might be regarded as a vestige of the embryonic cells, from which the neuroglia itself which normally exists in this region is formed. This being so, it seems to us unnecessary to conclude, as Simon does, that epithelium may form on any point of a newly-formed cavity. This view appears contrary to the general laws which regulate the development of epithelium.

Small refractile bodies have also been described in syringomyelia, of the size of a red blood corpuscle, rounded in form, of

* Raymond, *Atrophies musculairs et maladies amyothrophiques*, 1889.

a yellowish colour, sometimes isolated and sometimes collected in groups of three or four, and appearing most abundantly in the cervical and lumbar regions of the cord. These bodies seem to be independent of the vessels, from which they are usually clearly separated, and are chiefly found near the periphery of the lesion. The presence of pigment in this neoplasm has also attracted attention, as occasionally the pigment granules are so numerous that the tumour presents a brownish coloration which may obscure the features of the growth. It is well, however, not to attach too much importance to its presence, for accumulations of pigment are not peculiar to glioma, but are to be found in nearly all chronic affections of the nervous system.

The usual characters of inflammation are wanting in gliomatosis. Thus there is no infiltration by leucocytes, the vessels are not dilated nor gorged with blood, and no new vessels are formed. In some cases, however, especially at the periphery of the tumour, signs of irritation have been described, such as vascular injection, rupture of blood vessels, and the occurrence of true hæmorrhagic foci. These intercurrent hæmorrhages serve to explain the "strokes" or apoplectiform attacks which we have already described as occurring in the course of the disease, but they are obviously epiphenomena.

The nerve tubes also suffer change during the process of increase of the neuroglia. They are first displaced and then separated by the new growth, the prolongations of which force their way between the nerve elements; in this way they are compressed and broken up, and finally disappear. As the process advances very slowly, the nerve fibres disappear only by degrees, and this apparent tolerance of the nerve tubes affords an explanation of the absence of clinical manifestation occasionally for a long period. On examining a section treated by Weigert's method, all traces of nerve elements in the neoplasm are found to have vanished; on approaching the periphery of the glioma, occasional scattered nerve tubes, recognizable by their myeline, are to be found, and at the extreme limit the nerve tubes again become normal. When the glioma attacks the posterior cornua, as it nearly always does, the nerve cells disappear more or less completely. Usually the cornua are distorted and compressed, and sometimes separated from the main mass of grey substance by the tumour. The cells of the

anterior horns, especially in the cervical enlargement, are similarly affected, becoming granular and then atrophied. In some cases the grey matter totally vanishes, and its position is occupied by the glioma.

The information which we have sought for in the literature, concerning the microscopic appearances of the affected nerve elements, is very incomplete. Little is known regarding the changes in the nerve cells; it is certain that the nerve fibres may remain normal for a very long time. The medullary sheath is first affected, becoming swollen, degenerated, and transparent, and finally indistinguishable from the neuroglia. The axis cylinder resists for a much longer time. Schultze has shown that it may remain intact after the medullary sheath has disappeared.

The changes in the white substance will not detain us long. The neuroglia of the white columns may participate in the process of proliferation, and this usually happens in the posterior columns, a situation readily affected by the growth, although it is not usual to see the whole of these columns invaded. Secondary degenerations, such as are seen whenever a tract of fibres is cut off from its trophic ganglia, may also be present, *i.e.*, ascending degeneration when the afferent fibres are involved, and descending degeneration when the efferent fibres are concerned. According to Grasset, the white columns must become affected before these degenerations can take place. Degeneration of the pyramidal and cerebellar tracts has accordingly been placed on record, but it is in no way characteristic of syringomyelia.

The spinal meninges remain normal in the great majority of cases. Some writers, however, have stated that when the lesion reaches the periphery of the cord the meninges may be subject to chronic inflammation and show an abnormal development of blood vessels, adhesions ultimately forming between the membranes. Simon has observed that the position of the cavity sometimes corresponds to a patch of chronic meningitis. He has had several opportunities of verifying this, and suggests that it may not be a mere coincidence.

The spinal nerve roots are in the great majority of cases intact, but atrophy of the anterior roots has been mentioned in one or two cases.

The spinal nerves have been examined in a very limited number of cases; they have sometimes been found healthy, but

we are still unable to form a definite opinion regarding the condition of the peripheral nerves.

We do not intend to deal with the secondary changes which affect the skin, subcutaneous tissue, muscles, bones, and joints. We had the opportunity of seeing a case under the care of Charcot—arthropathy affecting the elbow joint, characterized by considerable deformity and the formation of many foreign bodies within the joint, some of them free, and some of them pedunculated.

CHAPTER V.

PATHOGENESIS.

IN the chapter devoted to the historical sketch of syringomyelia, we have shortly pointed out the phases through which the various conceptions, held by observers regarding this singular disease, have passed. A large number of views have been put forward, and, on perusing the treatises of nervous pathology, one is astonished at finding how numerous the causes of syringomyelia are stated to be by some authorities.

Erb gives the following seven causes of syringomyelia :—

1. Necrosis and softening of the centre of tumours with absorption of the degenerated elements ;
2. Softening and absorption of apoplectic foci ;
3. Central softening, of variable extent in some cases, following chronic myelitis ;
4. Experimental section of the cord (Eichhorst and Naunyn*) ;
5. Secondary dilatation resulting from the myelitis affecting the periependyma (Hallopeau) ;
6. Chronic meningitis ;
7. Obliteration of the central canal, causing cavity by the alteration in pressure.

Leyden enumerates the causes of the cavity as follows :—

1. Hydromyelia.
2. Cysts following spinal hæmorrhages.
3. Cysts the result of acute or chronic myelitis.
4. Absorption of an apoplectic focus.
5. Myelitis with softening.
6. Accumulation of serum in the central canal.
7. Degeneration of an intramedullary tumour.

* Eichhorst and Naunyn, *Arch. f. Exp. Path. und Pharmak.*, 1874.

Eulenburg distinguishes between hydromyelia and syringomyelia. He recognizes the following causes of hydromyelia:—Dilatation of the central canal, dilatation owing to pressure exerted by tumours of the mesencephalon and anomalous development. He gives as causes of syringomyelia: glioma, spinal hæmorrhage, and necrosis—that is to say, spontaneous softening of the cord.

Charcot, in his lectures, also states that several distinct processes may lead to the formation of a cavity in the grey matter of the cord. He mentions first hydromyelia, then certain chronic inflammations of the median grey matter, and finally glioma.

During the last few years a large number of observations have been published, chiefly in Germany, with the object of showing that the only cause of syringomyelia is spinal gliomatosis. Among the advocates of this theory are Schultze, Mlle. Bäumler, and Roth; in France, Déjerine has likewise upheld this view.

How do these authors explain the formation of these cavities?

I.

The view which naturally presents itself at first to one's mind is that the cavity is a dilatation of the central canal. A number of investigators have supported this opinion. The observations of Leyden* lead him to the conclusion that there is no real difference between the hydromyelia of infants and the spinal cavities met with in adults. The two affections present many points of resemblance; such as the great development of the cavities usually in the upper part of the dorsal cord, their frequent situation in the posterior portion of the cord, the destruction of tissue around the cavities, the presence, at least in places, of cylindrical epithelium on the inner surface of these cavities, and the fact that the posterior columns are usually intact in both affections. Leyden thus believes that syringomyelia of the adult is the remains of a congenital hydromyelia, and while acknowledging the accuracy of the work of Simon and Westphal, and agreeing with these observers that syringomyelia may arise from softening of the hypertrophied periependyma,

* Leyden, *Virchow's Archiv*, B. LXVIII., 1876.

he still thinks that hydromyelia is the predisposing cause of syringomyelia. In short, it ought to be considered a congenital disease, due to an anomaly in development of the cord; this anomaly consisting of incomplete closure of the primitive groove on the posterior aspect of the cord. In the embryonic state a cavity of considerable size exists in the central region of the cord in place of a canal.

Kahler and Pick* bring forward some new facts in support of Leyden's theory. In reality, they say, several cavities may be present in the cord, and yet not give rise to any symptoms. They conclude that these cavities may be diverticula of the central canal, and that it may have several separate channels in a portion of its extent; lastly, that the condition may remain latent in adults, just as hydromyelia may remain latent in children.

Kahler† has again recently advocated the view that the cavity depends upon a hydromyelia. "In typical cases of central cavities in the cord the aperture is due to dilatation of the central canal. The proof of this lies in the comparatively frequent presence of epithelial cells more or less completely lining the cavity, even when it occupies an abnormal situation or is multiple. If the disease gives rise to clinical signs, destructive changes of the nerve parenchyma around the dilated central canal are likewise present. These changes I attribute, provisionally at least, to chronic inflammatory processes, which I would place in the same category as the ordinary sclerosis of the central nervous system."

Harcken‡ also believes that the spinal cavities are either dilatations or diverticula of the central canal: that they may become the starting point of a cavity, and increase in size, owing to destructive changes in the tissues forming their walls.

We prefer, however, to think with Charcot that hydromyelia is simply a malformation resulting from dilatation of the central canal—a sort of anatomical anomaly, the clinical history of which is little known. The name "hydromyelia" should be reserved for the dropsical distentions or other dilatations of the central canal, and the word "syringomyelia" for the cavities

* Kahler u. Pick, *Prager Vierteljahrsch.*, T. CXLII., 1879.
† Kahler, *Prag. med. Wochensch.*, 1888.
‡ Harcken, *Thèse de Kiel*, 1883.

which are found at the centre of the cord, and independent of the central canal.

Syringomyelia, existing independently of hydromyelia, has been attributed to various changes in the parenchyma of the cord.

We shall now shortly run over some of the theories in connection with this view.

Erb, Leyden, and Stadelmann* affirm that the cavity may result from a hæmorrhagic focus, or from softening of the medullary tissue.

Steudener† has recorded an unique case, in which he describes an elongated cavity in the cord, displacing the entire grey matter and containing a viscid fluid. It apparently had originated from a colloidal degeneration, commencing in the tunica adventitia of the blood vessels, and then involving the grey substance.

Eickholt‡ believes that there may be a primary sclerosis of the periependyma, the dilatation of the canal being secondary to it. In his opinion it *might* arise from venous stasis, for in the case quoted the patient was in an advanced stage of morbus cordis.

In 1869 Charcot aud Joffroy§ published two cases in which they found cavities. They rejected the idea of their originating as hæmorrhagic cysts, owing to the absence of all traces of yellowish pigment. They believed that the cavities were the result "of that softening of the medullary tissue, and more especially of the grey matter, which Clarke has described under the name of 'granular disintegration.' Owing to the breaking up of the nerve elements and their connective tissue, areas of disintegration, filled with a soft, transparent, finely granular substance, or sometimes even a viscid liquid with fine granules suspended in it, are produced. On transverse section these areas vary considerably in shape. As a rule, they are rounded or oval, though sometimes they show angular or irregular outlines. They may even have the appearance of slits or fissures, which at first sight lead to the supposition

* Stadelmann, *Deutsches Archiv f. klin. Med.*, T. XXXIII.
† Steudener, *Hirsch's Jahresber.*, 1867.
‡ Eickholt, *Archiv f. Psychiat.*, T. X. 1880.
§ Charcot et Joffroy, *Archiv. de Physiol.*, 1869.

that they have been accidentally produced. Sometimes their contour is sharply defined, as if they had been punched out."

According to a considerable number of authors, syringomyelia is a variety of myelitis. This view has been supported in France by Hallopeau and by Joffroy and Achard.

Hallopeau* was the first to affirm that the cavity in the cord resulted from myelitis. In his opinion it is a chronic myelitis, located specially in the vicinity of the ependyma, very slow in its course, and terminating in sclerosis. In Hallopeau's case there was a focus of softening in the medulla oblongata, from which the irritation spread to the cord. Here it took the form of a diffuse interstitial myelitis, chiefly confined to the connective tissue surrounding the spinal canal; then followed degenerative changes and subsequently partial destruction of the sclerosed tissue, leading to the formation of a cavity. The dilatation of the central canal plays only a very minor part in the formation of this cavity.

In a recent brochure, entitled "Myélite Cavitaire," Joffroy† and Achard agree with Hallopeau that we have to deal with a myelitis of the periependyma. As proof of the inflammatory nature of the lesion they say: "We found at the superior and inferior margins of the lesion small canals, where the area of disintegration was about to disappear or had disappeared. In this situation the cord presented the characteristics of a diffuse sclerosis, situated usually around the central canal. We found in the sclerosed tissue only those signs that are present in all patches of sclerosis. One encountered dilated vessels with thickened walls, but there was no evidence of any greater vascularity than usual, except in the walls of the membrane which bounded the cavity. It seems to us, therefore, that there is no reason to substitute the word 'gliomatosis' for 'myelitis.' As for the cavities, they are only, so to speak, accidental phenomena in the course of the myelitis."

Joffroy and Achard explain the origin of the lesion by the distribution of vessels in the cord, as follows: "The white substance receives most of the peripheral vessels through the pia mater, while the grey matter is supplied by numerous important vessels, situated in the neighbourhood of the ependyma. The

* Hallopeau, *Gazette médicale de Paris*, 1870.

† Joffroy et Achard, *Archiv de Physiol.*, 1887.

cavity is due to obliteration of the vessels from thickening of their walls, or from thrombosis, or from both of these processes together. This obliteration of the vessels gives rise to patches of necrosis, which are analogous to Clarke's areas of disintegration. The necrosed tissue becomes absorbed just as is seen in the like condition of the brain."

As for the formation of the enclosing wall, "it is subsequent to all the changes which we have just described, and its formation will be similar to that which occurs in old hæmorrhagic foci, and in softening of the brain."

Some time ago Langhans* propounded an ingenious theory, which explained the formation of the cavities. This theory is founded on an increase of the intra-cranial pressure in the suboccipital fossa. From this increase arise venous and lymphatic stasis in the cord, then œdema, and subsequently disintegration of the elements of the cord. According to Langhans, who brings forward four cases in support of his view, this increase of pressure is due to tumours of the medulla and cerebellum. In one case he found a melanotic sarcoma of the floor of the fourth ventricle; in the second case there was a sarcoma of the vermiform process; in a third sarcomatous degeneration of the choroid plexus; lastly, in the fourth case there was a tumour of both amygdalæ, which compressed the medulla oblongata. In these four cases Langhans found a cavity in the cervico-dorsal region of the cord. It was located in the grey commissure, and was merely a diverticulum of the central canal.

Langhans thus believes that there is a relation of cause and effect between the tumours and the cavity. These tumours obstruct the return circulation, and lead to stasis of the blood-stream and of the cerebro-spinal fluid. As in cases of obliteration of the central canal, there is no dilatation below the obliterated point, this author concludes that the chief cause rests in the disturbances of the circulation.

The location of the cavity in the posterior commissure is determined by the presence of large veins at each side of the central canal. Thus, given the soft consistence of the grey matter, this locality offers the most favourable conditions for the occurrence of œdematous changes. But, according to Langhans, there is a distinct communication between the

* Langhans, *Arch. de Virchow*, T. LXXXV., 1881.

central canal and the cavity; the latter being as a rule only a diverticulum of the central canal. Can we distinguish the cavities derived from the central canal, from those which have their origin in its diverticula? Langhans believes that we can. The former are situated in the grey commissure or in the cornua, and are frequently lined with epithelium. The latter are located in the anterior part of the posterior columns, or between the columns, and never show epithelium. The wall makes its appearance after the formation of the cavity. It is composed of connective tissue, and has a fibrillated structure, sometimes with a more or less granular ground substance and occasional cells. This wall is a hypertrophy of the neuroglia. It has usually a regular outline, but may sometimes be irregular and push projections into the interior of the cavity. According to Langhans the wall does not exist before the cavity.

Langhans' view, shortly expressed, is that we have an œdema produced mechanically, and this leads to disintegration of the elements of the grey substance, increase in size of the lymphatic spaces, and the formation of a cavity containing lymph.

This theory may be appropriately applied to a limited number of cases; but it is well known that in the majority of instances tumours of the mesencephalon exist without syringomyelia, and likewise that syringomyelia exists apart from tumours of the mesencephalon.

III.

The great majority of writers now agree that syringomyelia, as a rule, results from the softening of a tumour—medullary gliomatosis. Grimm* was the first to record, in an article on muscular atrophy, two cases in which cavities in the cord were coincident with glioma. But to Simon and Westphal the honour belongs of having shown that the relationship between the cavity and the glioma is of the most intimate character, and that the cavity forms in the glioma, and at the expense of the glioma, by disintegration of its elements.

At the present day this theory is accepted by Schultze, Kahler, Bäumler, Roth, Bernhardt, Charcot, and Déjerine.

How is the formation of the cavity in the glioma to be

* Grimm, *Arch. de Virchow*, T. XLVIII., 1869.

explained? We are not yet in possession of sufficient facts to be in the position of fully adopting any one theory, and have still to resort to various hypotheses.

Leyden believes that the disintegration of the glioma depends upon defective circulation. "The tissue of the new growth, by reason of its firm consistence, does not offer conditions favourable to its nutrition, especially towards its centre where the vessels undergo sclerosis. Under the microscope commencing softening may be recognized round the vessels, and one sees large areas of a gelatinous soft tissue, which may be the point of origin of the cavity."

Schultze believes that the cavity is formed by degeneration of the glioma; it may be a mucoid, colloid, or fatty change, but the fact remains that the new growth undergoes softening and excavation.

Wichmann explains the elongated form of the cavity by the distribution of the blood-vessels. In his opinion the seat of election of the cavity is the apex or anterior extremity of the posterior columns, which constitutes the true centre of the cord. In this region the circulation is more precarious than in any other part. The anterior portion of the posterior column receives its blood supply from the artery lodged in the posterior groove and from the interfunicular artery of Adamkiewicz. These vessels are of considerable length and of very small calibre, and the capillary circulation from them is more limited than elsewhere. The elongated shape of the cavity exactly corresponds with this area in which the circulation is insufficient.

One theory is entirely founded on the presence of the central canal. The glioma being present, undergoes softening, giving rise to a cavity which soon unites with the central canal or one of its diverticula. In a work upon the pathogenesis of syringomyelia, Chiari* has dealt in review with 74 cases, which he investigated with the object of ascertaining the relationship between the central canal and the cavity. He came to the conclusion that in 45 of these there was some affinity between the two channels. He proposes to confine the term hydromyelia, irrespective of its original signification, to all cavities of the cord which are connected with the central canal; and to reserve the

* Chiari, *Zeitsch. f. Heilkunde.* Prague, 1888.

word syringomyelia for those that are independent of this canal. In hydromyelia, according to the conception of Chiari, the cavity is the primary condition and the gliomatosis secondary; while in true syringomyelia there is always a degeneration of the new growth leading up to the formation of the cavity.

We consider it inadvisable to further obscure the signification of these terms. The word hydromyelia should be left in its primitive sense to signify a dilatation of the central canal. If in syringomyelia the cavity happens to unite with the central canal, this fusion is quite of minor importance, as we have already pointed out. Moreover, the central canal may present a dilatation simultaneous with the existence of a syringomyelitic cavity, the two lesions being independent of each other. It is likewise interesting to bear in mind that a dilatation of the cerebral ventricles, with thickening of their ependyma, is present in some cases of syringomyelia. Turner* reports one of this kind, in which there was dilatation of the cerebral ventricles, and at the same time every section showed that the cavity was quite independent of the central canal of the cord.

It is thus evident that a cavity may form in the cord quite apart from the central canal. One may even be able to trace the stages in its formation. On section one sees that the gliomatous tissue has, in certain places, become less compact, of a greyish colour, and of a gelatinous consistence. With the microscope it is possible to follow the changes in the fibrils and cells. In one of our sections we could make out a wavy line surrounding the disintegrated area, and it is probable that this represented the future cavity and the future membrane in process of development. At a slightly different level there is an actual loss of substance and a cavity is formed. The wall of this cavity, though at first not differing from the rest of the neoplasm, may become altered; the cavity being filled with fluid, exercises an eccentric pressure upon the tissue. It gradually increases in size by pushing back the boundary wall, the tissues of which under the compression become converted into an enclosing membrane.

According to our own researches, it does not seem likely that the cavity is formed through necrotic softening, and we have never met with obliteration of the vessels in any of our prepara-

* Turner, *Transact. Pathol. Soc., London*, T. XXXIX.

tions. But if the actual method of excavation escaped our notice, the fact remains that the glioma undergoes excavation. According to Schultze it is very exceptional for the glioma to be without a cavity.

The examinations which we have had the opportunity of making are by no means numerous, and we therefore do not assume an authoritative position. The theory of medullary gliomatosis appears to us to be much the most satisfactory, and it can be applied to a great number of cases. All that we have had occasion to examine belonged to that variety. But it would be advisable not to adopt too exclusive an opinion, and to bear an open mind on certain theories until further facts enable us to decide regarding them. Besides, according to the new conception of medullary gliomatosis, it is a special affection of neuroglia, and distinct from the ordinary sclerosis, just as connective tissue is distinct from neuroglia; and thus it enables us to give a satisfactory explanation of the various symptoms of syringomyelia.

IV.

We have so far enumerated the various explanations that have been put forward to account for the lesion. Is it possible now to give a sufficiently clear interpretation of the symptoms from the nature of the lesion?

The early train of symptoms in syringomyelia consists in the dissociation of the different forms of sensation. Our explanation of this is still confined to a number of hypotheses; for the physiology of sensation is not yet fully known, in spite of numerous researches. Experiments upon animals with regard to the sensations of pain and temperature do not give satisfactory results, as one can readily understand. Pathology has therefore to come to the aid of physiology, and through the method now known as "anatomo-clinique," has already been the means of making great progress, particularly in the study of the nervous system.

We know that in syringomyelia the nerve elements may remain intact for a long time. It is thus intelligible that the disease may remain latent for a considerable period. The seat of election of the new growth is the cervical enlargement, so that muscular atrophy and alterations in sensation will most frequently make their appearance in the upper extremities.

How can the disturbances of sensation be explained? Physiologists do not agree as to the course which the impressions of touch, pain, and temperature follow in the cord. Brown Sequard, for example, believes that tactile impressions pass through the anterior part of the grey matter, painful sensations through the posterior and lateral parts, while thermal sensations are conveyed through the median grey matter; likewise that all these conducting tracts cross and recross each other in the cord.

Schiff, after a great many experiments, comes to the conclusion that tactile impressions are conveyed through the posterior columns, while thermal and painful sensations make their way through the grey matter.

More recently, Herzen* has advanced another hypothesis. He divides thermal impressions into two distinct sensations. Impressions of touch and of cold are associated together in one part of the cord, and sensations of pain and of heat in another; the former being conveyed through the posterior columns, the latter through the grey matter. Herzen bases this distinction upon the fact that, when the nerves undergo compression, the sensations of touch and of cold disappear earlier than the others. He therefore concludes that there are two thermal senses, the one for heat and the other for cold, and that they are independent of one another both anatomically and physiologically.

The clinical and anatomical study of syringomyelia has brought to our notice that changes in the posterior cornua may correspond to the abolition of painful and thermal sensations, while preservation of the sense of touch is accounted for by integrity of the posterior columns. This syndrome is accordingly a decided confirmation of Schiff's theory. The anæsthesia to heat and to cold are always observed simultaneously; when this does not occur, they are dissociated only at the periphery of the anæsthetic areas. We have therefore good reason to believe that impressions of heat and of cold are conveyed through the grey substance, and if separate conducting tracts exist, they are very close to each other.

Roth has pushed the hypothesis still further, and suggests the sensations of pain and of temperature follow different tracts,

* Herzen, *Arch. de Pflüger*, T. XXXVIII.

for clinical experience shows that thermo-anæsthesia may be present without analgesia. "One can hardly imagine," says Roth, "that the interstitial morbid changes, in extending along the cord, are confined solely to the tracts for the transmission of thermal impressions, and leave everywhere intact those which convey sensations of pain." He thus supposes that the paths of conduction are not anatomically separate, but that their physiological reactions are different; that is to say, that the nerve fibres when invaded by the new growth do not behave in the same way under the harmful influence. "For example," he says, "the hyaline degeneration of the neuroglia and of the myeline will give rise to 'chemical' changes in the nutrition of the axis-cylinders, and thus will affect the conductibility of thermal impressions, while the predominance of the hyperplesia of the neuroglia, acting 'mechanically,' will derange the function of the nerves, which transmit pain sensations." And further on he adds, "If we admit the rationality of the hypothesis that the conductors of the various forms of sensation may offer different resistance to the morbid changes in the spinal cord—or even of the conductibility of the different forms of sensation in the same tract—there is no reason to suppose that a separate path exists for the transmission of pain impressions. It may be situated close to the other tracts, but yet possess greater powers of resistance, even if a separate path for the transmission of tactile sense does not exist. The conductibility of tactile impressions along the sensory paths is less easily deranged than the transmission of thermal and painful impressions, and does not disappear till destruction of the axis cylinders takes place."

Roth himself acknowledges that he only puts forward a series of hypotheses. According to him, a lesion of the neuroglia or of the myeline will change the chemical conditions of nutrition in the nerve fibres, and derange the conduction of thermal impressions. As this lesion is the first in order of time, one understands that the thermo-anæsthesia may be the earliest clinical manifestation of the disease. Later on the hyperplesia of the neuroglia will mechanically influence the nerve elements so that impressions of pain are no longer transmitted, hence the analgesia. Lastly, when the axis cylinder itself is destroyed, tactile impressions will not be conducted, and loss of the sense

of touch will be manifest. In syringomyelia, the axis cylinder holds out for a very long time, and may be intact even at an advanced stage of the disease; this may explain the preservation of the sense of touch.

It is reasonable to believe that the numerous and diverse trophic disturbances depend upon alterations in the central part of the grey matter—that is, in the posterior commissure.

In a recent article upon the localization of centres in the spinal cord, Starr* declares it possible to go into minutiæ. For example, he thinks that the trophic centre for the bones is situated in the anterior part of the commissure, while the posterior part contains the trophic centres for the skin, nails, and bladder, and also the vaso-motor centre.

It is needless to add that the muscular atrophy is due to changes in the cells of the anterior cornua. The very slow progress of gliomatosis, invading step by step the different groups of motor cells, will undoubtedly some day enable us to differentiate the special centres which supply each group of muscles, and thus prove a valuable means of locating the centres in the spinal cord.

CHAPTER VI.

ETIOLOGY.

LITTLE is yet known concerning the etiology of syringomyelia.

Sex.—Almost all authorities agree that syringomyelia is more common in males than in females. In connection with this point, Wichmann has analysed thirty-three cases, twenty-two of them being males and eleven females. Roth states that he has observed three times as many males as females affected with the disease.

Of the thirty-six cases recorded by us, twenty-eight are males and eight females. We ought to remark, however, that if only the recent cases were taken into account, the figures would be five females and three males.

Age.—Charcot believes that the disease commences in youth. The first morbid signs appear usually between the ages

* Starr, *American Journal of Neurology*, 1894.

of fifteen and twenty-five. In a number of cases, however, it is impossible to exactly fix the period at which the disease commences.

Occupation.—Among those affected with syringomyelia, a great number are operatives, such as bakers, tailors, and shoemakers.

Frequency.—Erb* believes this affection to be very uncommon, and places it among the diseases described as "Rara et Curiosa." At the present day, however, it is known to be far from rare, and Charcot agrees with Schultze that it is at least as common as amyotrophic lateral sclerosis.

Occasional Causes.—The disease has frequently been attributed to cold and wet, particularly in the cases of Fürstner and Zacher. Traumatism appears to have had a share in its causation; Silcock, Harcken, Strümpell, and Oppenheim have all noted that the patients carried the commencement of the disease back in their minds to an injury. Falls take a prominent place among such cases. Among other causes Harcken mentions physical strain and pregnancy.

Infectious diseases appear to have an influence on the development of syringomyelia. Typhoid fever, in particular, should be mentioned. One of our patients had noticed scoliosis, the first symptom in his case, come on a few months after an attack of enteric. Bernhardt, Freud, Westphal, Schüppel, Sokoleff, Schultze, and Remak have all recorded typhoid fever in the previous history of their patients. Acute articular rheumatism, pneumonia, malaria, and gonorrhea have likewise been notified.

Predisposing causes seem to be without a rôle in the production of the disease. A history of hereditary nervous affections appears wanting in the great majority of cases. Alcoholism has very seldom been recorded in the subjects of syringomyelia. We have particularly investigated for syphilis, but without result; although it has been recorded in two or three cases by Simon and Schultze.

The absence of predisposing causes, the commencement at an early age, and the particularly slow course of the disease, are all facts which support the view that syringomyelia is probably a congenital affection; the primary lesion being some anomaly

* Erb, *Ziemssen's Handbücher*, T. XI.

in the development of the elements of the ependyma, favoured perhaps by other anomalies in development associated with the central canal. Syringomyelia is in all likelihood a disease of evolution.

CHAPTER VII.

Prognosis.

Syringomyelia, we have already stated, is a progressive disease terminating in death, and the prognosis must therefore be serious. But by reason of its slow and interrupted course, Charcot has stated that the patient may live for a long time, and that the disease possesses much to make the prognosis less gloomy than in most other organic spinal affections with which it ought to be classified. Remissions of several years in the course of the disease have been recorded by Roth, and he asks if complete recovery even may not be possible. Charcot is inclined to regard certain cases of cure as really misinterpreted cases of hysteria, and lays stress upon the important bearing of a correct diagnosis upon the prognosis.

We must also mention that infectious diseases, occurring in the subjects of syringomyelia, are often attended by serious results.

CHAPTER VIII.

Treatment.

The treatment of syringomyelia differs little from that of most other chronic affections of the spinal cord. It should not be neglected, for in some cases it appears to have a considerable influence upon the development of the disease. Hydrotherapeutics, warm baths, tonics, iron, quinine, arsenic, strychnine, iodine and the iodides, and nitrate of silver may prove of service.

The remedies which seem to be most commonly employed are warm baths, electricity, and counter-irritation along the spinal column by means of hot needles, blisters, and cauteries.

Lastly, every form of injury should be particularly guarded against, as, even from trivial causes, the consequences are likely to be much more serious than patients would readily realize.

Conclusions.

1. Syringomyelia due to gliomatosis of the spinal cord, which has more particularly been the subject of this work, ought at the present day to have a definite position in the nosology of spinal affections.

2. It manifests itself clinically by special derangements of sensation, consisting of analgesia and thermo-anæsthesia with persistence of tactile sensation, by muscular atrophy which usually is of the Aran-Duchenne type, and by many and diverse trophic disturbances.

3. Owing to its symptomatology syringomyelia admits of diagnosis. Moreover, this diagnosis has been frequently verified post-mortem.

4. The only variety of syringomyelia presenting well known clinical symptoms is that due to gliomatosis of the cord, that is to say, to a particular lesion of the neuroglia, which we consider different from connective tissue in its origin and in its micro-chemical reactions.

5. This form of syringomyelia usually leads to the formation of a cavity, central in position, and of considerable size, and occupying a great extent of the cord, and simulating hydromyelia, with which it has often been confounded.

6. The gliomatosis of the cord undergoes excavation. This fact is assured, but we are still ignorant as to the reason of the excavation. Whether it does or does not excavate, it gives rise to the same symptoms.

The following two typical cases have been selected from those recorded in Bruhl's work:—

Case I.

Reported by M. Isaac Bruhl.

Muscular atrophy of the Aran-Duchenne type; preservation of the sense of touch; analgesia; thermo-anæsthesia; scoliosis.

Paul B., 28 years of age, a clerk by occupation, admitted to

the Andral Hospital under the care of Dr. Debove, on the 18th January, 1889.

Family history.—Father, 78 years of age, has always enjoyed good health: not of a nervous temperament. Mother died at the age of 46, cause unknown: never exhibited signs of neurosis. Two brothers, the one in good health, the other died of acute pulmonary tuberculosis when 43 years old. Two sisters, the one living and well, the other died in childhood. No history of insanity in the family; one cousin committed suicide.

Previous history.—During the earlier years of life the patient was inclined to be strumous and badly developed; no signs of rickets. When 14½ years of age he had a severe attack of typhoid fever, lasting about two months, and showing nervous symptoms with protracted delirium. At the age of 16½ scoliosis appeared and developed rather rapidly, the curvature becoming more prominent during the two years following, thereafter remaining stationary: it involves the lower dorsal and the upper lumbar vertebræ, the convexity of the curve being directed towards the left. The maximum deviation from the median line measures three centimetres, and corresponds to about the level of the ninth dorsal vertebra. A slight compensatory curve is situated in the upper dorsal region with its convexity directed towards the right.

When 18 years old he commenced to drink in excess, indulging in wine, spirits, and absinthe; he also smoked heavily. These excesses continued for 15 years and appear to have been well withstood, for one can scarcely find any indications of alcoholism.

The patient has not been subject to migraine; has never had rheumatism for syphilis, no traces of the latter being in evidence. In 1879 he acquired gonorrhea, which lasted several months. In 1880 he fell on the right knee: in spite of the rather severe injury he experienced no pain, and was even able to continue using the limb in walking. The next day, however, the knee assumed alarming proportions; in spite of the absence of pain he deemed it advisable to enter hospital, where the knee was scarified and cupped, this treatment being unattended by pain. Since this accident he has been subject to a limp.

Onset of the disease.—The patient thinks that the disease

commenced five years ago: he first of all noticed a weakness of the hand, and subsequently a defective position of the little finger; the hypothenar eminence thus seems to have been first affected. The atrophy next involved the other muscles of the hand, compelling the patient to give up his occupation as clerk.

In 1887 he came under the care of Charcot; after treatment by electricity and sulphur baths he left the hospital much improved. Owing to a slight attack of bronchitis he entered the Andral Hospital under M. Debove in January, 1889.

Present condition.—The patient is a man of fair intelligence, of medium height, and good build. A burn, unattended by pain, which he accidentally incurred while in the hospital, drew our attention to the state of sensation; the examination of which revealed a most interesting condition, with which we shall commence.

Sensation.

1. *Sense of touch.*—Examination conducted with Weber's æsthesiometer indicates that this sense is normal. The patient feels and correctly locates the slightest touch. Muscular sense is also intact.

2. *Sense of pain.*—There is complete analgesia over the whole cutaneous surface. On pricking or violently pinching the skin, the patient experiences merely the feeling of contact. It is impossible to precisely state when the analgesia first appeared; in all probability it was in existence in 1880, for at that time he suffered from an injury to the knee-joint; the trauma was followed by an acute arthritis, which was unaccompanied by the slightest pain, and the application of the scarificator gave rise to no discomfort.

3. *The sense of temperature* has shown some derangement for several years; the entire surface of the body is not, however, affected. Thermo-anæsthesia is distributed symmetrically upon the extremities. The sense of temperature is entirely wanting on the upper limbs. On the application of a flask containing water at 90° and of one containing a freezing mixture the impressions experienced by the patient are identical, and he can in no way distinguish the hot from the cold body. On the lower extremities, thermo-anæsthesia is absolute from the toes up to

the lower third of the thigh. On the upper two-thirds of the thigh the appreciation of temperature exists, but is very imperfect; heat and cold, however, produce impressions which enable them to be differentiated. On the face temperature sense is normal. On the trunk thermo-anæsthesia is incomplete, with the exception of the right half of the thorax, where there is an actual hyperæsthesia; in this situation heat and cold give rise to feelings of pain.

The sense of temperature over the surface of the body of this patient could accordingly be represented as follows:—

1. Absolute thermo-anæsthesia on the upper extremities, and on the lower with the exception of the upper two-thirds of the thighs.

2. Partial thermo-anæsthesia on the upper two-thirds of the thighs and on the trunk, exclusive of the right half of the thorax.

3. Hyperæsthesia on the right half of the thorax.

4. Normal sense of temperature upon the head.

The thermo-anæsthesia in conjunction with the analgesia is such that the patient made a deep burn on the sole of the foot without feeling pain or knowing that he had burnt himself. Moreover, he bears numerous marks of old burns. He does not recognize the temperature of a bath until the upper portion of the thighs are submerged. Quite recently he burnt his leg while warming himself by the fire.

Some of the mucous membranes participate in the disordered sensation; those of the nose and the glans are anæsthetic; the cornea and conjunctiva are similarly affected. The buccal, lingual, rectal, and urethral mucous membranes are normal. On the tongue, however, thermal sensation is partially deranged, but not so as to endanger burning the mouth on taking food.

There is no disturbance of the special senses—no contraction of the visual field. All the organs are healthy.

Motion.

1. *Lower Extremities.*—The patient walked well up to the time of his accident (1880); thereafter walking with a limp, but without fatigue. A year ago a condition of paresis affected

the lower limbs, and gradually advanced so that walking was rendered difficult. Muscular atrophy, chiefly involving the left side, also appeared. The right calf measures one centimetre in circumference more than the left. The atrophy is most noticeable in the gastrocnemii and quadriceps extensor.

2. *Upper Extremities.*— A. *Right side.* — Atrophy of the muscles of the right hand at once attracts attention; it commenced in the hypothenar eminence, which has now entirely disappeared. The thenar eminence is also much wasted. The interossei can hardly be said to exist, for the intermetacarpal spaces show great definition. The hand presents the appearance of the "main de griffe," the phalanges being flexed upon each other, and the fingers flexed upon the metacarpal bones; the degree of flexion varies, being most marked in the little finger, and diminishing progressively towards the index finger, which is extended normally.

The chief movements are, however, still possible; the patient can close his fist, the thumb can be effectively opposed, the movements of abduction and adduction of the fingers are alone abolished. Muscular power of the hand is markedly diminished, the needle of the dynamometer never pointing beyond the number 9, when grasped by the patient.

The forearm is wasted, chiefly in its lower extent; the epitrochlear and epicondylar muscles retain their normal outline. The deltoid presents some wasting; the shoulder is flattened, the bony processes standing out beneath the skin, but still the shoulder movements can be duly effected.

B. *Left side.*—The hand shows undoubted atrophy, though not nearly so extensive as on the right hand. There is no deformity of the hand; the fingers are extended, and all movements can be performed. The interossei alone appear wasted; the deltoid seems slightly diminished in size. Muscular power is defective, the dynamometer not registering more than 19. Muscles of the head and trunk are intact.

The electrical reactions, as tested by M. Vigouroux at the Saltpêtrière on the 30th March, 6th and 9th April, gave the following results:—

1. *Reaction of degeneration.*—A. Complete in the third left palmar interosseus, and the left common extensor of the toes.

B. Partial in the right and left anconeus and the left fourth interosseus.

2. Absence of response both to galvanic and faradic currents in the muscles of the right hypothenar eminence, the left extensor longus pollicis, the left peroneus brevis, the left gluteus maximus, and the long head of the biceps of the right thigh.

3. Response to faradic but no response to galvanic current in the left external and internal gastrocnemius (the right external gastrocnemius contracts only on using a very strong current).

4. The other muscles present no abnormal electrical reaction. It should be noted that some of them, especially on the left side, require a comparatively strong current to elicit contraction.

The patient does not present any trophic lesion of the skin or subcutaneous cellular tissue.

Reflexes.—The tendon reflexes of the upper extremities are diminished. The left patellar tendon reflex is totally abolished, the right slightly exaggerated, so that one is led to suppose that the lesion has involved the left posterior column and the right lateral column. The pharyngeal, cremasteric, abdominal, and plantar reflexes are normal.

The pupils are equal, and react well to light and on accommodation.

The genital function seems to be slightly affected; there is no impotence, but a diminution of the sexual appetite is present. No disturbance of the sphincters has yet shown itself. Micturition is normally performed; incontinence and retention of urine and fæces have never been present. For some considerable time urination has been frequent and urgent. Micturition is performed every hour, and is accompanied by a good deal of straining. Expulsion of the first few drops of urine is painful and requires effort; there is also some polyuria, the quantity of urine passed exceeding 2 litres in the twenty-four hours. The urine is turbid and freely ammoniacal; the microscope shows numerous pus cells; otherwise it contains no albumen and no sugar. Urethral stricture, as one might expect after gonorrhea, cannot be detected by catheterization.

The urinary troubles have remained stationary for about a year, and have not in any way affected the general health of the patient, which has continued satisfactory.

The patient has no suffering. He complains solely of troublesome sensations of heat and of cold. In spite of his thermo-anæsthesia, he has noticed that he feels the cold in winter very much, and is inconvenienced by the heat of summer.

There is no disturbance of sweat secretion beyond some increased perspiration on the head and hands, and that only on exertion.

The intellectual capacity is unaltered. Memory and speech are normal. The spirits are slightly affected, and since the onset of the disease there has been a decided inclination to hypochondriasis.

Otherwise the general condition of the patient is satisfactory; appetite is good, deglutition normal, digestion well performed. There is a tendency to constipation.

During the year that we have had the patient under observation, we have found no change in his condition.

Case II.

Reported by M. Gilles de la Tourette.

Muscular atrophy; analgesia; thermo-anæsthesia; scoliosis; trophic skin affections; inequality of the pupils; nystagmus.

S., 51 years of age, vendor of programmes at the Odeon. Entered Bouvier Ward of the Saltpêtrière in June, 1889.

Family history.—No hereditary nervous taint.

Previous history.—Measles and scarlatina in childhood, typhoid fever at about 6 or 7 years of age. When 15 years old suffered from a generalized eczema, which lasted three or four months.

At the age of 19 atrophy of the muscles of the left hypothenar eminence and left interossei was noticed, and subsequent to this wasting of the left forearm, and fibrillary twitchings of the muscles, but no pain in the affected regions.

A little later he commenced to feel shooting pains in the left leg, which recurred from time to time. The disease remained stationary for ten years.

In 1868 he entered the Necker Hospital under the care of Mouneret. Here he was examined by Duchenne of Boulogne, who diagnosed the case as progressive muscular atrophy.

In the meantime (about the age of 25) curvature of the vertebral column, with the convexity directed towards the left, appeared. The patient remembers that at this age his mother remarked to him upon the shape of his shoulders.

About 30 years of age the right hand was attacked in the same way as the left. Atrophy advanced very slowly, so that the impairment of muscular power did not reach its maximum till the age of 40, since which it has remained stationary.

During the last 10 to 15 years the patient has suffered from time to time from left facial neuralgia, the pain sometimes radiating towards the heart. Painful contractures of the muscles have also supervened during the last 4 or 5 years.

When 33 years of age the patient says that he suffered for six months from the sensation of a ball, with constriction and suffocation, in the throat, and a feeling of extreme pain in the head. The attacks recurred almost every second day. They have not again made their appearance.

Apart from the muscular atrophy and other symptoms we are about to describe the patient feels in good health. The thoracic and abdominal organs act normally; sexual appetite persists.

Present condition.—There is well-marked atrophy of the left thenar and hypothenar eminences. Hand "en griffe." Less wasting of the forearm, where some movements of pronation and supination still persist.

Right hand is less atrophied than the left. The last three fingers are fixed and contracted and cannot be extended. Some of the movements completely lost on the left side still persist on the right.

Fibrillary twitchings in all muscles of the body.

Sharp intermittent pains in the right heel.

The reflexes of the upper extremities are normal. Patellar tendon reflexes are greatly exaggerated on both sides. Gait is rather good, but there is a slight embarrassment in raising the feet from the ground.

Two eschars are to be seen on the palmar aspect of the thumb and index finger, resulting from burns produced, unknown to the patient, by the cigarette. They have been in existence since he was 17 years old.

Sensibility to pain is abolished in the upper extremities to

within two fingers' breadth of the elbow joint. A patch of anæsthesia occupies the interscapular region, the nape of the neck, and back of the head.

On the lower limbs hyperæsthesia is arrested at the instep.

Sensation is normal on the feet. Over the rest of the body sensations of pain are normal.

Over the areas of normal sensation one produces, on pricking the skin, a small spot very like a flea-bite. This phenomenon does not appear on the anæsthetic regions.

On the right forearm the patient bears a semi-circular cicatrix produced by the constriction of an elastic band, by which the shirt-sleeve was retained in position. The patient, who rarely divested himself of his shirt and of a woollen vest which covered it, did not notice the wound until the band of india-rubber had penetrated the tissues for a considerable distance.

The *sense of touch* is, on the whole, preserved. It may be said to be less acute over the regions of insensibility on the hands and forearms, and over an area bounded above by a horizontal line passing through the umbilicus, in the median line by the linæ alba, externally by the outer border of the right loin and outer border of the right thigh and below by the knee. In this last-mentioned area tactile impressions are perverted rather than abolished.

The *sense of cold* (ice) is completely abolished on the upper extremities up to the elbows and diminished above this up to the root of the shoulder. On the trunk it is normal; on the lower extremities it is increased.

The *sense of heat.* On the left hand and forearm, thermo-anæsthesia to 100° and below this point. On the right hand and forearm it is abolished for 90° and under. Right and left arms (as far as the root of the shoulder) abolished for 75° and under. On the lower extremities the sense of heat is hyper-æsthetic; over the rest of the body it is preserved.

Muscular sense is abolished.

Eyes.—Examined 17th July, 1889. Pupils unequal, the left being the smaller. Well-marked nystagmus. Papillary reflex less active in the left. Left upper lid is not so well raised as the right; narrowing of the palpebral fissure. Retraction of the left globe.

The other special senses are normal.

Electrical examination (made by M. Vigouroux on the 16th July, 1889). The interossei respond neither to the faradic nor galvanic currents. On the whole the muscles, which are more or less intact, may be said to respond normally.

DESCRIPTION OF PLATE (page 115).

This plate is a reproduction of one which accompanies Bruhl's monograph. The author acknowledges his obligation to M. Déjerine for the preparations which are delineated.

FIG. I.—A central glioma of the cord, from the lower part of the lumbar enlargement, showing the beginning of the cavity.

FIG. II.—A central glioma with cavity. (From the middle region of the lumbar enlargement.)

FIG. III.—A large cavity with a limitary membrane formed of gliomatous tissue (from the middle part of the cervical enlargement).

FIGS. IV., V., AND VI.—A central glioma of the cord with a cavity in its substance. (The sections were made in the cervical region, but the glioma extended the whole length of the cord.)

Copied from Bruhl on Syringomyelia.

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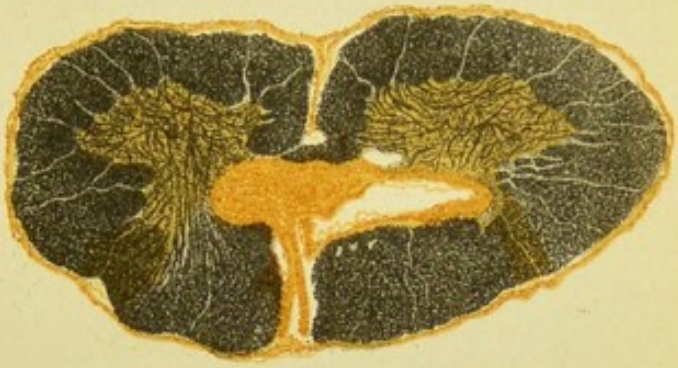

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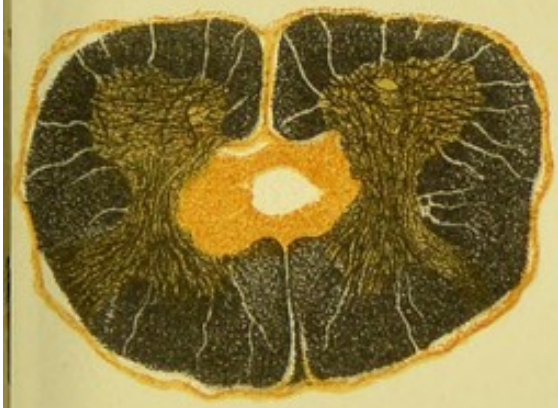

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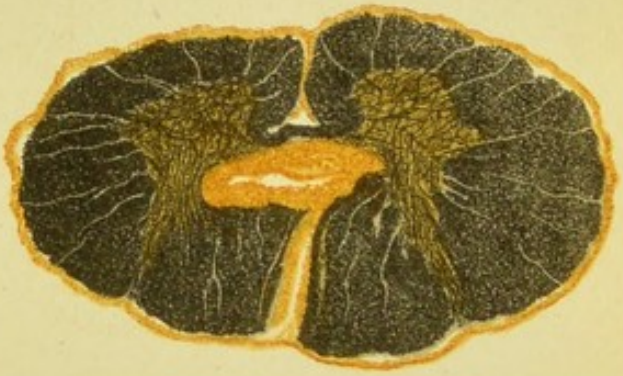

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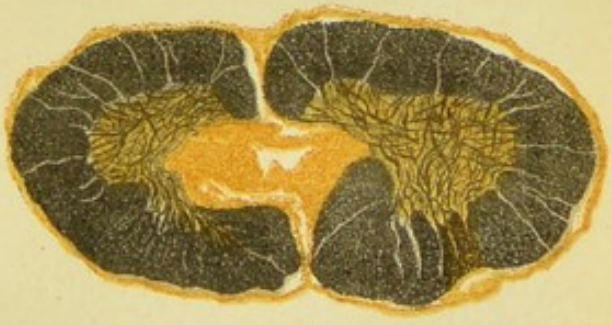

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A CASE OF

CEREBRO-SPINAL SYPHILIS,

WITH AN

UNUSUAL LESION IN THE SPINAL CORD.

BY

HENRY M. THOMAS, M.D.,

Assistant in Neurology, Johns Hopkins Hospital.

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A CASE OF CEREBRO-SPINAL SYPHILIS, WITH AN UNUSUAL LESION IN THE SPINAL CORD.

By Henry M. Thomas, M.D.

Clinical Summary.—*Male, æt.* 33. *No syphilitic history. Paralysis of right sixth cranial nerve, accompanied by intense headache in January, relieved by treatment. In May, headache and paralysis of the left fourth nerve. In November, paralysis of the left third and fourth nerves. Weakness of the muscles on the right side of the body, with slight sensory changes. Increasing coma. Death.*

Anatomical Summary.—*Syphilitic orchitis. Syphilitic end-arteritis (gummatous) of cerebral arteries. Gumma on left third nerve, involving left crus. Gummata on left fourth, right sixth, ninth, and twelfth nerves and in brain. Gumma on anterior roots of third cervical nerves. Meningitis of cord. Poliomyelitis of lumbar enlargement. Hyaline degeneration in the wall of the small arteries.*

The patient was first seen at his house two weeks before his death, when his mental condition was such as to make it impossible to obtain from him any reliable history of the cause or beginning of his illness.

His friends were able to tell but little about his previous history, so that the notes which were taken on his admission to the Hospital are incomplete. However, through the kindness of Dr. Hiram Woods, who saw the patient several times, and who has lent me his notes, I have been able to add some important facts which explain in an interesting way the lack of agreement between the symptoms noticed during life and the condition found at autopsy.

This case seems to me again to emphasize strongly the im-

portance of a full and accurate history of an illness, if we are to hope for a diagnosis more than partially correct.

The history which was obtained at the Hospital from his friends was as follows :—

J. K., æt. 33, driver ; admitted to the Hospital November 14, 1889.

Up to the beginning of the present trouble the patient has been a strong, healthy man. As a younger man he led a very irregular life, but his friends do not know whether he contracted syphilis or not. A little more than a year ago he began to complain of a very severe pain in his head, in the hope of relieving which he had his teeth drawn. After this operation his mouth became very sore. His headache has persisted in greater or less intensity ever since, often being so severe as to prevent his sleeping at night, and to require the use of opiates.

Soon after his head had begun to ache, he complained of seeing double, and went for treatment to the Presbyterian Eye and Ear Hospital. His friends think his right eye was affected at that time.

His left eye-lid has been drooping for several months.

From time to time the patient has complained that the right side of his face felt numb. The weakness in the muscles of his right arm and leg has been noticed only during the last few weeks, and was discovered by his physician.

The patient had to give up work five weeks ago, and has been in bed three weeks. His mind became evidently affected on the 13th of November.*

* Abstract from Dr. Hiram Woods' notes :—

J. K. was seen first on January 28th, 1889. He came complaining of intense pain in the head and double vision. An examination revealed a paralysis of the right external rectus.

Vision, $\frac{20}{20}$; eye-grounds normal.

Patient acknowledged having had gonorrhœa but denied syphilis, and no history of secondary symptoms could be obtained.

Iodide of potassium was given three times a day in 40 grs. doses, and passive motion was applied to the weak muscle. Under this treatment he rapidly improved, the muscle recovering completely.

In May of the same year he was again seen. He complained this time as before of intense pain in the head and double vision. His double vision troubled him when he looked down. Upon examination all the muscles of the right eye were found to act normally. Tests by prisms revealed a weakness of the superior oblique muscle of the left eye.

Potassium iodide was ordered, but the patient was lost sight of, and so the result of the treatment cannot be stated.

Present condition.—Intelligence is clouded. He is able to obey commands but his answers are unreliable, as he often gives different answers to the same question.

*Eyes.**—The left pupil is dilated; the right is of normal size. The left pupil does not react to light, and the right only sluggishly. The left eye-lid droops and he is unable to raise it. He cannot move the left eye either to the right, up or down; he is able to move it toward the left.

Face.—The muscles which contract and raise the eye-brows, and those which close the eyes, act well and equally on both sides of the face. When attempting to expose his upper teeth the muscles on the left side of the mouth act slightly more than those on the right. He opens his mouth with difficulty, and in doing so the lower jaw is moved slightly to the right. The right side of the tongue is higher than the left. The tongue is protruded towards the right.

Sensation is practically normal, perhaps a little dull on the right side.

Hearing is sub-normal on the right side.

Arms.—Muscular strength of right arm is decidedly below that of left. The deep reflexes are exaggerated on both sides.

Legs.—The right leg is markedly weaker than the left. The patellar clonus and ankle clonus are well marked on both sides, and the plantar and cremasteric reflexes are also very active.

The clinical diagnosis was of a tumour of the left crus, involving the left third, and possibly the fourth nerve. The growth was thought to be syphilitic. He was put upon large doses of iodide of potassium with mercurial inunctions.

The patient remained in practically the same condition except that he became more and more unconscious.

On November 25th, the note is: "Patient in a semi-comatose condition, cannot be easily roused, passed a very restless night. Stiffness in right arm very marked. Patellar clonus very much diminished, so also the ankle clonus. The knee-jerks are still active, especially on the right side."

For 36 hours before death the patient lay in a comatose condition; mucus plugged up the respiratory passages; respiration

* An ophthalmoscopic examination was made, and the eye-grounds were found to be normal; but as there is no note to that effect in the Hospital history, and I have to depend upon my recollection of this point, I have omitted it from the text.

became very rapid; pulse not to be counted. He died quietly about 2 a.m., November 28th.

Autopsy.—Seven hours after death. Body large, strongly built, well nourished. Rigor mortis strongly marked in all the extremities. On the dorsum of the glans penis, just above the corona, there is a small depressed cicatrix. Skin over the body is smooth and presents no evidence of a former eruption.

Abdomen.—The abdominal cavity contains a few cc. of clear fluid. Peritoneum normal.

The liver, spleen, kidneys, stomach, and intestines are all apparently normal. Both testicles are firm, indurated, and contain a fine diffuse growth of connective tissue.

Thorax.—Præcordial space uncovered by lung 8 × 6 cm. Both lungs adherent to pleura by slight adhesions; in left pleural cavity a few cc. of clear fluid; in right same amount, somewhat cloudy.

Both layers of pericardium smooth. Heart flaccid; on both sides of heart fluid blood mixed with dark coagula.

Myocardium pale. Left ventricle 12 mm. thick, right 3 mm. Aorta, above valves, 73 mm. wide. Valves normal. Coronary arteries wide, with here and there slight thickening of the intima. Aorta contained a few whitish non-calcified patches.

In the posterior portion of the lower lobe of left lung a few areas of croupous pneumonia. Lung elsewhere slightly œdematous. Mucous membrane of bronchi injected; pus squeezed from small bronchi in any place in lung.

Entire posterior portion of lower lobe of right lung, and small portion of middle lobe, in a state of gray pneumonic consolidation. Bronchi red, and injected. Pus in small bronchi everywhere.

Brain.—Skull-cap thin, dura not adherent, vessels of dura full, longitudinal sinus contains large clots; the veins of the pia entering the longitudinal sinus much distended.

Base.—Arachnoid clear, olfactory bulbs and nerves normal; optic nerves and chiasm uninvolved; infundibulum and pituitary body normal; the right third nerve lies free—a little reddish at its point of emergence around the crus.

The left third nerve is involved at its point of emergence in an ovoid gummous mass, which lies between the left cerebral artery and the anterior margin of the pons and the inner margin

of the left crus. The gumma appears to be really in the nerve itself.

The left fourth nerve as it passes around the crus is involved in a small gumma the size of a split pea; on the right side the fourth nerve is free.

Fifth nerve, left side, is uninvolved; right side there is little matting and adhesion to the dura.

Sixth nerve on left side normal; on right side the first centimetre of the nerve, after emergence behind the pons, is involved in an ovoid gummatous growth. Running transversely across this, and adherent to it, is a branch of the basilar artery.

Seventh pair on both sides uninvolved.

The pneumogastric on the left side free; on the right side the lower two or three roots are involved in a small gumma. The left spinal accessory and hypoglossal normal.

On the right olivary body, and involving the upper filaments of hypoglossal, there is an irregular gumma 12 by 6 mm.; it is attached to one of the posterior cerebellar arteries, a branch of the right vertebral.

Arteries.—The carotid on both sides normal; the right anterior cerebral as it crosses the inner root of the olfactory nerve is hard and firm, and surrounded by slightly thickened meningeal tissue. At the anterior communicating there is a small nodular gumma; the meninges are here adherent, and there is a considerable area of gummous infiltration, chiefly involving the inner aspect of the first frontal gyrus. The anterior cerebrals beyond this point are small; they contain blood; the left anterior cerebral from the carotid to the anterior communicating is closely adherent and surrounded by thickened gumma tissue.

The posterior communicating on both sides normal; the right is larger than the left.

The right posterior cerebral is free; the left at its emergence from the basilar is opaque-white in colour, and is adherent to the gumma on the third nerve.

The basilar presents three ovoid dilatations due to the presence of gummata in its walls.

The left vertebral is free; the right is involved in a small gumma just as it passes along the side of the olivary body.

On one of the cerebellar branches of the basilar on the right side is a small gummatous nodule. The left crus is softened at

its outer and under aspect; the pons and medulla appear normal.

The convolutions at the base present no special anomalies.

The fifth ventricle is dilated; the hemispheres are normal, white and gray matter are firm and healthy looking; the ventricles are not dilated.

Cord.—Meninges of cord of ordinary thickness. Cord itself firm. On the anterior roots of third cervical nerve on right side, about 1 cm. from the cord, a small gummatous tumour.

Anatomical diagnosis.—Croupous pneumonia of both lungs, more marked on right side. Acute bronchitis. Syphilitic orchitis. Syphilitic endarteritis (gummatous) of cerebral arteries. Gummata on cranial nerves and in brain. Gumma of third cervical nerve. Anterior poliomyelitis in upper lumbar cord.

Microscopical Examination.—The brain and spinal cord were hardened in Müller's fluid, and many microscopical sections were prepared and studied. This work was done in the Pathological Laboratory of the Johns Hopkins University, and I am indebted to Dr. Welch and Dr. Councilman for their advice and assistance.

Arteries.—Sections of the basilar artery (Fig. I.), at the site of the enlargements noticed at the time of autopsy, show the following condition. The nodules in the wall of the artery are seen to be composed of three, more or less, distinct zones. The outermost layer (*a*) is made up of a great number of small round cells, whose nuclei stain deeply and well with hæmatoxylin. This layer is rich in blood vessels, which are filled with red blood corpuscles. Here and there one sees a larger blood vessel, the wall of which is completely infiltrated with these small cells, and whose lumen is obliterated. In the second layer (*b*) the cells are not so plentiful, their nuclei stain well, and one is able to distinguish the formation of fibrous tissue. The third and innermost layer (*c*) is composed of necrotic tissue; in it there are no well-stained nuclei, but merely the remains of these. This tissue appears firm and fibrous, and contains the remains of obliterated blood vessels.

This new growth occupies for the most part the adventitia of the artery, but also encroaches in places on the muscular coat.

The infiltration of the small round cells which make up the outer coat is not confined to the nodule itself, but extends in

the adventitia to a greater or less extent all round the artery. The muscular coat, except where it is invaded by the new growth, seems to be normal. The elastic lamella is intact, but the internal coat is very extensively thickened. This thickening is made up of new-formed fibrous tissue, and encroaches upon the lumen of the artery very materially. At places (Fig. I., *d*) there is an infiltration of small cells into the thickened intima. Where this infiltration occurs, it occupies the portion nearest the lamella, and in it we see numerous new-formed blood vessels.

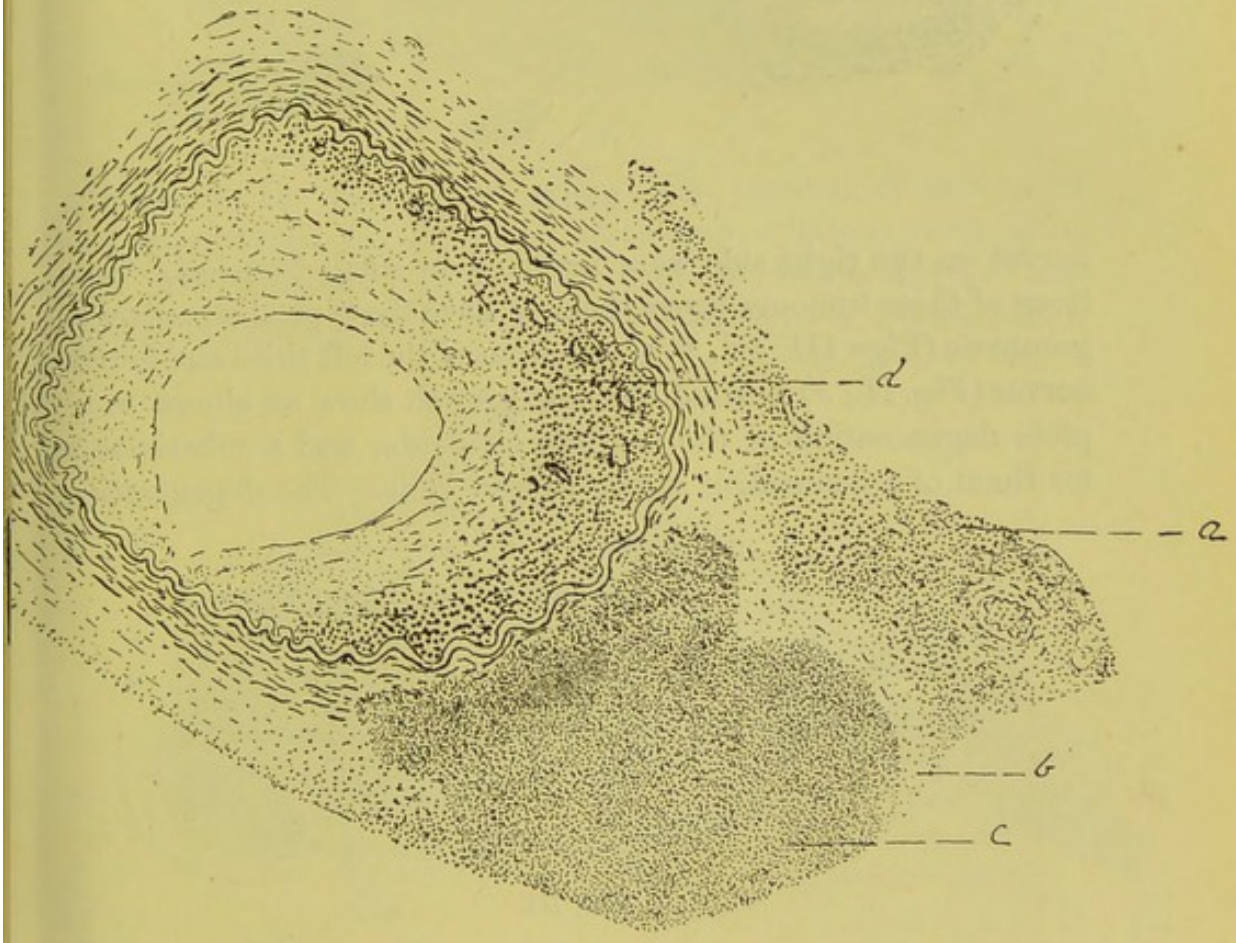

FIG. I.

Sections through the other arteries at the base of the brain show them to be all more or less diseased. Where their walls are not the seat of actual gummatous growths, the adventitia is usually infiltrated with small round cells, and the intima is the seat of an increase of connective tissue. The muscular coat usually appears normal, but it is in places thinned, and here its nuclei have lost their characteristic appearance. This change usually extends only part way round the artery, and we find that

the greatest thickening of the inner coat corresponds accurately to the degenerated part of the muscular coat. These changes vary greatly in different arteries; both internal carotids, just as they enter the base of the skull, are affected, the right much more than the left.

Nerves.—At the autopsy it was found that the left third, the left fourth, the right sixth, and some roots of the ninth and twelfth

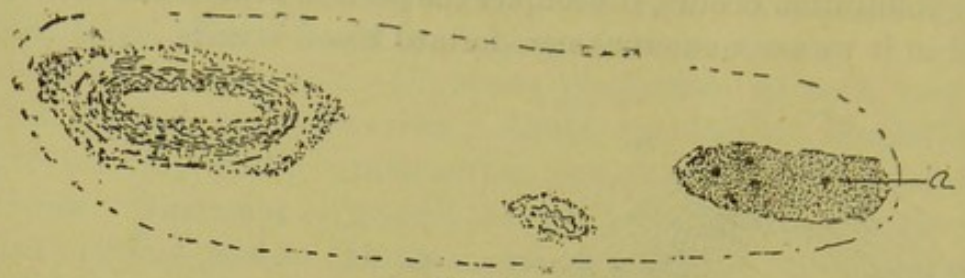

FIG. II.

nerves on the right side were involved in small tumours. Sections of these tumours prove them to have the typical structure of gummata (Figs. III., IV., V.). Sections of the left third and fourth nerves (Fig. II., *a*) beyond the new growth show an almost complete degeneration of the nervous elements, and a substitution for them of a connective tissue rich in cells. The degeneration

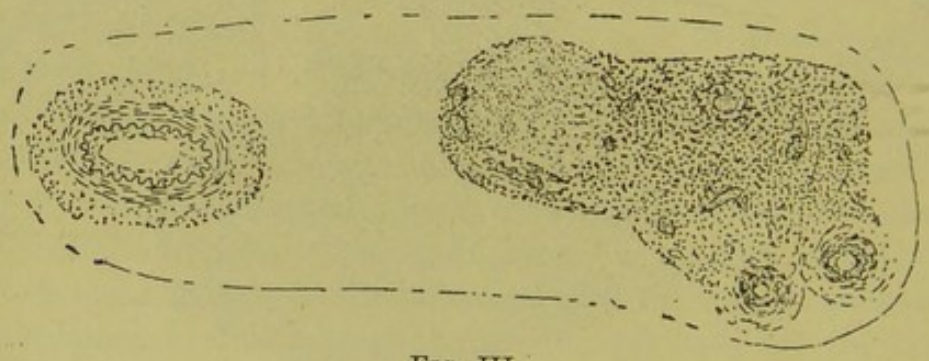

FIG. III.

of these nerves is well seen in sections prepared from the tissues which occupy the back of the orbit on the left side. On these preparations we have sections of the optic nerve, of the nerves which supply the muscles of the eye-ball, and sections of those muscles themselves. The degenerated nerves are easily distinguished by the contrast which they make to the healthy branches of the sixth. It is interesting to notice the well-marked atrophy of certain muscles, presumedly those to which the diseased nerves are distributed.

The optic nerves are normal on both sides.

The gummata on these cranial nerves are all connected with the walls of small arteries. This is well illustrated by the fourth nerve, parallel to which runs an artery, which becomes closely

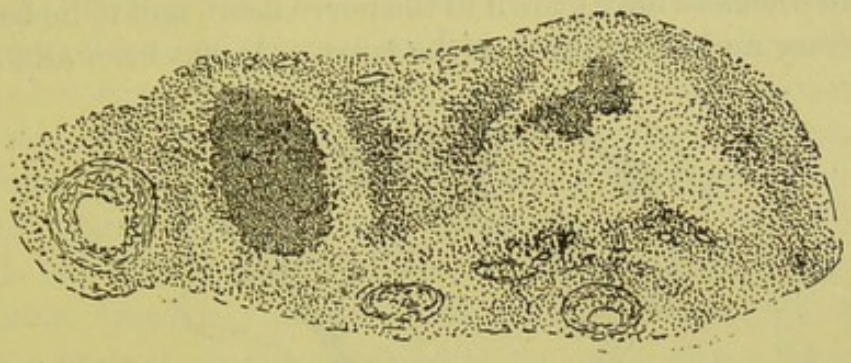

FIG. IV.

adherent to the gummatous mass. The sections of this nerve and artery (Figs. II., III., IV.) taken from different levels illustrate this connection, and it is also well seen in the series of sections of the gumma on the right sixth nerve (Fig. V.), which show

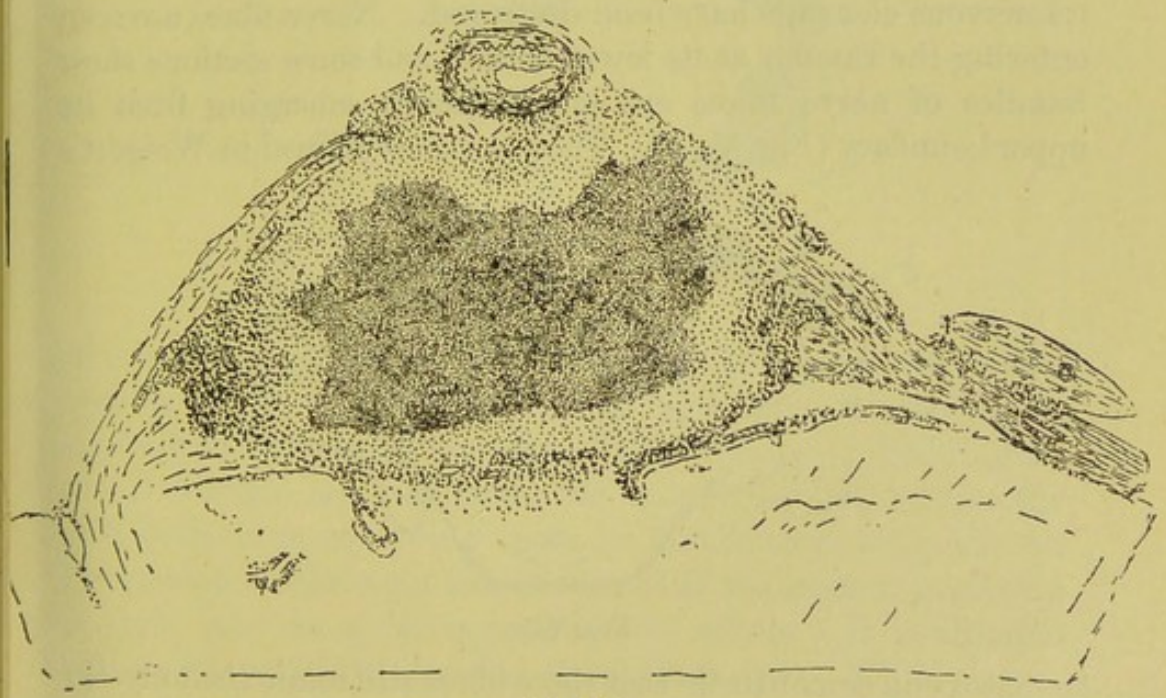

FIG. V.

the artery running over this gumma, becoming obliterated and lost in the tumour mass. Sections of the right sixth nerve beyond the gumma show that this nerve, although not normal, still contains quite a number of well-preserved nerve fibres contrasting strongly with corresponding sections from the third and fourth

nerves. As compared with sections of the left sixth nerve it is smaller, contains more connective tissue and fewer nerve fibres. Sections (Fig. V.) of this gumma, prepared so as to cut the nerve longitudinally, show its relations in an interesting way. The tumour seems to have grown in the nerve itself, and to lie between the artery and the surface of the pons. As has been said above,

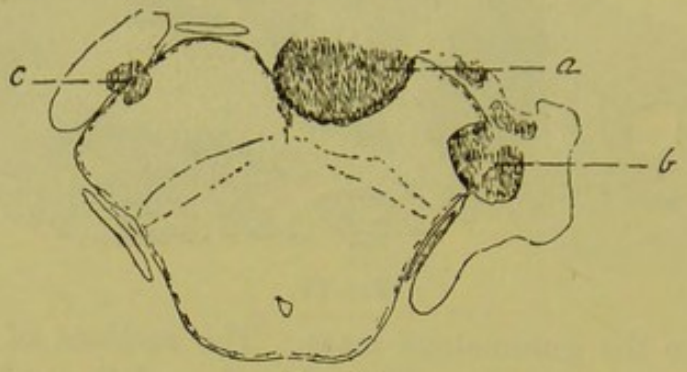

FIG. VI.

the artery is lost in the tumour mass. The superficial layers of the pons have been invaded by an infiltration of small cells, and its nervous elements have been destroyed. Nerve fibres are seen entering the tumour at its lower border, and some sections show bundles of nerve fibres cut longitudinally emerging from its upper boundary (Fig. V., *a*). These sections stained in Weigert's

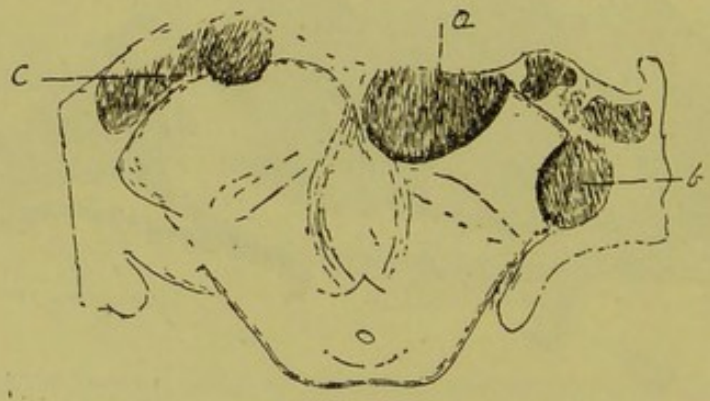

FIG. VII.

hæmatoxylin demonstrate that these fibres still retain their myelin sheath. The neurilemma which separates these bundles of nerve fibres is infiltrated with small cells, and the blood vessels which run in them are also surrounded by these cells.

The gumma involving the third nerve also extends into the substance of the left crus. Sections cut at different levels through the crura (Figs. VI., VII., VIII., IX.) show that this tumour (Figs. VI.,

VII., *a*) involves about the inner third of the cross-section of the left crus and extends anteriorly for a little more than one centimetre. These sections show that this part of the brain is also invaded by numerous other gummatous growths. In the section nearest to the pons (Fig. VI., *b*) there is on the left side, besides the gumma described above, a smaller tumour situated partly in the crus involving its outer angle and partly in the structures surrounding it. There are also other still smaller gummata in the surrounding tissue. On the right side the crus is encroached upon, at its periphery, by a small gummatous mass (Fig. VI., *c*). Towards the brain we find the tumour associated with the left third nerve becoming smaller and disappearing (Figs. VII., VIII., *a*), while the tumour noticed at the angle of the left crus, together with those in the surrounding tissue, become larger

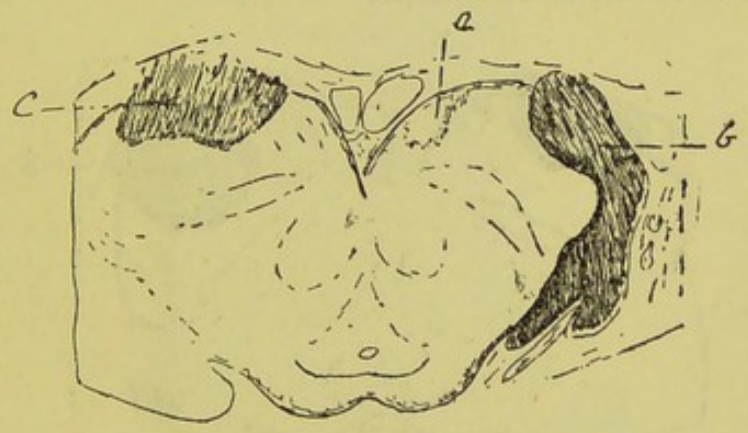

Fig. VIII.

and seem to coalesce, forming an irregular gummatous mass, lying for the most part outside of the crus, but infiltrating its periphery to a greater or less extent (Fig. VIII., *b*). Still higher up this gumma becomes more and more confined within the limits of the crus, occupying about its middle third (Fig. IX., *b*). The gumma on the right side increases as we ascend, involving the right crus to quite a considerable extent; it is situated for the most part in the middle third (Figs. VII., VIII., *c*).

In sections of the medulla and pons numerous small gummata are to be seen lying in the meninges and in the periphery of the nervous substance. Some of the sections show very clearly that this gummatous infiltration is a direct extension of that in the meninges, and in general it may be stated that all the gummata have this connection.

Besides the tumours noticed above there were others found here and there in the base of the brain.

Spinal Cord.—After having been hardened in Müller's fluid, the fresh-cut surfaces of the spinal cord show that the right lateral column is less deeply coloured than the other white tracts. The left lateral column is also of a somewhat lighter colour than the surrounding tracts. At the commencement of the lumbar enlargement the anterior gray horns appear diseased; a little lower down hemorrhages are evident in them, and still lower the gray matter seems to have been disintegrated, leaving a cavity. Just below this there is an area in which the gray matter, although evidently diseased, presents no loss of substance. This is again followed by hemorrhages and cavity formations in the anterior horn. Below this second more pronouncedly diseased area, the gray matter seems to be normal.

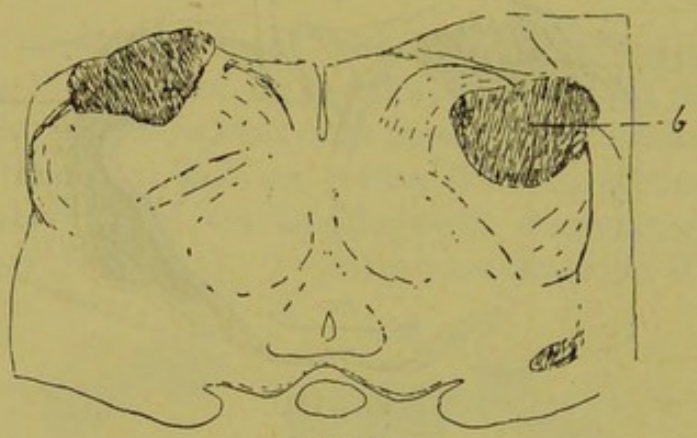

FIG. IX.

Sections were cut from the different regions of the cord and stained in hæmatoxylin and eosin, carmine, and by Weigert's hæmatoxylin method.

The pia mater throughout the whole length of the cord is infiltrated with small round cells. This infiltration is most intense about the anterior longitudinal fissure, and is best seen in sections cut from the diseased area of the lumbar enlargement (Fig. X.). The vessels which run in the pia mater are usually surrounded by an intense cellular infiltration, and some of the smaller ones are obliterated by it. The infiltration accompanies the vessels as they run into the fissures, and to some extent into the cord. The connective tissue surrounding the nerve roots is more or less affected.

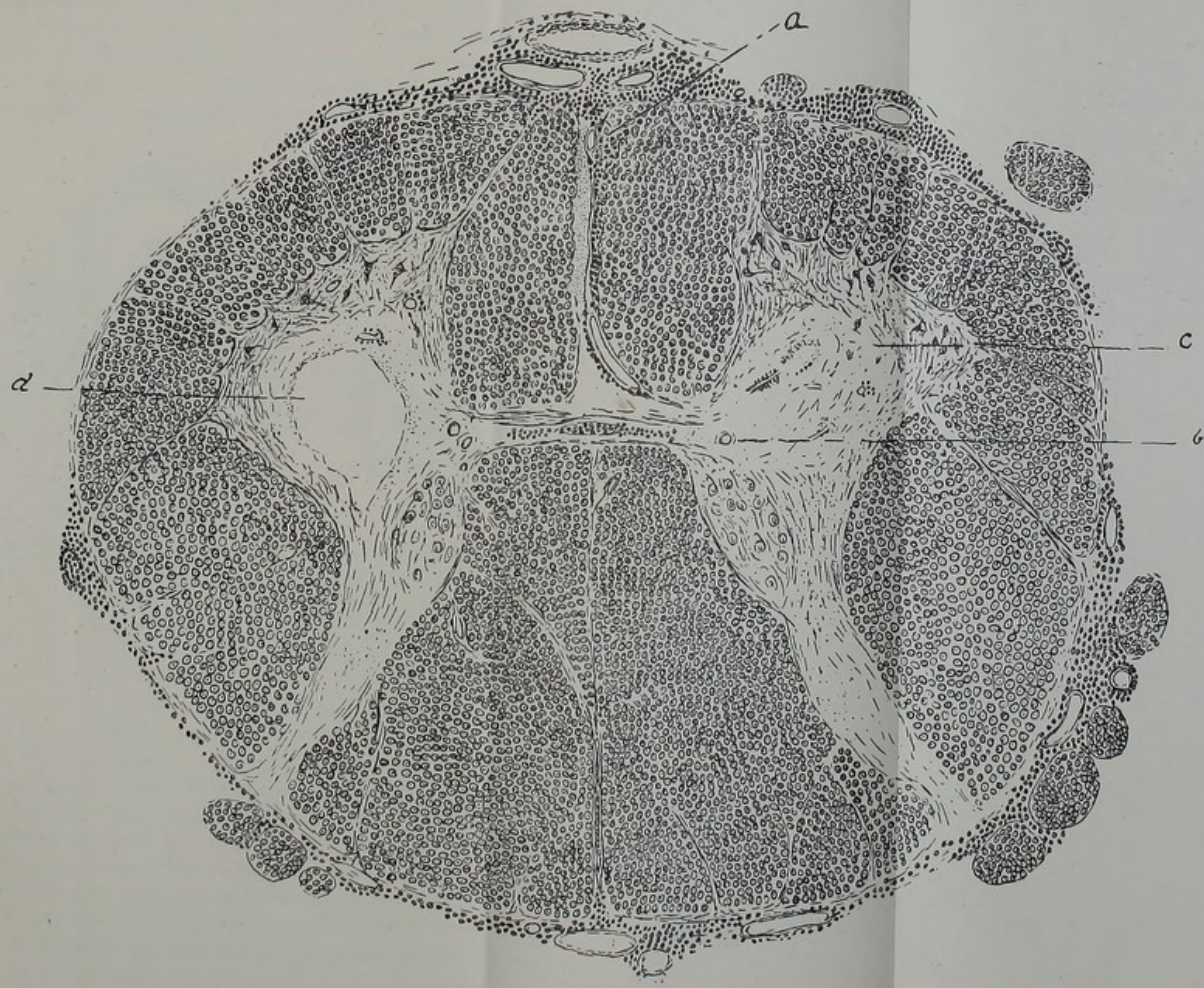

Fig. X.

The walls of the larger vessels, which are seen in cross-section lying about the cord, seem to be but little affected, except by the cellular infiltration of their adventitia. The internal coat shows no marked thickening. Many of the smaller vessels present a very striking condition of their coats, these having undergone a hyaline degeneration. This is well seen in the vessels running in the anterior and posterior median fissures (Figs. X., *a*, and XI.),

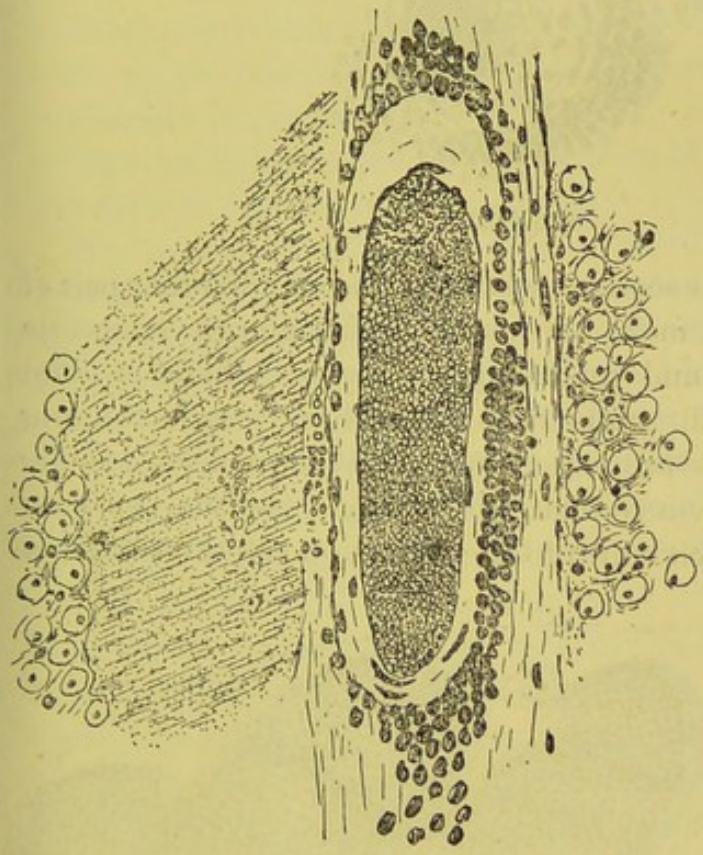

FIG. XI.

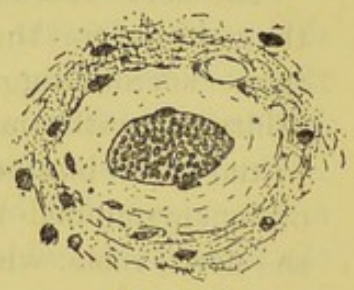

FIG. XII.

and in the vessels which are seen in cross-section at the root of the anterior horn (Figs. X., *b*, and XII.), and in the little vessels running in the gray matter.* The walls of the vessels which present this change appear homogeneous with but very few scattered nuclei, and are highly refractive. This hyaline substance, if such it be, does not stain to any extent in sections prepared as these were. The vessels are usually surrounded by small round cells. This change in the walls of the vessels is to be seen in sections from every portion of the cord; it is also present in sections of the medulla and pons, and some of the

* Figs. XI. and XII. are cross-sections of Fig. X. at *a* and *b* respectively, shown under a higher power.

vessels running among the nerve roots in the cauda equina show this change. Some also in this situation show a typical endarteritis obliterans (Fig. XIII.). It is, however, most marked in the lumbar region where the degeneration in the anterior horn is present.

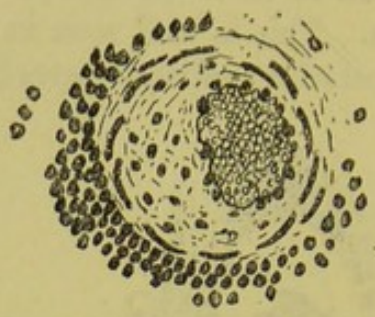

Fig. XIII.

The nerve roots as seen on sections from the different parts of the cord are for the most part normal, although the connective tissue surrounding and separating the nerve bundles is often infiltrated with small round cells. The blood vessels running in the nerve bundles are more prominent than is usual, and are often surrounded by a cellular infiltration. Sections cut from the nerve roots, which run into the gumma on the third cervical

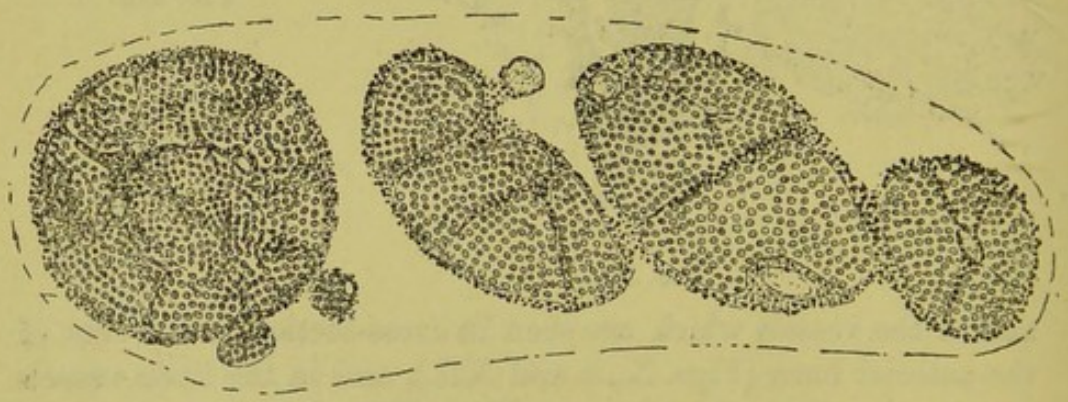

Fig. XIV.

nerve (Fig. XII.), show that near the periphery of the tumour the cellular infiltration is confined to the connective tissue elements. The nerve fibres, just before they enter the tumour mass, seem remarkably well preserved. The nerve roots making up the cauda equina show no marked abnormality.

The gray matter in the cervical region is nearly normal. It appears somewhat more richly supplied with blood than is usual, and there are here and there small capillary hemorrhages. The

large multipolar cells in the anterior horns are well preserved and are present in about normal numbers. In sections from this region, stained by Weigert's hæmatoxylin method, the lateral columns appear macroscopically less deeply stained than the other white tracts. Under the microscope it is difficult to convince oneself of any marked change in the nerve fibres of these columns. The axis cylinders are present in normal number, surrounded by thin myelin sheaths, which do, however, appear somewhat distended. The connective tissue is not noticeably increased.

The condition in the thoracic region of the cord is practically the same as that seen in the cervical.

The microscopical examination of the diseased portions of the lumber region reveals here very interesting changes. Besides those changes described above as affecting the meninges and blood vessels, there is a most extensive destruction of the gray matter. In the anterior horns, at the points where the process is apparently commencing, the blood vessels are conspicuous, their walls usually having undergone the hyaline degeneration, and often infiltrated with small cells. Capillary hemorrhages are frequently seen surrounding these vessels. The neuroglia has lost its typical structure and has become rarefied, staining here much less deeply than in the undiseased regions. It presents a finely fibrous appearance, and here and there branched neuroglia cells are seen. The smallest vessels are easily seen on account of their swollen hyaline walls. The large ganglion cells, which should occupy this affected area, have either completely disappeared or are represented by their shrunken and degenerated remains. These changes do not usually occupy the whole of the anterior horn, but are, more or less, limited to certain portions of it. The disease affects more especially the central part of the gray matter, leaving its superior and outer portions comparatively unaffected (Fig. X., *c*).

At the place where this destructive process has reached its greatest intensity, there is a complete loss of substance in the gray matter (Fig. X., *d*). These cavities, which occupy for the most part the central portion of the anterior horn, but which extend somewhat into the posterior horn, are surrounded by an area of degenerated tissue. This tissue is extensively infiltrated

with well-preserved red blood corpuscles. In places near the border of the cavity, one sees the deposit of a homogeneous finely granular substance, which stains readily with eosin. This substance is seen usually in connection with blood vessels, and is apparently the same as that which accompanies the vessels running in the anterior fissure (Fig. X., *a*).

In sections through the lower portion of the lumbar enlargement, the gray matter is normal, containing a great many large, well-stained ganglion cells and normal nerve fibres.

The white tracts in the lumbar enlargements present practically the same condition as that described in the thoracic region.

A short review of this case may help us to keep in mind what seem to be its important features:—

The patient, a man 33 years old, acknowledged to having had gonorrhœa, but denied any syphilitic infection; he began to complain of intense headache about one year before being admitted into the Hospital. In January, 1889, he consulted Dr. Hiram Woods on account of double vision. He was at that time found to have paralysis of the right external rectus muscle; this paralysis was completely cured under the use of iodide of potassium. In May of the same year he again visited Dr. Woods, who discovered a weakness of the superior oblique muscle of the left eye, the other muscles of both eyes acting normally. There were no ophthalmoscopic changes in the fundus of either eye. Dr. Woods then lost sight of him, and the patient applied for admission to the Hospital on the 13th of November, 1889, two weeks before his death. He was then unable to give an account of himself, but his friends said that he had been suffering for about a year with very severe headaches, and with difficulty of vision; also that he had complained from time to time of some numbness on the right side of his face. He had stopped work a month before, and had been in bed three weeks. The examination showed that the patient had ptosis on the left side, the left pupil was dilated and fixed, the left eye-ball could only be moved outwards; *i.e.*, there was complete paralysis of the left third and fourth nerves. The right eye showed no abnormality. There was no optic neuritis. Sensation on the right side of face seemed somewhat duller than on left, and the muscles on the whole right side of the body were much weaker than those on the left side. The deep reflexes were everywhere exaggerated.

Not knowing at that time the history which we subsequently got from Dr. Woods, and finding a paralysis of the left third and fourth cranial nerves, combined with a weakness of the muscles on the right side of the body, it seemed clear that there must be a growth on the left crus, and that such a lesion would explain all the symptoms.

The autopsy revealed a growth on the left crus, involving the third nerve; besides this, the expected tumour, there were many others whose presence had not been thought of; thus the left fourth nerve, the right fifth, sixth, ninth, and twelfth nerves were all more or less involved in tumour masses. Other growths were found in the crura on both sides and in the under surface of the brain. Marked changes were also found in the spinal cord.

The endeavour to bring the symptoms noticed during life into any sort of accord with the condition found at the autopsy, seems at first sight nearly hopeless, and indeed it only can be done in a very imperfect manner. In the first place, it must be acknowledged that we noticed no symptoms to correspond to the very marked changes which were found in the spinal cord. It should be remembered that the condition of the patient when first seen was such as to make the examination difficult. What we did find was a partial right hemiplegia with slight sensory changes, combined with a paralysis of the left third and fourth nerves, and we assumed, a growth on the left crus involving these two nerves. The fourth nerve, instead of being involved in the same growth, was the seat of an independent tumour. The final symptoms would have been the same in either case, and the history which was then unknown was the only thing that might have led to the proper diagnosis. The tumours on the other cranial nerves were all on the right side, and tended, with one exception, that on the sixth, merely to intensify somewhat the hemiplegic symptoms, and it is not possible to determine even now just the extent to which the symptoms depended on the lesions of the nerves or on those in the crus; the anæsthesia, for example, of the right side of the face was so slight that the tumours of the left crus might well have accounted for it if no lesion had been found of the fifth nerve.

The tumour on the right sixth nerve should have caused paralysis of the external rectus muscle of the right eye, a symptom

which certainly ought not to have been overlooked, and having tested the movements of the right eye shortly before death, and found them normal, we were at a loss to explain its presence. Soon after the autopsy we learned by chance that Dr. Woods had seen the patient, and through his kindness we were able to use his notes, which threw a great deal of much-needed light on the case. It will be remembered that Dr. Woods treated the patient in January, 1889, for a paralysis of the right external rectus muscle, and that under anti-syphilitic treatment this muscle regained completely its normal function, and that when Dr. Woods saw him in May, it was still acting well. So it seems fair to consider that this nerve was performing its function at the time of the death of the patient, and several months preceding it, in spite of the presence of the gumma, which was found on it at the autopsy. The microscopical examination of this nerve beyond the tumour shows that, although it could not be considered normal, still it contained a good many well-preserved nerve fibres, a very different condition from that found in the left third and fourth nerves, which were paralyzed at the time of death. Sections of this gumma (Fig. V.) correspond exactly to those of the gummata on the other cranial nerves. I was unable to trace any nerve fibres running through the gummatous tissue, and I do not understand how so many fibres escaped destruction in it. We know that the granulation tissue, which precedes the gummatous formation, grows primarily in the connective tissue surrounding the nerve fibres (Fig. XIV.), and that a nerve may be quite extensively involved in the process and still retain its function (Siemerling).* It does, however, seem remarkable that such a tumour, situated as this one is, should not have produced a total destruction of the nerve. I have been unable to find a record of any similar case.

Any symptoms that may have been produced by the other tumours which involved the left crus were masked by those caused by the original gumma. It is interesting that so many separate lesions should have been so arranged that the resulting symptoms could all be accounted for by the supposition of one tumour. The importance of the previous history of this case is obvious.

Besides the gummata mentioned there were others in various

* Arch. f. Psychiatrie, xxii., p. 191.

parts of the brain; these, with the exception of those in the right crus, were so situated as not to produce any focal symptoms. The latter apparently affected the pyramidal tracts on that side, and should have caused weakness on the left side of the body. The patient, however, had as much strength on that side as seemed compatible with his general condition, and the only symptom which can be referred to this lesion is the exaggeration of the deep reflexes.

From the standpoint of pathological anatomy, this case is also of interest. The arteries at the base of the brain present a very typical example of the gummatous arteritis described by Baumgarten,* and the only thing which requires special mention is the very perfect way in which some of the sections illustrate the point insisted upon by Thoma,† that the new growth of connective tissue in the intima of an artery is compensatory to a diseased and weakened condition of its media. On these sections there is a more or less sharply localized degeneration of the muscular coat, and corresponding to this, both in situation and intensity, there is a new formation of connective tissues in the internal coat.

The gummata on the cranial nerves and in the substance of the brain are typical and require no minute description. It was noticed in the description of the microscopical appearances that there was quite a good-sized artery attached to each of the tumours involving the cranial nerves, and the thought suggests itself that the point where a vessel crosses a nerve may be peculiarly favourable for the growth of the syphilitic tumour.

The lesions found in the spinal cord are especially interesting, partly on account of the comparatively few records of autopsies in cases of syphilis of the spinal cord, but particularly from the occurrence of the local destruction of the gray matter in the anterior horns, which makes this case nearly if not quite unique.

The changes which are produced by syphilis in the cord, and its membranes, have in the course of the last few years been the subject of a number of investigations. Greiff‡ in 1882 collected thirteen cases from literature, and reported a case of his own.

* Virchow's Arch., Bds. 76 and 86. † Virchow's Arch., Bds. 93, 95, 101, *et seq.*
‡ Arch. f. Psych., xii., 564.

Since then Eisenlohr,* Jürgens,† Rumph,‡ Meigs and de Schweinitz,§ Gilbert and Lion,‖ Schmaus,¶ Oppenheim,** Siemerling,†† have all written important articles.

From these it seems that syphilis causes in the spinal cord essentially the same lesions as it does in the brain, *i.e.*, a diffuse cellular infiltration or the formation of gummata in the meninges accompanied by marked changes in the vessels. The nervous tissue itself is affected secondarily, either by the extension of these processes along the connective tissue septa, running into the spinal cord and giving rise to sclerosis or to the production of gummata; or the changes in the vessels may, by disturbances in the blood-supply, cause destructive changes in the nervous elements, producing sometimes softening and sometimes sclerosis.

The cellular infiltration of the meninges is almost a constant lesion, and is considered by many observers the primary change. It is widespread, most intense about the longitudinal fissures, and can often only be recognized by the aid of the microscope. There may or may not be the formation of gummata in the membranes, the walls of the vessels on the nerve roots or in the substance of the cord. There is some difference of opinion concerning the changes in the blood vessels, but the prevailing view is that the vessel walls are affected by the extension of the cellular infiltration in the meninges to their adventitia and muscular coats, and that the increase of connective tissue in the intima is secondary to this. It seems, however, more probable that the vessels in this situation, as well as those in the brain and elsewhere, may be directly affected by the syphilitic virus and become the seat of a primary arteritis. The process affects the veins as well as the arteries, causing in this case a phlebitis obliterans.

The walls of the smaller vessels and those running in the cord have several times been found swollen and hyaline.

The lesions which were found in the spinal cord of the case

* Neurol. Centralb., 1884, p. 73. † Charité Annalen, 1885, 10, p. 729.
‡ Der Syphilitischen Erkrankungen des Nervensystems, 1887.
§ Jour. of Nerv. and Ment. Diseases, 1887, p. 1.
‖ Arch. Gen. de Médecine, 1889, p. 402.
¶ Deutsch Arch. f. Klinishe Medecine, 1889, xliv., p. 244.
** Zur Kenntniss der Syphilit. Erkrank. des Cent. Nervensystems, Berlin, 1890.
†† Arch. f. Psych. xxii., pp. 191 and 257.

described above correspond, for the most part, closely to the descriptions of the authors referred to. There are, however, some changes which deserve especial notice. The condition of the lateral tracts is a curious one. When the cord, hardened in Müller's fluid, is cut across and the surface examined, the lateral pyramidal tracts are seen to be less deeply coloured than the surrounding tissue. If sections be cut and stained in Weigert's hæmatoxylin, these tracts are again easily distinguished by their lighter colour, but if these sections are examined under the microscope, they present here surprisingly few morbid changes. The only abnormalities that can be distinctly made out are a swelling of the nerve fibres and a fainter staining of the myelin than is usual. This appears to be an early stage of secondary degeneration.

The hyaline degeneration of the walls of the small vessels is in this case a widespread and striking lesion. It is well seen in the smaller vessels and also in the smallest vessels which are visible in the gray matter, especially in those portions that are diseased. Similar changes were noticed in the cases of Meigs and de Schweinitz, Schmaus, and Siemerling.

In a paper on syphilis of the lung, Councilman* described a hyaline degeneration in the capillary walls in the lungs and kidneys of two syphilitic cases. He considers this the primary change and thinks we can best understand its production by "the assumption of a soluble substance, which having been produced by an organism, exerts a special action on certain tissues of the body—namely, on the capillary walls." In spite of the fact that "hyaline degeneration" is a somewhat indefinite term and probably includes more than one process, it is very suggestive that in so many of the cases of syphilis of the spinal cord the walls of the smaller vessels should have been described as hyaline.

The gray matter throughout the cord was found to be richly supplied with blood vessels, and here and there it was the seat of small capillary hemorrhages. In general, there were no very well-defined alterations in the ganglion cells. But in the upper part of the lumbar enlargement there was found very extensive destruction of the gray matter. Here there is what is essentially an anterior poliomyelitis, accompanied by capillary hemorrhages, which has gone so far in some places as to cause the breaking

down of the tissues and the formation of cavities of quite considerable size. Some of the sections look as if the formation of the cavities had been preceded by comparatively large hemorrhages.

Lesions of the gray matter in syphilis of the spinal cord have been described by several authors, but for the most part they have consisted in rather indefinite changes of the large multipolar cells in the anterior horns, and Schmaus' second case† is, as far as I know, the only one in which there was anything that could be called a true poliomyelitis. In this case there was found in the lumbar region of the cord a localized destruction of the anterior gray matter, the description of which shows the process to have been very similar to that observed in our case. Schmaus also found a hyaline degeneration of the smaller blood vessels throughout the cord, but affecting especially those in the posterior columns. He considers the process in the gray matter to have been inflammatory, and entirely independent of the changes in the blood vessels, only being connected with these by their common cause, syphilis.*

In our case we consider it more probable that the changes in the gray matter were secondary and dependent upon the lesions of the blood vessels. In the present state of our knowledge, the supposition that the syphilitic poison can cause a primary inflammation of the gray matter is, to say the least, bold. Again, we know that disturbances of the circulation act as the cause of many of the morbid changes in the central nervous system. This has long been known in connection with the brain, and is every day becoming more and more recognized as an important factor in the pathology of the spinal cord. The experiments of Ehrlich and Brieger, and of C. A. Herter,† have shown that changes in the blood supply of the cord, if continued even for a short time, may produce permanent destruction of the nervous tissue. Nauwerck‡ reports a case of softening of the spinal cord in which he found well-marked lesions of the blood vessels, and these he considered to be the primary change, and that the softening was dependant upon them. Klebs§ has lately reported a most interesting case of Landry's paralysis, in which the

* Deutsch. Arch. f. Klin. Med., xliv., p. 257.
† Journal of Nerv. and Ment. Diseases, vol. xiv., No. 4, April, 1889.
‡ Beitr. zur Path. Anat. Zeigler, vol. ii., p. 73, 1888.
§ Deutsch Med. Wochenschrift, 1891, No. 3, p. 81.

microscopical examination of the cord showed a hyaline thrombosis of its central arteries. He thinks that the symptoms were caused by the disturbance in the circulation of the gray matter which this lesion produced.

Therefore, finding as we did extensive alterations in the walls of the blood vessels, and a lesion of the gray matter which might be accounted for by a disturbance in the circulation, the conclusion that the one depended on the other was not far to seek.

PEMPHIGUS VEGETANS,

WITH REMARKS ON THE

DIFFERENTIAL DIAGNOSIS OF BULLOUS ERUPTIONS OF THE SKIN AND MUCOSÆ FROM SYPHILIS.

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TRANSLATED

BY

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PEMPHIGUS VEGETANS.

By Prof. Heinrich Köbner, M.D.*

The frequent mistakes between syphilis and the bullous affections of the skin and mucosæ induce me to bring the subject before this Congress, rather than before one of dermatologists only. Recently I have had the opportunity of studying a typical case of pemphigus vegetans, one of the least well-known of the bullous eruptions. It is the third case that has come under my notice, and I propose to consider its pathology and treatment, and present a short synopsis of other affections that may be mistaken for it.

More for the sake of completeness than because actually belonging to the subject, I allude first to *aphthæ*. This eruption is not infrequently met with in those who have or had syphilis on the mucosa of the lips, cheeks, gums, and tongue. The affection is often mistaken for a syphilide. Dr. I. Neumann's case,† that of a hitherto healthy girl, ætat 26, is almost unique. The eruption was not only present on the buccal and palatal mucosa, but also affected the mucous membrane lining the vulva, labia minora, vagina, and cervix uteri (*colpitis aphthosa*). There was general malaise, and the affection spread to the lower extremities. They showed livid-red firm papules, from a lentil to a threepenny-bit in size. Many of the papules presented a yellow head, millet seed in size. Neumann‡ termed the rash *erythema toxicum*. It was also papular on the various mucosæ, in some places discrete, in others confluent. The papules varied from a bright yellow to a dull white in colour, and from a hemp seed to a lentil in size. They gradually healed under a

* Read at the 65th meeting of German physicians and scientists held in Nürnberg, September, 1893.

† Clinical and Histological Changes seen in the Vaginal Mucosa (Archiv f. Dermat. u. Syph., 1889, fasciculus v., p. 635, with plate).

‡ Atlas of Skin Diseases, fasc. xii., plate xi.

diphtheritic (*i.e.*, membranous) slough, with loss of substance especially marked in the genital tract, at the same time as the erythematous papules on the skin.

Those cases of foot and mouth disease occurring in men through infection from domestic animals also deserve to be mentioned. It has been called "aphthous plague," "mouth plague" of Siegel,* *stomatitis epidemica*, but bearing in mind its origin *stomatitis epizootica*† is a preferable term. The eruption consists of bullæ and vesicles passing into small ulcers, and is seen on the lips and buccal mucosa (but seldom on the pharyngeal and nasal mucosa), and the hands and feet, and even on the external genitals at times.‡ Febrile symptoms usher in the attack: the gums, tongue, and floor of the mouth are usually swollen and tend to bleed. Siegel drew attention to the frequent presence of petechiæ on legs and forearms, and the increased size of the liver.

The various herpetic eruptions are a fruitful source of error in diagnosis. *Herpes genitalis* in males is well-known, and not so often mistaken for chancre. On the other hand, in females, according to R. Bergh,§ although the affection is little known, herpes genitalis precedes and accompanies menstruation in no less than 75 per cent. of the cases of herpes genitalis observed by him. Bergh states it is more frequent in women than in men. It is usually observed on the labia majora, less frequently on the clitoris and at the vestibulum, and seldom on the cervix uteri, either alone or in conjunction with vulvar herpes.‖ The eruption on the pudendum (and vestibule) is more liable to be

* Mouth-plague in Man—stomatitis epidemica—its ætiological connection with foot and mouth disease in domestic animals (Deut. Med. Wochenschr., 1891, No. 49).

† Cf. a similar affection in boa-constrictors, and discussion held at a meeting of the Berlin Medical Society (Deut. Med. Wochenschr., 1893, No. 40).

‡ Siegel, paper read before the Berlin Surgical Society, July, 1893.

§ Herpes Menstrualis (Monatsh. f. Prakt. Dermat., 1890, fasc. i.).

‖ Bergh observed herpes genitalis attacking the cervix uteri four times, and once only in conjunction with vulvar herpes, out of a total of 284 cases of the affection. His statement is probably correct that its presence on the cervix uteri alone would be found to be more frequent were the genital brach examined more often than it is, during menstruation. In Paris, in 1860—61, at the Lourcine Hospital, I often saw herpes of the cervix uteri only in the patients in Lailler's wards where frequent vaginal examinations were made. This refutes Profeta's assertion that it is always accompanied by herpes vulvæ. Out of 248 cases of herpes genitalis occurring in the lock wards of the Copenhagen Vestre-Hospital, 210 (nearly 80 per cent.) showed the labia majora and vicinity to be affected; 25, the labia minora; 8, the vestibule; 7, the clitoris, and the remainder the perineo-anal region.

mistaken for soft chancres,* than for a primary syphilitic sore; that on the cervix uteri for mucous patches (syphilides). Similar diagnostic mistakes frequently happen with chronic recurring herpes of the oral cavity, as well as in the rarer herpetic affections of the hard and soft palate and pharynx, especially where the eruption alternates with a similar one on the genitals.† Again, it is frequently mistaken when *herpes zoster*, which usually occurs but once, affects the genital region. In 1873 I showed a case of *herpes zoster sacro genitalis*‡ limited to the distribution of the Nerv. pudendus et N. cutaneus major posticus femoris on the left side. The eruption implicated the posterior aspect of the left half of the scrotum, of the penis, and of the glans. In the latter site the vesicles had broken, and a diagnosis of soft chancre was the result. Herpes zoster of the mouth, especially when the fauces§ are involved, ought not to be readily mistaken, as it generally implicates the area of distribution of the second and third branches of the trifacial on the same side. The neuralgia affecting the teeth of both jaws, the paræsthesia of the mucosa and the groups of vesicles covered in places with sloughs, are characteristic.

Those rarer cases of herpes occurring vicariously in different regions belong to the same category. *An acute outbreak of numerous vesicles appears alternately on the tongue or penis and scrotum, often in the latter case preceded by pruritus.*‖ I have

* I may here mention a case of herpes vulvæ et vestibuli in a pregnant woman where it was mistaken for soft chancres. It was only after repeated failure with auto-inoculation that I was able to convince her medical attendant of its nature, and so stay proceedings in the Divorce Court on the part of the wife.

† For similar cases *vide* Sabrazès, Recurring Herpes of the Mouth and Penis (9 years), (Annal. de la Policlin. de Bordeaux, 1890, p. 188); S. Flatau's case of 16 years' duration (Deut. Med. Wochenschr., 1891, No. 22); cf. also Monographs by P. Diday and A. Doyon, "Recurring Herpes of the Genitals."

‡ Annual Report of the Schles. Gesellsch. f. vaterländ. Cultur. für 1873, Breslau, 1874. I may here again urge the necessity of thoroughly examining the whole of the cutaneous distribution of the pudendal nerve in herpes genitalis, especially as Bergh states that vulvar herpes is *so frequently unilateral only*. The same holds good in herpes iris of the genitals, for in a case in 1877, I shall mention further on, the eruption repeatedly appeared at first on one side only, but on further examination attacked the greater part of the cutaneous area supplied by the pudendal nerve on the same side.

§ Cf. Henri Fournier, Notes on Zona occurring in mucous membranes (Journ. des Malad. cut. et syph., III. year, August, 1891).

‖ I allude to cases of my own where the ætiology was unknown, but recommend most careful inquiry into the nature of diet or medicine the patient may be taking (cf. infra, bullous drug eruptions).

once seen a phlyctenular eruption in a male, ætat. 40, which could not be referred to any definite nerve area. It began as phlyctenular conjunctivitis, involving successively the nasal, buccal, faucial, and laryngeal mucosa.* Its recurrence was constant, and he was treated for syphilis. Later on it spread to the glans penis, and even appeared on hæmorrhoids. The affection consisted of superficial painful erosions, lentil in size, and showed a marked tendency to bleed. *Herpes iris*† is often wrongly diagnosed; it belongs genetically to the same class as *erythema polymorphe* (Hebra).‡ Herpes iris much more frequently than the latter attacks the mucosa of the lips and mouth, at times spreading to the palate, pharynx, and introitus laryngis. The eruption may even appear one or two days earlier than on the sites of predilection, viz., the hands and feet, where the central vesicle or crust with its circlet of smaller vesicles at once shows the nature of the affection. Sometimes it involves the forearms and legs and even the eyelids. It is always obstinate; febrile symptoms may be present, and in one case that lasted some 25 years, they always ushered in the attack. In many the recurrence of herpes iris was accompanied by a similar eruption on the genitals, perineal, anal, and even gluteal regions. In 1877§ I showed a case of herpes iris which for 8 years had been energetically treated at Aix-la-Chapelle and Wiesbaden for syphilis. The eruption was well defined, situated on the flexure aspect of the fingers (the nails of which were also affected), on the palms, penis, along the raphe scroti, involving the anal and gluteal region, and on the sole of one foot. The buccal mucosa, on the other hand, was the most severely attacked. The anterior aspect of the genitals showed round excoriations, the posterior aspect, including the anal and gluteal region as well as the palms, still preserved the typical character of herpes iris.

* This must not be confounded with pemphigus, to which reference will be made later on, and which is so frequently used collectively for diseases that are quite distinct and should be kept apart. E. Besnier and A. Doyon have recently emphasized this point in their annotated translation of Kaposi's work on Diseases of the Skin (2nd ed., Paris, 1891, vol. i., p. 822 et seq.).

† Clinical and Experimental Notes in Dermatology and Syphilis, Erlangen, 1864, p. 5. Cf. Lauz, A case of erythema exsudativum multiforme, implicating the buccal and faucial mucosæ. Berlin, Klin. Wochensch., 1886, No. 11.

‡ Text-book of Skin Diseases, 2nd. ed., vol. i., p. 321, Hebra (translated by the New Sydenham Society).

§ The Pathogenesis of Herpes Iris; Berlin Med. Society Meeting, March 23rd, 1887 (Deut. Med. Zeit., 1887, No. 28).

The eruption in the mouth was very extensive; it implicated the mucosa of lips, cheeks, the frænum linguæ, gums, hard and soft palate, extending to the posterior wall of the pharynx and introitus laryngis. The erosions were confluent in places, covered with greyish-white or yellow sloughs, which could be readily detached. Around them there was a vivid red and painful halo. Around the teeth the eruption formed a vesicular festoon, but on the velum palati the erosions were more discrete.*

In spite of the similarity of this disease with *dermatitis herpetiformis* (first described and named by L. Duhring,† of Philadelphia), to which I prefer the older name *hydroa pruriginosa* (Tilbury Fox) as being more descriptive, L. Duhring and Brocq‡ have accentuated four cardinal points of difference. The rash is polymorphic in character, *i.e.*, macular, vesicular, or bullous, and with a distinct herpetic distribution. Cutaneous and deep-seated paræsthesiæ are frequently present not only during but also between the attacks, which in spite of these subjective symptoms leave the general health undisturbed. Dermatitis herpetiformis at rare intervals affects the buccal and

* It is remarkable that Hebra did not recognize this localization on the mucosæ, or even the febrile disturbance that is never absent in extensive attacks of herpes. He writes, "In patients suffering from herpes there is no fever; gastric and cerebral symptoms are absent; the mucosæ are unaffected, and no changes occur in serous or fibrous structures" (loc. cit., p. 322). E. Besnier (loc. cit., p. 363) gives an excellent description under the name of *Erythème Hydroa Muscosæ*, as also Quinquand, in Annal. de Dermat., 1882, who adopts Bazin's term, *hydroa buccalis*. Furthermore, extensive outbreaks of herpes iris are perhaps less liable to be taken for syphilis than those circumscribed, afebrile attacks often alternating with erythema multiforme (cf. two recent cases recorded by Baudouin, hydroa buccalis pseudo-syphiliticus: Soc. Franc. de Derm. et Syphilig., May 8, 1890; Annal. de Dermat. et de Syph., 1890, p. 433; Sem. Méd., 1890, p. 174.)

† Phil. Med. Times, 1884; New York Med. Journal, 1884 and 1887, and in Monatsh. f. prakt. Dermat., vol. vii., p. 158.

‡ Dermatitis herpetiformis of Duhring [syn., Hydroa bulleux (Arthridides bulleuses) of Bazin; Pemphigus pruriginosus of Hardy; Hydroa pruriginosa of Tilbury Fox], by L. Brocq (Annal. de Dermat., 1888). In his paper Brocq terms the eruption "chronic recurrent pruriginous polymorphic dermatitis"; in a later one (Internat. Dermat. Cong., Paris, 1889; Monatsh. f. Dermat., vol. ix., p. 215) he substitutes the name "Dermatitis polymorphe dolorosa," which, though descriptive enough, is too long. I do not agree with Besnier (Nomenclature des Pemphigoïdes, l. c., p. 831), who objects to the proposal of Crocker and of Unna to term the disease "hydroa." Besnier says this term is too elastic, and he uses it adjectivally as erythema hydroa (in place of Bazin's hydro-vesiculeux) for herpes iris. R. Bergh's (l. c.) suggestion to find a new name for "Duhring's disease," because he thinks hydroa (febrilis) of Peter Frank is often used synonymously for herpes facialis, is likewise unnecessary. Hydroa pruriginosa, for German writers at least, is sufficiently distinctive.

lingual mucosa, producing evanescent vesicles, and this condition combined with the skin eruption—gyrate pigment patches fringed with vesicles and pustules in various stages—frequently leads to a mistaken diagnosis of syphilis.

Impetigo herpetiformis (Hebra) is also a source of error. It is chiefly found in women, and consists of superficial groups of pustules, from a millet to a lentil-seed in size, and is situated in the genito-crural regions and hypogastrium. It spreads centrifugally to the trunk and extremities, forming a circinate eruption decked with pustules. Sometimes it implicates the mucosa of the vulva and vagina as well as that of the mouth, fauces, and œsophagus. Here the purulent excoriations are covered with greasy scabs, and frequently lead to a diagnosis of syphilis. In the case of a nulliparous woman, in contrast to the statement of Hebra* and others,† there were *extensive circinate patches, covered with condyloma-like excrescences, in the hypogastrium and genito-crural regions.* There were also similar warty growths on the buccal and tonsillar mucosa. Du Mesnil and Marx‡ have recorded a similar case of this rare affection. Careful examination of the eruption—the typical concentric plaques of pustules sub-epidermal and sub-dermal in origin—notwithstanding the presence of the numerous warty growths which mask its nature, will prevent mistakes.§

Again, there are the various drug eruptions described by me in 1877‖ as toxic, and named by Besnier *toxidermatites*. They occur on the skin and mucosæ primarily as sharply-defined circular red maculæ, rapidly becoming vesicular or even bullous. The final stage of the eruption is frequently mistaken—in the absence of knowledge as to its cause—particularly if the mucosæ are not involved at the same time as the skin. For example,

* Hebra's Atlas of Skin Diseases, pl. 9, 10.

† Kaposi has emphasized the fact that the affection is confined to pregnant and parturient women as an important feature in its ætiology, although the first and fatal case he described and figured happened to be that of a male! (Archiv f. Derm., 1887, p. 273.)

‡ Archiv f. Dermat. u. Syph., 1889, and ibidem, 1891; Du Mesnil, p. 723 et seq.

§ Auspitz's first case, described by him as herpes vegetans (Archiv f. Derm. u Syph., 1869), and which gave rise to so much discussion, undoubtedly belongs to this category, and has as little connection with syphilis as with pemphigus vegetans.

‖ Drug eruptions with especial reference to quinine (Berlin, Klin. Wochenschr., 1877). At the Dermatological Section of the Inter. Med. Congress held at Berlin, I have related further observations on this subject (*vide* Trans. Internat. Med. Cong., vol. iv., sect. f. Dermat. u. Syph., 1890).

after *antipyrin* the rash is usually situated on the hands, face (lips and eyelids), lower extremities, penis, and scrotum, rarely on the trunk. If, however, these regions are successively attacked, or the eruption is confined to the mucosa of the mouth or to the anal or genital region, the difficulty of diagnosis is apparent. In some patients after *iodide of potassium* a bullous rash may appear on the face, upper extremities, especially on the backs of the hands, and sometimes implicates the buccal and nasal mucosa and genitals, very rarely the conjunctiva and cornea. In some neurotic women, after *quinine*, a circumscribed vesicular eruption is seen on the mucosa of the mouth and nymphæ. Should doubt arise as to the exact nature of the efflorescences, we can always test the case by exhibiting the suspected drug, and watching the results. Hallopeau's case illustrates this point. The patient with syphilis was repeatedly treated with large doses of iodide of potassium for an eruption which was diagnosed as syphilitic, but proved to be a case of pemphigus vegetans iodicus.* Frequently *pemphigus vulgaris*

* A case of pemphigus vegetans et atrophicans iodicus (Annal. de Dermat. et Syph., 1888, vol. v., p. 285 et seq.). The patient was repeatedly treated at his own request with potassium iodide for old-standing syphilis. At first the drug caused no disturbance. His face, arms, and backs of hands presented numerous round disfiguring scars, surrounded with small pedunculated warty growths. The corneæ were leucomatous, and the tongue was seamed with scars due probably to syphilis. The physicians at the Saint-Louis Hospital finally cleared up the diagnosis after the administration of iodide of potassium (7½ to 15 grs. daily). Some seven doses were taken, when an eruption appeared on the above-mentioned regions, the conjunctiva, cornea, and tongue. It was at first papular, then vesicular with purulent contents, and finally partial cicatrisation took place followed by the development of acuminate warts. Leucomata followed in the corneæ, and white patches on the tongue where the vesicles were. The iritis and deep cicatrices of the tongue were the result of syphilis, whereas the febrile symptoms and diarrhœa were due to iodism. Hallopeau was right in concluding that the *coxcomb granulations* coupled with the ocular affection were referable to iodism favoured by the presence of phthisis and albuminuria in the patient.

Trafesnikow describes a similar case of pemphigus vegetans iodicus occurring in the St. Petersburg Clinic for Syphilis (Therapeut. Blätter, 1893, No. 2, and abstract in Monatsh. f. prakt. Dermat., vol. xvi., No. 12, p. 587). The patient—male, ætat. 55—had not acquired syphilis, but was taking 15 grs. of potassium iodide daily for a nasal affection for a fortnight. The eruption consisted of bullæ, walnut in size, with turbid contents; ulcers formed with surfaces covered with *vegetations*. There was also an ulcer on the nasal mucosa. On stopping the medicine they quickly healed, and on resuming it the eruption appeared again (v. infra, p. 36, on the diagnostic value of exact observation of the developing ulcer). At first the papules were noticed, then blebs, which later on broke down, forming a central ulcer, fringed with vegetations, like Hallopeau's case. In contrast to these unique examples, is the majority of those cases where iodide of potassium

begins in the *mucosa of the mouth, fauces, larynx,* and at times the nose.*† In some cases the eruption has been limited to this region three years before it appeared on the skin. In others its appearance on the mucosæ has followed upon its presence in the form of circinate and serpiginous pemphigus of the skin, especially when situated on the inner aspect of the thighs, genitals, and hypogastrium. When affecting mucosæ it has often been mistaken for diphtheria or syphilis. As I shall describe in detail the special characteristics of pemphigus vegetans, I shall allude here only to those features that are common to all *bullous eruptions*, and emphasize the differential diagnosis between them and the *correlated syphilides* as regards the mucosæ.

We have then—I., the superficial, *i.e.*, intra- or sub-epidermal site of the efflorescence; II., the general absence of cicatrices, or at most isolated ones due to suppuration, and scattered pigment spots; III., the nature of the crust formed after rupture, whitish epithelial flakes, fibrinous or purulent in character, easily loosened, exposing an eroded bleeding surface. Its margin is inflamed, and where the eruption is not confluent, sharply defined; with large bullæ the margin is frequently undermined; IV., the frequent change of site in the course of the same or subsequent attacks; V., the fixed type of the eruption with the exception of hydroa pruriginosa. The absence of polymorphism in contrast to syphilis. *Hydroa pruriginosa* may show in isolated cases one or two varieties of the primary type and thus justify Brocq's epithet polymorphe; but even these are more frequently met with in recurring attacks and are quite different from syphilides; VI., the

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produced a bullous eruption on skin and on mucosæ, recorded by Prince Morrow, Wolf, Bradley, and Hyde. Here the eruption was superficial, and either left slight pigmentation behind or a soft scar, quite different to the results of syphilitic ulceration.

* Besides numerous observations of my own of pemphigus vulgaris attacking first the mucosæ, and later on the skin, and the three cases (v. infra) of pemphigus vegetans, which belong to the same category, Besnier (loc. cit.), Mandelstamm (Berlin, Klin. Wochenschr., 1891, No. 49), Mosler (Deutsche Med. Wochenschr., 1890, No. 1), Purjesz (Cong. f. innere Med., 1890, p. 270) have recorded others.

† Seifert, Pemphigus of the naso-pharyngeal mucosa (Revue de Laryngol. d'Otologie et Rhinologie, 1891, No. 3). The affection had appeared four years ago on the conjunctiva, resulting in symblepharon, and on the mucous membrane of the mouth, nose, pharynx, and larynx, without implicating the skin at all.

evolution; and VII., the course of the eruption; its purely local character, even where recurring outbreaks prolong its duration. VIII., lastly, there is either complete absence of glandular enlargement, as in simple herpes, or the glands are actually and locally inflamed. There is never present the multiple indolent enlargement so typical of syphilis.

I come now to the main subject of my paper—*Pemphigus vegetans*. It was first described and named by I. Neumann in 1886* as a distinct affection; previous to this it was considered and treated by him, Hebra, Kaposi, as "Syphilis cutanea papillomaformis s. vegetans," and even now-a-days is frequently mistaken for syphilis. My cases are three in number.

Case I.

A. ——, ætat. 62, civil service official, slightly built; became ill about the middle of July, 1885. After some days of malaise, complete aphonia, severe dysphagia, it was discovered that there was considerable swelling, redness, and mucous exudation in the arytenoid region, together with profuse expectoration. *Treatment:* chlorate of potash inhalations, and cold water compresses to the throat.

Gradually the aphonia disappeared, leaving persistent hoarseness. The dysphagia diminished, but the expectoration from the pharyngeal and laryngeal regions was still considerable, and at times streaked with blood. Ten days later the whole of the buccal and lingual mucosa was destitute of epithelium. The gums were swollen and covered with pultaceous membrane, movements of the tongue painful, and well-marked fœtor was noticeable. He was now placed on antisyphilitic treatment. Potassium iodide, decoction of sarsaparilla internally, a collutorium of chlorate of potash, and the gums were painted with a solution of nitrate of silver. At the beginning of August, superficial ulceration of the introitus narium and two phlyctenulæ near the cornea were observed. Later on there was marked swelling of the lips, desquamation of the epithelium, and formation of dark brown scabs. Antisyphilitic treatment was stopped, 4 grms. pro die (ʒ j.) of chlorate of potash were administered internally, and the application of nitrate of silver was

* Pemphigus vegetans, Vierteljahrsch. f. Dermat. u. Syph., 1886. Atlas of Skin Diseases, plates 22 and 31.

continued. Early in September the following pills were ordered: ℞. Massæ pilularis Valett, 5 grms. (75 grs.), quininæ hydrochloratis, ·5 grm. (7½ grs.); fiant L. pilulæ; capiat ij., ter in die. A collutorium of tannin was prescribed for the constant salivation, replaced in the middle of September by one of mercuric chloride (1 pro mille.), which was only used for a few days. At the end of September the patient was much worse, fever and great weakness were present.

Inhalations of infusum anthemidis c acido borico, a collutorium of potassii permanganas, and owing to obstinate constipation in spite of oleum ricini, senna, rheum, podophyllinum (·06 grm. [$\frac{9}{10}$ gr.]) enemata were ordered. The amount of urine passed was very scanty, and although the patient was on fluid diet, the bladder was emptied only once or twice in 24 hours. In the middle of October, owing to the appearance of condyloma-like growths in the anal region, mercurial inunction was ordered, and decoctum sarsæ et guaicai given. Now, for the first time, pemphigus appeared on the skin, which with the exception of some acne efflorescences in the scapular region had hitherto been quite free from any eruption.

On November 24th, 1885, I first saw the patient in consultation. He was emaciated, decrepid, and displayed nigh *universal pemphigus foliaceus et vegetans*. Almost the whole integument was covered with loose, moist, epidermal flakes and crusts—plainly the remains of bullæ. It was specially well developed in the vicinity of the orifices of the body, the eyelids, nares, mouth, and meatus urinarius. On both lips, which were everted, there were groups of moist vegetations decked with fissure scabs; those of the lower lip almost touched the chin. Similar groups were seen in the axillæ, inguino-scrotal regions, and particularly around the anus. The conjunctivæ were the seat of phlyctenulæ. The mucosa of lips, mouth, and fauces was more or less decorticated and showed a tendency to bleed. Salivation was profuse and the fœtor excessive.

Mercurial inunction and the decoctions were stopped, a collutorium of liquor aluminis acetatis, and dressings of liquor plumbi acetatis and unguentum acidi borici for the vegetations, were prescribed. On December 1st, as salivation had decreased, the patient began to take 6 to 12 drops of liquor arsenicalis daily. His medical attendant reported that the latter medicine was well

borne up to the middle of January when diarrhœa set in. The arsenic was stopped, but the diarrhœa persisted. As long as it was present no fresh eruption appeared, and the older ulcerations gave distinct evidence of healing. In fact just before death the diseased skin areæ of the back, abdomen, and arms, in spite of new bullæ here and there, were rapidly getting well. The phlyctenulæ never implicated the corneæ, and healed under ordinary treatment in a fortnight. The patient died, after 7 months' illness, from marasmus with low muttering delirium.

Case II.

The patient, ætat. 32, South African merchant, robust with a tendency to obesity, stated that 4 years ago (1886) he suffered from sore throat together with blebs and small ulcers of the mucous membrane of the cheeks and tongue. At Cape Town, in 1888, mercurial inunction was prescribed owing to the presence of condylomata, which had followed intertrigo of the gluteal region. Antisyphilitic treatment, hypodermically administered, failed to influence the growths, and in the following year, owing to a recurrence of the mouth affection, some 320 blue pills were taken. Ultimately the condylomata disappeared under some external application which the patient could not remember. I had already seen him once in 1888 for the mouth trouble, and in March, 1890, he again consulted me. At that period the mucosa of the cheeks, tongue, and palate revealed round erosions, lentil in size, covered with sodden white flakes. These were certainly not syphilitic in character. In the following September, 1890, a bullous eruption appeared in the inguinal regions that caused so much discomfort that he again came under my notice. On October 7th, the mucosa of the lower lip, cheeks, and tongue presented small vesicles in various stages of development. The inguino-scrotal regions showed tense blebs, which greatly increased in numbers during the next few days. There was great irritation, and soon flat, moist, vegetations like condylomata appeared. Lotio plumbi subacetatis having proved ineffectual, Plencke's solution* (although I recognized their non-syphilitic nature) was ordered on October 14th, along with mercurial sitz-baths and aloetic preparations to relieve the constipation.

* Plencke's solution—equal parts by weight. Hydrarg. perchlor., alumen, plumbi carbonas, camphora, acetum, spiritus vini. Trans.

November 10th, I saw the patient again; meanwhile his medical attendant, convinced of their specific nature, had prescribed calomel internally and externally, followed by painting the vegetations with sodium chloride solution. The excrescences, in spite of the treatment, had greatly increased in size and in extent, involving the hypogastrium and the inner aspect of the thighs and the perineal region. The limits of this extensive area were fringed with bullæ.

November 13th, under chloroform, the growths were thoroughly scraped away, and the thermocautery applied and iodoform dressings used. November 24th, several small vegetations appeared on the left thigh near the margins of the primary seat, and spread to the gluteal region. These were removed 3 days later, with Volkmann's spoon, after previous cocaine injection. November 25th, fresh itching blebs near the anus and some on the tongue were noticed; tincture of iodine was applied to them as well as to any suspicious-looking granulations in the cauterized area, and a collutorium of chlorate of potash was ordered. At the end of January, 1891, the wounds were healed and left discoloured patches behind. Ever since November 10th up to the middle of January the patient had been taking—intermittently, owing to anorexia and diarrhœa—Fowler's solution. On March 17th, I saw him again, and since then up to February 15th, 1893. Quite recently I heard that he had settled in the Transvaal and was quite well.

[Note.—This patient, after two years of fair health, has a return of malady, and after a year's illness with characteristic symptoms died. He was under the care of Mr. Hutchinson in London, and was seen by many dermatigists. The conclusion of the case will be published in detail.]

This case of pemphigus vegetans* is the second on record of complete recovery, and is remarkable for the limited area of distribution, viz., buccal cavity, genitals, genito-crural, and perineal regions.

Case III.

The patient, female, ætat. 45, married, very stout, came under observation October, 1892. She complained of pain in the left side of the neck, especially on swallowing. In the previous

* Vide the second case, two cases of pemphigus vegetans, by C. Müller (Monatshft. f. prakt. Derm., Bd. xi., No. 10, p. 427 et seq.).

January she caught cold and had a sore throat. In March there were some erosions of the buccal mucosa on the left side (attributed to decayed stumps) which were treated with nitrate of silver solution. From June to July, the patient went through a course of hydropathy at Marienbad, as she had been in the habit of doing for the last five years. On her return home about July 23rd, she took 3 soda baths (2½ lbs. to one bath), and it was then she noticed for the first time small, flat elevations, about a farthing in size, in the left inguinal region. On August 20th, a similar eruption appeared in the right groin, further the hard palate and throat became painful and showed the epithelium exfoliating, and the introitus narium was occupied by a dry scabby mass.

At the beginning of September ten stumps were extracted, and on the 14th the vesicles and sores had spread from the left side to the tongue and fauces. On the 16th a suppurating patch was discovered in the umbilical region which, in spite of the application of lunar caustic and iodoform, gradually became decked out with vegetations. On September 22nd the left side of the face swelled involving the mucosa of the mouth, and feverish symptoms were present. Aphthæ were thought to be the cause of the trouble, although no fungus was discoverable; borax had no effect.

The disease spread in the umbilical region, the labia majora and the scalp became similarly affected; in the right inguinal region the vegetations resembled condylomata. The patient was now placed under mercury, although there was no history of syphilis and her children were quite healthy, a collutorium of mercuric perchloride was ordered—which had to be stopped after a few days, owing to aggravation of the symptoms—and potassium iodide, which was taken continuously up to October 14th. The general health was indifferent, the patient was hysterical, slept indifferently, suffered from indigestion, and worried herself needlessly about her children. The patient's mother was a neurotic, and recently her brother committed suicide. She had never had any serious illness, although she frequently suffered from alimentary disturbance (dyspepsia, diarrhœa). She took the waters of Marienbad with the object of reducing her weight, which had the desired effect.

On examination of the mouth, the four upper incisors alone were present; the mucosa of the cheeks, hard and soft palate,

the fauces and of the tongue, including the frænum linguæ, was covered with islets of sodden epithelium. Here and there excoriations were seen, especially at the angles of the mouth, and it was plain, from the various stages of the eruption, that it was originally vesicular in character. Salivation was abundant. The introitus narium was blocked with crusts, and in the centre of the scalp there was a crust double-florin in size. Below the umbilicus, in the hypogastric fold, on the genitals (clitoris and nymphæ) there were similar excoriations, some free and granular, others covered with thick crusts. In the hypogastric region distinct vegetations could be detected. The inner surface of the right labium majus showed two ulcers, the right labium minus one; these were pea in size, superficial, and covered with a yellow slough. On the inner aspect of the right thigh, just within the inguinal fold, there was a group of dark-red vegetations (7 cm. × 3 cm.). They were covered with sodden epidermis, and looked like condylomata; the centre of the group was depressed and deeply pigmented; the lower margin was thicker and more raised than the upper one. The skin below, bordering on the group, was loosened and inflamed. The anterior aspect of the left thigh presented five linear parallel rows of round excoriations, lentil in size, some of which showed distinct vegetations.

I diagnosed pemphigus vegetans, in spite of the assurance of other medical men that bullæ had never been observed, and gave a grave prognosis. Further examination revealed distinct enlargement of the liver and fatty heart; this latter rather militated against the administration of an anæsthetic, in case similar treatment to that used in Cases I. and II. should be followed. I prescribed 6 to 9 drops daily of 1 per cent. solution of sodium arsenite, a collutorium of tannin, a pulvis aspersorius of 3 parts of talc and one part of dermatol, for the vegetations, and boric acid ointment for the nose.

Up to October 26th, twelve days later, the patient had only taken ·06 grm. ($\frac{6}{7}$ gr.) sod. arsenitis, but complained, however, of discomfort in the epigastrium. It was stopped for several days, and then replaced by 1 mgrm. of As. as liq. arsenii hydrochlorici, thrice daily. Locally tincture of iodine was applied to the vegetations on the hypogastrium, then a dusting powder and an ice-bag. In spite of a previous painting with cocaine and dilution of the iodine tincture, the patient suffered so much pain that this pro-

cedure was only carried out every 5 days. On the 12th November, the vegetations on the right thigh were similarly treated. A 10 per cent. solution of alumnol was used for the slight erosions on the left thigh, and a 2 per cent. of the same solution for the vulvar and buccal lesions. Up to November 18th 2 mgrms. of acid arseniosum had been taken daily, owing to diarrhœa the dose was diminished to ·035 grm. On the 24th her medical attendant began the hypodermic administration of arsenic (sodii arsenitis ·1 grm. aquæ destillatæ 10 grms., acidi carbolici ·15 grm. Fiat solutio. From half to a full Pravaz syringe (·5 cm. to ·1 cm. daily), and quinine and iron by the mouth.

At the beginning of December the numerous closely-set condyloma-like proliferations had increased on the hypogastrium and labia majora. The inner aspect of both thighs showed large areæ, hand's breadth in size, covered with vegetations; the margins were circinate and sharply defined. The anterior surface of the left thigh presented another group of vegetations, florin in size, separated by sound skin from that on the inner surface. The vegetations were covered with greyish-yellow crusts, under which a fœtid discharge continuously oozed. The nymphæ and the introitus vaginæ were beset with painful erosions. Those on the buccal mucosa showed marked improvement, so that nourishment was much easier taken. The introitus narium was also freer from crusts, although there were still fresh erosions. On the vertex there was a second small scab.

On December 3rd the patient was anæsthetized, and all the vegetations of the skin and various mucosæ were thoroughly swabbed with tincture of iodine and ·015 grm. of morphine given to allay the after-pain.

December 5th, the aseptic dressings, which were soaked with discharge, were removed, the patient having been placed in a warm bath for some 2½ hours. Dermatol was then applied. She suffered from clonic spasms of arms and legs, evidently hysterical, which yielded to a dose of potassium bromide. December 6th, the dressings were changed whilst the patient was in a bath, and 15 per cent. ointment of dermatol-vaseline was used instead of the dermatol only. During the following days tincture of iodine was painted seriatim upon the vegetations, and morphine again given to allay pain. December 10th, two small pemphigus bullæ were discovered between the

mammæ. December 12th, as improvement was so slight after the repeated application of tincture of iodine, and the after-suffering considerable, the patient was again anæsthetized, the vegetations were now thoroughly scraped away by Volkmann's spoon and cauterized, and the erosions of the genital mucosa lightly touched with Paquelin's thermocautery; the umbilical and hypogastric regions were not cauterized, but swabbed with iodine instead. Pain was severe for some 3 hours in spite of morphine.

December 14th, the dressings were changed, the hypogastric region was covered with a profuse discharge, the eschars of the cauterized areæ were dry. The irritation was considerably less everywhere, except within the vulva, where pessaries of morphine and menthol failed to relieve the distress.

Iodine was painted on numerous small fresh blebs which filled the introitus narium, and appeared here and there amid the sites of former erosions on the lips, buccal mucosa, and scalp. December 16th, the eschars were becoming loose, and islets of epidermis were visible. December 19th, the eschars came away, leaving dry surfaces; on the other hand, the hypogastrium was still freely oozing. Three fresh bullæ just beyond the margin of the scraped area were noticed on the right thigh, another on the vulva, and another on the chest. The eruption on the scalp has spread to the occiput. Since December 3rd there was no fever, the temperature being in the morning 36·6°—36·8° (98· to 98·6), in the evening 37·4° (99·5), with the exception of slight rises due to the operation proceedings. The urine contained abundant urates, but no albumen. Although the diet was most liberal the patient lost weight considerably. About December 22nd the patient began to have febrile symptoms; temperature in the morning 37° to 37·9° (98·6 to 100·2). Alternate application of iodine to the mouth and abdominal region.

December 23rd, compresses of 2 per cent. sol. aluminii acetatis were applied to the areæ, which in spite of assiduous use of dermatol ointment* had become foul-smelling. Half a Pravaz syringe of sol. sodii arsenitis was again administered.

December 26th, small vesicles were noticed for the first time

* Dermatol was used instead of iodoform as it was feared lest the patient, naturally melancholic, might be still more depressed by its use.

on the skin bordering the right thumb nail, on the palms, soles, and umbilicus.

December 27th, ¼ Pravaz syringe of arsenic was given.

December 28th, several large bullæ had developed near the lower margin of the scraped area of the right thigh and around the umbilicus; and on December 29th a bulla at the base of the left great toe, and a crop of vesicles on the left pinna and within the external auditory meatus were noticed. During this eruptive period the temperature rose remittently from 36·8° (98·6) morning December 24th to 38·4° (101·5) evening December 30th.

From December 31st up to the day of death slight fever was constant.

January 5th—8th, rapid growth of fresh button-shaped vegetations along the margins of the previously cauterized areæ took place. Thorough swabbing with iodine was carried out. The scalp was covered with crusts, and excessively fœtid. Compresses of 1 per cent. sol. calcis chlorinatæ were applied continuously.

January 11th, a 15 per cent. solution of acetate of alumina was applied to the left thigh and a 5 per cent. solution to the excoriations of the vulva and between the nates. For the first time a 1 per cent. solution of terchloride of iodine was used to the head.

January 14th, infusion of condurango was ordered on account of gastro-intestinal disturbance. No iodine could be detected either in the urine or fæces during the local application of iodine.

January 25th, the sinciput was almost well, and the occiput had improved under the application of terchloride of iodine solution, the hypogastric and femoral regions were still very fœtid.

January 25th to January 31st, the latter were bathed with sol. calcis. chlorinatæ, and then dressed with terchloride of iodine solution.

January 26th, the morning's urine was scanty, dark red, acid sp. gr. 1024. Dr. H. Rosin found neither blood, bile pigment, hæmo-porphyrin, trace of albumen nor albumose. There were, however, present urobilin, urine-rosa, peptone, acetone, and an amount of uric acid and urate of soda (these two formed the sedi-

ment, which was free from casts) sufficient to reduce the copper, but no sugar. A slight amount of indican was also found.

A similar result was obtained, except that the urates were less, from an examination on January 31st.*

From January 26th to February 13th the patient's condition had considerably changed. The extensive sores on the hypogastrium and thighs had, under the terchloride of iodine, almost healed, leaving a deeply-pigmented smooth surface. The mucosa of the nares and mouth was so much better, that the patient slept with closed mouth. Since February 1st vesicles starting in the sacral region had spread upwards to the interscapular area, some of these became confluent, formed sores about ½ inch in diameter. On February 9th a bed-sore developed and fresh vesicles appeared on the nymphæ and clitoris, as also on the anterior aspect of the thighs below the healed areæ. The vulvar irritation, in spite of carbolic lotion, was so great as to necessitate sedatives at night. February 11th, the terchloride of iodine was stopped owing to decubital sores, and dermatol used instead. February 12th, the urine was drawn off to avoid contamination with discharges, and examined by Dr. Rosin. It was alkaline, and contained a few pus corpuscles and a considerable quantity of sulphuretted hydrogen; there was no trace of acetone or peptone.† Vichy water was taken for a few days, and the bladder washed out with boric acid solution. The cinchona and hydrochloric acid mixture was stopped owing to gastric disturbance, and for some 6 days ·12 grm. to ·2 grm. (2 grs. to 3 grs.) of hydrochlorate of quinine was given hypodermically every second day.‡

February 24th, the urine was acid, contained enormous quantity of bacteria, some pus cells, urobilin, but no sulphuretted hydrogen (which was still present on the 19th), peptone, or acetone. The voice became hoarse.

February 27th, appearance of fresh bullæ on the right side of the tongue and palate; iodine applied. The bed-sore was dressed for the first time with terchloride of iodine, and vegeta-

* Dr. Rosin stated, as the result of his examination, that grave metabolic disturbance, in all probability due to the liver, was the cause of the urinary changes.

† A drop of the urine added to normal urine speedily induced decomposition of the latter with evolution of sulphuretted hydrogen.

‡ Subcutaneous Injections of Quinine (Deutch. Med. Wochenschr., 1890, No. 15).

tions touched with lunar caustic, and on the following day painted with a 20 per cent. solution.

From March 6th to March 9th the fever was greater, and more or less delirium present, especially at night. March 10th, diarrhœa began and confusion of intellect was noticeable; on the following days great restlessness, irregularity of pulse and insomnia, the latter was relieved by morphine.

March 16th, the patient died, having lost consciousness for some hours previously.

P.M. Examination by Prof. Pfeiffer.— Cor adiposum; wall of right ventricle 2 to 3 mm. ($\frac{1}{12}$ to $\frac{1}{8}$ in.), that of left nearly 1 cm. ($\frac{1}{2}$ in.); atheroma of aorta. Old-standing adhesions of pleuræ and cicatrices of apices of lungs, which were œdematous. *Liver* fatty. *Kidneys* fatty. Patches of hyperæmia in the gastric and vesical mucosa. There were erosions, pea in size, on the lingual and laryngeal surfaces of the epiglottis, on the vocal cords, and scattered in the trachea. Close to the arytenoids on each side there was an ulcer, lentil in size. Superficial ulceration in plaques of the skin of head, trunk, and extremities, and decubitus of the sacral region.

The above three cases—one of pemphigus foliaceus, and two of pemphigus vegetans—show a common characteristic in the eruption, having begun on the mucosa of mouth and fauces, which only attacked the skin after a considerable lapse of time (from a few months to four years). Further, in all three cases it was vesicular, spreading peripherally while the central area healed. The favourite regions were the hypogastric, inguinal, genito-crural, pubic, perineal, anal, axillary, and umbilical (in Case I. the chin-furrow), practically therefore where skin surfaces came into contact with one another.* After an interval of 6 days, after rupture of the blebs,† the typical changes became apparent in

* The apposition of warm moist surfaces alone cannot be regarded as the main cause of the disease; for both in Haslund's (Hosp. Tidende, 1891, Nos. 5 and 6) and in Neumann's cases the hands and scalp were also implicated.

† The rapid proliferation in the site of the ruptured bullæ must be regarded as one of the most important characteristics of pemphigus vegetans. This differentiates it from pemphigus chronicus, where, according to Kaposi, similar vegetations may at times arise in contact areæ. Moreover Neumann remarks (Wiener Med. Presse, 1886, No. 3), that even in ordinary pemphigus, slight warty elevations may occur, which, however, are quite different from the extensive, confluent, condyloma-like vegetations of pemphigus vegetans. Riehl (Pemphigus

the form of condyloma-like vegetations, now discrete, now confluent, which developed in the sites of the bullæ. The granulations were frequently fringed with vesicles or thickened epidermis "en collarette."

In their evolution these cases agree with those already on record, and as Radcliffe Crocker has noted, exhibit the serial changes characteristic of the affection.* Contradictory statements are to be explained by the notorious want of exactness in the history of any illness where the patient is the sole authority.† Herein lies the connection between pemphigus vegetans and pemphigus vulgaris, which, as I have already stated, is not sufficiently well known—viz., the frequency with which pemphigus vulgaris attacks the same mucosa, and remains confined to it weeks, months, and even years (3 to 4), before the first blebs are seen on the skin.

Moreover, the bullous eruptions in Cases I. and III. (occurring in crops and ceasing only on appearance of cachexia) came out after the appearance of the vegetations in the sites of former blebs. Both these cases therefore resembled those recorded by earlier writers (Neumann, Marianelli,‡ Haslund, and others). They noted the similarity in appearance and general distribution of pemphigus vegetans to pemphigus vulgaris (Case II. to pemphigus foliaceus), and it is therefore difficult to understand why C. Müller objects to Neumann's classification, and prefers Unna's term erythema bullosum vegetans. This really has no justification, it only leads to confusion; for, in the first place, cases of erythema multiforme with pronounced exudation have

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Wien. Med. Jahrb., 1885) examined microscopically two cases in which the warty growths were covered with a horny stratum, which showed that the former had begun to develop *after* the surface was covered with epidermis. He therefore concludes that they were different from pemphigus vegetans.

* Pemph. Vegetans (Medico-Chirurgical Trans., vol. 72 (1890), p. 223 et seq.). Crocker notes especially the mouth affection in two of the cases (Nos. 13 and 14) collected by him, which Jonathan Hutchinson has described (along with four other cases not belonging to this affection) as a chronic inflammation of the lips and mouth (Ibid., vol. 70).

† A fourth case recently under my notice, since the above paper was written, confirms me in this opinion. The first symptom, dysphagia, with white patches on lips and buccal mucosa, lasted some 4 months before the skin was implicated. This case resembled Case III. in all respects.

‡ Contribution to the Study of Pemphigus Vegetans (Giorn. ital. delle Malatt. ven. e della pelle., June, 1889).

been named erythema bullosum (Besnier and others); and secondly, neither in Case I. nor in Case III. was there present any erysipelas-like erythema such as Unna describes, "that developed within 24 hours to the size of the palm of the hand, and that later on became the seat of discrete blebs, which burst spontaneously in the course of a few days." None of the medical attendants who had examined Case III. had noted any such evolution in the course of the disease. As a rule the bullæ appeared quickly, with no precursory indications of inflammation, and even after the contents became turbid no halo of redness was noticeable. The temperature rose only slightly before and during the eruption when this was extensive. The general health suffered from want of nourishment and of sleep owing to the irritation,and probably from the abundant exudation.

The recurring crops of bullæ in former sites (especially in Case II. scrotum and inner aspect of thighs, in Case III. labia majora and minora) and around the vegetations certainly looked like direct infection. From this point of view it is nteresting to note that in Neumann's first case,* the first bullæ noticed were quite close to a cluster of vegetations in the axillæ, and similarly so in a case of Crocker's. C. Müller states that after inoculation of the discharge taken from the margin of a group of vegetations, a red blush, finger nail in size, appeared two days later, rapidly spreading in the next few days. Some of the inoculation sites developed blebs which were cut short by the application of iodine. It must, however, be remembered that the skin of the patient was practically predisposed to such a reaction, and no case of inoculation or transmission has been recorded in a healthy subject.

Our researches in this direction proved negative. Dr. Strelitz, with the usual precautions, removed the contents of two bullæ, hazel-nut in size, and inoculated tubes of agar-serum and bouillon-gelatine. A luxuriant growth of staphylococcus pyogenes aureus was the result; inoculation of the genital tract of a guinea-pig produced no change. Prof. Pfeiffer did not succeed in Case III. in obtaining any cultures from the liq. pericardii from blood in the left ventricle, a clot in the pulmonary artery, or from a piece of lung tissue. Sections of the skin,

* Contribution to our Knowledge of Pemphigus (Med. Jahrbuch, 1876, No. 14). This case is numbered III. in Neumann's Series published in 1886.

during life and after death, failed to reveal any micro-organisms, although the methods used were various and according to Ehrlich. Marianelli had likewise obtained from bullæ, cultures of staphylococcus pyogenes aureus, and from pieces of skin removed some 10 hours after death in addition staphylococcus pyogenes albus. Inoculations in a rabbit produced abscesses, but no other cutaneous change. The ætiology is thus very obscure, but from the evolution, course, and duration, 3 to 7 months, of the disease (with the exception of Case II. and Unna's case) its cause is probably organismal in nature. It is plain that as in Case III. lesions of the buccal mucosa, even at the outset trifling, may form the starting-point of an extensive cutaneous affection. In fact after removal of the stumps the disease spread so rapidly locally as well as on the skin, that the dentist was suspected of having infected the patient through unclean instruments. Haslund's patient ran a splinter of wood under the nail; in 8 days suppuration occurred, followed in 6 weeks' time by sloughing of the pulp of the finger and paronychia of the index of the other hand and the two middle toes.* In the course of 4 days bullæ were detected in the mouth and within the vulva. The disease ended fatally after 7 months' duration, with typical vegetations (back of hands and scalp), and the autopsy revealed similar changes to those recorded in Case III.

The pathological, and certainly rare changes in the nervous system (spinal cord, Ehrmann, upper cervical ganglion, Marianelli), are, I think, secondary and depend on some bacterial toxin. That some such intoxication agent is at work is practically shown in those cases of bullous toxidermatites with vegetations resembling venereal warts (condylomata acuminata) (Trafesnikow), or as in Hallopeau's case, after potassium iodide. Neumann's observation of exalted tendon-reflexes in his three cases during the last weeks of life, is to be explained by the inanition and debility that was present.

* Haslund thinks the diagnosis of paronychia (made when the patient was in the surgical ward) should be altered to "bullous affection of the nail-bed," a condition which is not after all so infrequent. He considers the pathogenesis of this case best expressed by neuritis traumatica ascendens followed by pemphigus vegetans, which in turn is the result of some central nervous lesion, and therefore not due to infection. His objection that there was no lymphangitis, does not however exclude the latter view.

As regards the differential diagnosis from confluent condylomata lata, the following points should be noted:—(i.) The rapid growth of vegetations in the site of former blebs, which may be so transient as to escape notice (v. Case III.). In such cases the state of the mouth and fauces will materially aid us in diagnosis. (ii.) The presence of itching and pricking of the vegetations. (iii.) The margin shows the remains of the previous bleb in the shape of loosened epidermis (en collarette). (iv.) The absence of epidermis, as Neumann pointed out, on the vegetations, which are stippled, excoriated, or even necrosing, in contrast to the uniform surface that is observed in condylomata lata. (v.) The course and persistence of the vegetations, which spread and appear in fresh sites, whereas condylomata frequently undergo spontaneous involution under measures of simple cleanliness. (vi.) The general symptoms especially are quite different from syphilis. (vii.) The disastrous effects of potassium iodide and mercury. (In a case I recently saw innumerable blebs had followed the administration of potassium iodide.)

The microscopic character of the vegetation will also aid us in diagnosis. When the stratum corneum and stratum granulosum are unchanged, the horizontal layers and the inter-papillary processes of the rete malpighii are greatly increased compared with normal skin (Neumann, Marianelli, and C. Müller). Several prickle cells in the section give evidence of active proliferation. Sometimes in the middle of a large inter-papillary process the cells are very large, the inter-spinous spaces distended, and an arrangement resembling cell-nests is frequently discernible. The hair follicles and sebaceous glands are filled with horny scales. Subjacent to the stratum corneum congeries of round cells may be seen, limited by degenerated prickle cells. When the horny layer yields, these spherical infiltrates form the moist points on the surface previously described. Extending downwards to the stratum papillare of the derma are linear collections of migratory leucocytes which form a meshwork between the above described spherical infiltrates and the vascular system of the derma. The papillæ vary considerably in extent and configuration, the fixed connective tissue elements are prominent owing to the œdematous inter-cellular substance. The blood and lymph vessels are dilated and form a network filled with leucocytes. In the lower layer of the cutis (pars reticularis) and

the subcutaneous tissue the blood vessels reveal proliferation of the intima which has encroached upon their lumen (arteritis et phlebitis obliterans). The sweat-glands are swollen and irregular, the coils distended with cells, and the cuticle of the infundibuliform ducts is œdematous.

If we are unable to support Müller's statement that from these changes alone pemphigus vegetans can be diagnosed, especially as Du Mesnil has described similar structural alterations in impetigo herpetiformis, yet they are quite sufficient to distinguish the affection from condyloma latum et acuminatum where cell proliferation is also well marked.

As regards treatment, Case II. shows what benefit may be derived from early and energetic operative measures followed by iodine painting. In Case III. the erasion of the foul-smelling vegetations and subsequent application of iodine relieved the patient in spite of the severity of the method. Unna's opinion of the value of iodine in pemphigus vegetans derives but little support from my cases. In spite of the healed surfaces of the skin and mucosæ, the cachexia ran its course. Arsenic by the mouth or hypodermically had no influence. Of the numerous substitutes for iodine, alumnol, dermatol, subnitrate of bismuth, and other dusting powders failed to relieve. A solution of terchloride of iodine (1 in 1,000) proved to be the most efficacious of all the topical remedies employed.*

* When terchloride of iodine is used, owing to its ready decomposition, prepared gauze dressings must be avoided, and the remains of previous applications used to the skin containing starch must be thoroughly removed.

PEMPHIGUS VEGETANS.

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PEMPHIGUS VEGETANS.

By Prof. J. Neumann, M.D.*

It is seldom we meet with a disease so puzzling in its features as *Pemphigus vegetans*. Opinions about its nature have undergone a complete change, for on reference to dermatological literature we have not succeeded in discovering any description that agrees with the main characteristics of this affection. Perhaps the account of *Frambœsia syphilitica* resembles it most; on the other hand, the term frambœsia only connotes a form of disease—does not indicate its nature, and moreover has been used for various skin affections.

Sauvages,† who first introduced the word, described *Frambœsia* "as raspberry or strawberry-like vegetations, generally developing in the axillæ and genital regions, which were cured by mercury." Many endemic and tropical skin diseases characterized by vegetations were thus grouped under this term, regardless of their nature (Plencke,‡ Willan§). Alibert‖ reckoned *Frambœsia* in the class of syphilitic skin diseases, *Dermatosæ syphiliticæ*. He distinguished a *mycosis frambœsioides*, *mycosis fungoides*, *mycosis syphiloides*. But neither in these descriptions nor in Köbner's¶ account of multiple malignant tumours has it been possible to trace any resemblance to *pemphigus vegetans*.

In an exhaustive paper on *Frambœsia*, Kaposi has described the various forms, and there pemphigus vegetans can be recognized as *syphilis cutanea papilloma formis* (*vegetans*),** *frambœsia syphilitica*. In his book on syphilis of the skin the

* Vierteljahresschrift für Dermatologie und Syphilis, 1886, vol. xiii., pp. 157—178.

† Nosolog. method. Amstelod., 1768.

‡ Doctrin. de morb. cutan., Viennæ, 1783.

§ Prakt. Darst. der Hautkmukh. von. Bateman nach Willan, Leipsic, 1841.

‖ Lectures on Diseases of the Skin, Leipsic, 1837, p. 294.

¶ Clinical and Experimental Essays, Erlangen, 1864.

** Archiv f. Derm. u. Syph., 1869.

disease is illustrated by two plates. We are not surprised at this view, for it was the one held by our revered teacher, Prof. Hebra. In the same year H. Auspitz described the affection as *herpes vegetans*, and he also maintained its syphilitic nature.

We are thus able to account for the absence of any reference to *pemphigus vegetans* in the literature of pemphigus, and at the same time understand how more recent writers, including Hebra, have overlooked the nature of this puzzling and rare disease.

The case I published in 1876 was the turning-point in our views. It was at first regarded by Hebra as well as by myself to be syphilitic in nature. Later on, Prof. Bamberger saw the case; he considered it to be a severe form of pemphigus vegetans. The following are the details :—

In January, 1875, Prof. Politzer called me in to see Mrs. B. She had always enjoyed good health up to the end of November, 1874, when the first symptoms of the disease appeared. It consisted of isolated blebs in the right axilla, which on bursting left exposed a raw moist surface. The sores were most rebellious to treatment; in fact, they showed no tendency to heal, in spite of various applications—ointments and caustics.

The patient was 31 years old, robust, well nourished, but complained of great discomfort on swallowing. The first time I saw the patient there was in the right axilla a dusky-red raised area, half-a-crown in size, destitute of epidermis. Its surface was furrowed, granular, and bathed in serous discharge. At the end of a week the granulations had increased so as to be 2 cm. above the surrounding skin level. Plencke's solution* and caustic potash had no effect whatever. The mucosa of the lower lip was now attacked, flat blebs appeared, rapidly drying into crusts. On removal of these a firm adherent slough was disclosed. The eruption spread to the mucosa of mouth and fauces, so that the patient could only take fluid food. The temperature of the skin was normal, bowels regular, menstruation scanty, and the urine free from albumen. As the axillary vegetations were uninfluenced by treatment, and their condyloma-like appearance became more striking, the specific nature of the affection was, so to say, confirmed. Examination of the husband

* Plencke solution—equal parts by weight of mercuric perchloride, alum, lead, carbonate, camphor, spirits of wine, and vinegar. [Trans.]

revealed nothing; however, syphilis was diagnosed, and the patient treated accordingly. On February 8th, I noticed on the inner surface of the right arm, close to the axilla, a fresh bleb, about a walnut in size. It was tense, contained a clear fluid, and was encircled by a series of smaller ones as large as lentils, and with similar contents. Rupture occurred the following day, exposing to view a dusky-red uneven sore, fringed with shaggy epidermis, the remains of the bleb-wall. Six days later, raised granulations like lentils had developed on the surface of the sores. They resembled condylomata lata, and gradually increased in breadth and height. The periphery of these vegetations was festooned by exfoliating epidermis, beneath which a serous exudate oozed. In the course of a week similar vegetations appeared on the abdomen, groins, and labia majora. *Pari passu* with these integumentary changes, the various orificial mucosæ were affected. The eruption here caused considerable distress to the patient; each efflorescence was covered with a greyish slough; after the application of nitrate of silver to them, the swelling was so intense that only the blandest applications could be tolerated. Antisyphilitic remedies—iodide of potassium, hydrargyri iodum viride, Zittmann's decoction—had no influence over the disease. As I had already seen two similar cases of syphilis cutanea vegetans end fatally, I gave an unfavourable prognosis. Prof. Hebra's opinion agreed with mine, and we both arrived at the conclusion that the disease was *frambœsia syphilitica* seu *syphilis cutanea vegetans*. Antisyphilitic treatment was to be persevered in, and the moist vegetations were to be dressed with powdered alum. Shortly after, the patient had a febrile attack, and it was during this period that the skin manifested fresh and peculiar alterations.

For while the vegetations preserved their condyloma-like aspect the later eruptions were typical of pemphigus vulgaris. Prof. Bamberger now saw the case for the first time. The blebs were hemispherical, from a pea to a hazel-nut in size, and contained a gum-like fluid. They were most numerous on the chest, abdomen, and back, in many places confluent, in the left axilla there were solitary ones. As the epidermis exfoliated the raw surface looked like a burn of the second degree. Pain was considerable; appetite very indifferent, and fluid nourishment could only be taken through a tube. As the nasal mucosa was

implicated, the patient was obliged to breathe with open mouth. As a consequence the lips were cracked, rhagades had formed at the corners of the mouth, and the buccal, lingual, and faucial mucosa was decked here and there with dry scabs and greyish white sloughs. There were numerous blebs on the eyelids, the palpebral and ocular conjunctiva were intensely injected, and secreted a purulent discharge. Singultus and frequent attacks of vomiting came on, the urine was scanty, the air smelt strongly of ammonia in spite of ventilation and scrupulous attention to cleanliness.

March 22nd: As the majority of the sores, in spite of antiseptic dressings, remained foul, the patient was placed in a bath 29° R. (97·2 F.), medicated with perchloride of mercury. At first she remained in it 3 hours and later on 8 hours daily. In the intervals salicylic wool was used as a dressing, and this of all others allayed the penetrating odour; the comfort of the bath was noticeable, and the patient's distress greatly alleviated. The later developed blebs appeared in groups and spread serpiginously—pemphigus foliaceus—leaving a central raw area either free or covered with a yellowish offensive exudate. Owing to the difficulty in swallowing, food could no longer be taken by the patient, and nutrient enemata had to be administered. The various medicines—acids, quinine, arsenic—had no influence over the disease and were stopped. On March 30th the patient died from marasmus and exhaustion, after an illness of 4 months' duration. We were no longer in doubt now as to the nature of the disease; it was certainly not a case of syphilis maligna, but a peculiar and hitherto undescribed form of pemphigus. I have alluded to this disease in my work published three years later, and Kaposi* in 1880 wrote the following: "There are, in short, forms of pemphigus characterized by the growth of vegetations in the axillæ, groins, and other regions, discharging foul-smelling viscid secretions. These vegetations may undergo necrosis, or may spread serpiginously and proliferate. As a rule they all terminate fatally."†

G. Riehl has recently published three cases he observed in Kaposi's clinic. For these reasons, now-a-days, the disease is classified quite apart from syphilis. We certainly know more

* Pathology and Treatment of Diseases of the Skin.

† Medical Year Book, 1885, sect. iv.

about its course, but unfortunately the prognosis remains as grave as ever. In truth there is no disease so serious in its nature as *pemphigus vegetans*, with its exfoliating and partly serpiginous development. A small patch no larger than a florin in the axilla, one or two small blebs on the lips suffice, even in a healthy, well-nourished individual, to foretell, in a few months' time usually, the fatal issue of the disease.

The remarks of Prof. Bamberger, 25 years ago,* on pemphigus apply to this form especially. He writes: "If we consider how this disease begins, its trivial onset, its steadily pernicious course, the question naturally arises, What is its cause? There is no disease that induces cachexia in so short a time, and when the local signs subside, the patient's vital powers rapidly deteriorate and sink."

According to the older views, *pemphigus vegetans* was a syphilitic affection, and though the patient's morals were thus indicted, on the other hand the hope of recovery was held out to him. Now unfortunately we are obliged to give a grave prognosis. For these reasons early diagnosis is important. I shall first state the clinical appearances of the disease, and then give an account of the cases I have had under observation and treatment. The development of the efflorescences takes place in the following manner. The first sign to be noticed is the presence of small bullæ, lentil in size, and with a lax wall. They soon become tense, owing to the increased exudation, and dull white in colour. When the wall bursts, spontaneously or through friction, the centre, in the course of a few days, becomes raised and soon shows warty, closely-set granulations. These gradually increase in size and spread serpiginously; the serpiginous patch is limited by a shaggy undermined epidermis. The vegetations secrete an evil-smelling ichorous fluid, alkaline in reaction, which soon dries up into easily detachable crusts. The underlying sprouting granulations are covered by a streaky layer of epidermis, lying like a meshwork upon them. The labia majora and minora, the mucosa of the lips and buccal cavity, the axillæ, the anal region, and at times the rectal mucosa, are successively attacked. Even the cervix uteri has been implicated. In the male, the pubic region and inner surface of both thighs and nates are the seat of the onset of the disease, where it has been

* Würzburg Transactions, 1860.

mistaken for *eczema marginatum*. The vertex of the scalp is also frequently involved. Circumscribed excoriated patches on the mucosa of lips and cheeks are observed, which soon become covered with a dusky-yellow shaggy membrane. The efflorescences spread serpiginously, raising and fissuring the skin at the corners of the mouth. The mucosa of the tongue, tonsils, uvula, pharynx, and larynx is next involved. This renders deglutition painful; respiration is impeded through the blocking of the nares, and the patient is compelled to breathe with open mouth. The buccal mucosa becomes dry and fissured, showing numerous rhagades; the tongue swells, its margins become crenated, and eventually excoriated by the pressure of the teeth. Similar blebs may appear elsewhere, *e.g.*, axilla, root of the nail, and vola of the hand. The nail is raised from its bed by proliferations, and is surrounded by a rampart of loosened epidermis. The bullæ on the vola manus frequently give rise to lymphangitis, which may extend up to the axilla. Where the vegetations undergo involution the skin becomes deeply pigmented. The longer the disease lasts, the less the tendency to formation of vegetations; on the other hand, the development of blebs becomes more pronounced. Lastly, the epidermis may exfoliate in flakes exposing the papillary layer, resembling burning of the second degree. It is then that the patient suffers great distress in lying, to which the continuous bath affords considerable relief. The rapid decomposition of the discharges and the presence of superficial skin necroses give rise to great fœtor, which becomes nigh unbearable to those around.

The resemblance to condylomata lata is especially striking where the mons veneris, inner aspect of thighs, and buttocks are beset with vegetations. In fact, in four of the cases I am about to mention, antisyphilitic treatment had been energetically applied before they were admitted to the hospital.

The following points should be borne in mind in establishing a differential diagnosis between *pemphigus vegetans* and *syphilis*:—

I. *The character of the periphery of the vegetations.* In pemphigus vegetans they are always encircled by the remains of the bleb-wall. In confluent condylomata the margin is sharp and indurated.

II. *The partial loss of epidermis of the vegetations* give them a

stippled appearance, which distinguishes them from condylomata, which at times may be covered with a uniform deposit.

III. *The course and accompanying symptoms.* Condylomata imply a certain acuteness of the disease, and are always accompanied by other signs of syphilis. Moreover, even when untreated they undergo involution, whereas the vegetations of *pemphigus vegetans* generally increase the longer the disease lasts, and only become quiescent when the patient's vital powers are beginning to fail.

The above are the most important characteristics in my experience that I have been able to deduce from the nine examples that have come under my observation. I shall now allude briefly to these cases :—

Case I.—I saw this case in 1860 in Hebra's clinic, where it was diagnosed as *frambœsia syphilitica.* He greatly improved under treatment. In 1869 he was readmitted, and shortly after died. The vegetations occupied the pubic and femoral regions, and bore a striking resemblance in distribution to eczema marginatum. There is a description accompanied by a plate of this case in Kaposi's Atlas, and it is the only one on record that lasted 10 years.

Case II.—It was that of a woman, admitted under Hebra's care; here again syphilis was diagnosed.

Case III.—I have already mentioned this case (*v. supra*).

Case IV.—A male, ætat. 50, engineer; at first treated for syphilis, later on a correct diagnosis was established. It terminated fatally.

Case V.—I only saw this once with Prof. Kaposi; it also ended fatally.

The following three cases have been under my own care :—

Case VI.—M. J., ætat. 30; was admitted to the clinic April 26th, 1884. He had been treated previously for syphilis with iodide of potassium. The disease began in October, 1883, with pain in the throat.

On admission, the skin in the immediate vicinity of the mouth was excoriated, reddened, bathed in discharge, and partially decked with crusts and the remains of ruptured bullæ. The

mucosa of the lips and tongue showed scattered abrasions, some covered with sloughs, others displaying easily bleeding granulations. The corners of the mouth were deeply fissured, and showed grey sprouting vegetations. In the upper part of the naso-labial furrows there were yellow scabs. On the scalp, greenish-yellow crusts, half-a-crown in size, concealing moist uneven granulations. Some of the nuchal glands were as large as beans. In the interscapular region there were brown-red patches, raised, about the size of sixpence. The centre was covered with epidermis, and surrounded by a ring-like crust beneath which pus was oozing. There was a bulla at the root of the left thumb-nail; the nail was discoloured, raised, and pus concealed beneath it. The margin of the nail of the right ring finger presented a red vegetation; the nail was raised from the bed. The nails of the middle and index finger were ashy grey in colour. In the left genito-crural fold there were confluent vegetations partly concealed by a greyish-yellow slough. In the right inguinal region there was a red, moist, stippled patch, fringed by the remains of blebs. In the pubic region there was a mass of vegetations, covered with yellow crusts, surrounded partly by shaggy epidermis and partly by ulcerated patches. On either side of this mass there was a smaller one about the size of a sixpence. On the anterior surface of the left thigh there were the remains of bullæ, which had formed crusts with thickened margins varying from a pea to a farthing in size. Close to the anus there were well-marked rhagades which secreted an evil-smelling fluid. On the buttocks the remains of ruptured bullæ. The upper surface of both big toes was excoriated, granular, and bathed in a greyish exudate. The circumference of the nail eroded, and the nail itself uneven and fissured. The most external interdigital space was stript of epidermis and moist. The fourth toe presented pigment spots and recent scars, the nail was also discoloured.

June 14*th*, 1884: The flexures of both elbows, the neck, both naso-labial folds, the buttocks, the pubic region, showed circumscribed brown patches covered with normal epidermis. In other regions, viz., the back, hypogastrium, inner surface of thighs, there were firm elevated infiltrates of a gyrate shape. On closer examination they turned out to be numerous closely set vegetations; over the rest of the integument there were scattered

bullæ containing a dirty-white exudate. On the scalp, upper lip, chin, and cheeks the skin was slightly pigmented. Blebs continued to make their appearance on the mucosa of the lips, and the tongue was still in places destitute of epithelium. Fever had disappeared and appetite was normal.

June 30th: A linear eruption of blebs appeared in the middle line between the thenar and hypothenar eminences of both hands; in addition there were two small blebs, hempseed in size, on the palmar surface of the distal joint of both little fingers. Fresh bullæ had made their appearance in the healed areæ over the elbows, in the genito-crural folds, and in the interdigital spaces.

July 2nd: A bleb, bean in size, of a livid hue, developed in the palm of the hand, and a firm red cord could be traced up towards the axilla.

July 3rd: The redness disappeared, but the induration was still to be made out.

July 6th: Blebs have again appeared on the palms and soles, backs of feet, scrotum. Elsewhere fresh bullæ, from a sixpence to half-a-crown in size, have developed in previous sites, surrounded by an erysipelatous blush. On their rupture, a reddened moist, uneven sores were visible. The external surface of the right elbow showed two tense blebs surrounded by numerous small ones. The contents of the latter were distinctly alkaline, whereas those of the larger and older blebs were neutral or faintly acid. The saliva and nasal mucus were acid.

July 13th: The blebs in the palm have become confluent.

July 16th: The epidermis of the palm and back of hand were exfoliating in large flakes. The blebs on the forearm have become confluent. On the neck and chest fresh blebs have appeared.

July 25th: The eruption of bullæ has become more general and has attacked former sites. Appetite poor, patient is losing flesh, and fever is present. At the instance of his friends he left the hospital and died 8 days later from exhaustion.

Case VII.—M. R., female, ætat. 56; was admitted under my care February 23rd, 1885, with a history of 4 months' duration. The disease was ushered in by pains in the neck, and had been treated as syphilitic in nature.

On admission, the left labium majus, the margins of the nymphæ, the inner surface of the thighs, the nates, and the intergluteal furrow are the seat of serpiginous excoriations fringed with shaggy epidermis. The central portion shows marked loss of substance. Scattered over the surface of the integument are isolated blebs; in the axilla the blebs are rugose and their contents turbid. Both lips are destitute of epidermis and are fringed with the remains of bullæ.

July 25th: The eruption has completely disappeared from the mucosa of the lips and mouth. The tonsils, uvula, and pharynx are smooth and look normal. The vegetations on the mons veneris have subsided. Several fresh blebs, from a pea to a bean in size, some of which have become confluent, have developed, accompanied by febrile disturbance. Where rupture has occurred, the skin resembles the second degree of burning. The sores secrete a thin discharge, and their margins are festooned by epidermal flakes. On the posterior surface of both thighs, the buttocks, and back, there are circumscribed patches deeply pigmented at the margins, less so towards the centre. The epidermis is quite firm and cannot be detached; a distinct crop of fresh blebs can be made out developing on these patches.

July 30th: The skin of the back of the left foot and over the external malleolus is swollen and red, subcutaneous tissue distinctly œdematous.

August 1st: A bulla with sanguineous contents has appeared on the dorsum of the foot.

August 2nd: It has increased rapidly and its contents have become gangrenous and foul-smelling. Pulse frequent and thready. The patient has lost flesh considerably during the time she has been in the clinic; she sleeps badly and is very querulous.

August 4th: At her own request she was discharged. Dr. Ehrmann attended her afterwards, and gave me the following particulars. Irregular bluish streaks appeared on the legs, not disappearing on pressure; the œdema gradually extended to the hip. Frequent attacks of hiccough. Pulse 120, thready; temperature of the extremities below normal. A good deal of pain present.

August 5th: The above-mentioned streaks became now the seat of bullæ; on rupture wash-leathery looking sloughs covered

the sores. Cyanosis supervened, and death followed a few days later. About 3 weeks before the patient left the hospital, painful spasmodic contractions of the right knee and left elbow, lasting a few minutes, frequently occurred. The patellar and cubital reflexes were exaggerated.

Case VIII.—J. P., ætat. 41; first took ill September, 1884. She complained of pain in the roof of the mouth, and was admitted, September 30th, under my care.

On admission, there were on the labia majora, in the genito-crural folds, moist vegetations, destitute of epithelium, varying from a lentil to a sixpence in size, fringed with shaggy remains of bullæ. The inner surface of both thighs presented raw patches, half-a-crown in size, bordered by the remains of blebs. These patches were granular-looking, bathed in discharge, which in places had dried up forming easily detachable crusts. In the axilla there were blebs of the size of a hempseed, and small erosions and distinct vegetations. The extensor surface of both forearms displayed red patches, the circumference of which passed in one direction into the surrounding healthy skin, in the opposite it consisted of the remains of bullæ. Over the clavicles, in the mammary and scapular regions, there were red areæ, devoid of epidermis. The epidermis around the anus was exfoliating, exposing sprouting vegetations surrounded by shaggy remains of bullæ. In the trochanteric regions there were similar areæ. The lower lip was swollen, had shed its epithelium, and bled easily. Salivation was present. The tongue revealed excoriated patches, some of which were decked with a greyish-white membrane. The angles of the mouth were occupied by flattened bullæ, and the nares were blocked with crusts. In the mid-region of the scalp there was a circinate patch; its centre was the seat of moist warty growths, capped with greyish sloughs; the margin was formed by shaggy undermined epidermis. There was a similar area, but not quite so advanced, in the occipital region. Below the left eye there was a sore the size of a bean, showing centrally a dried crust, peripherally flaky epidermis.

October 10th: Fresh efflorescences have appeared in the umbilical and right mammary regions. Frequent attacks of vomiting and singultus.

November 7th: The swelling of the lower lip has subsided.

Patient is only able to take fluid nourishment. Fresh bullæ have made their appearance on previously affected sites and some of the older sores have spread.

November 15th: The tendon reflexes—patellar and cubital—distinctly exaggerated; this increase was first noticed some ten days before the patient's death, and during this period intervals of unconsciousness, alternating with excitement, were present. November 16th the patient died from exhaustion.

Case IX.—Mrs. H., ætat. 61, a Moravian, was admitted to the clinic July 15th, 1885. The disease had begun 9 months ago.

On admission the labia majora and nymphæ, the genito-crural regions, the anal furrow, revealed groups of moist vegetations decked with white sloughs and fringed with the remains of bullæ. In the neighbourhood of these excrescences there were scattered papules and blebs from a hempseed to a lentil in size. The epidermis soon exfoliated, exposing raw, moist sores to view. The discharge from the vegetations was very offensive; the inguinal glands were as large as hazel-nuts. The red border of both lips, including the angles of the mouth, was beset with hempseed-sized blebs, the contents of which soon dried up, forming brown scabs. The tongue displayed rhagades, its margin crenated, and here and there patches destitute of epithelium. The mucosa of the hard and soft palate was swollen and red, the tonsils deeply fissured. The margin of the right lower eyelid was fringed with crusts, elsewhere the integument was free from eruption.

July 22nd: Near the margin of the vegetations a few small blebs have developed; rupture readily takes place, leaving an easily bleeding sore.

July 27th: Fresh blebs have appeared on the labial and palatal mucosa, followed by serpiginous exfoliation of the epidermis.

July 30th: In both genito-crural regions there are recently ruptured vesicles.

August 8th: Around the warty vegetations fresh crops of bullæ keep on appearing, which on rupture show reddened, raised, moist sores. The older efflorescences continue to spread so that the more recent ones become encircled by them.

August 27th: Over the left margin of the os coccygis there is a spot, lentil in size, of exfoliation of the epidermis.

September 5th: Pain in the throat—dysphagia, hoarseness, and dyspnœa.

September 12th: At the left angle of the mouth and at the anterior commissure of the vocal cords fresh vesicles are to be seen.

September 21st: Bronchial catarrh, and increase of hoarseness.

October 13th: The toe-nails present a dead appearance, they are furrowed length and breadthwise, the margins are the seat of warty granulations, partly concealed by scabs, and limited by shaggy epidermis.

November 1st: The right thigh is at times spasmodically adducted. The patellar and cubital reflexes considerably exaggerated. Spasm of these muscles occurs on the slightest provocation.

November 3rd: The fissures of the lips are healed. The pain in the throat continues, and there is marked redness and swelling of the vocal cords. The vegetations on the toes have increased in size and are spreading.

November 11th: Headache for the last few days; solid food can no longer be taken, and even fluids cause great distress. The right upper eyelid droops, but the movements of the eyeball are quite normal. The lips and tongue are covered with crusts. Speech is an effort, and articulation indistinct. Intellectual powers normal.

November 21st: The loss of power in the right levator palpebræ superioris persists. The patient wanders at times, and refuses food.

November 22nd: Death from collapse.

Microscopic examination of the skin.—The somewhat incomplete character of the examination of the skin I made conjointly with Dr. Blanvelt, I have been able to make good through the opportunities afforded me by the last three cases. In the *epidermis* there is a meshwork of elongated rete-cells in the meshes of which numerous exudate cells can be recognized—a condition resembling that seen in a variola pustule and the second degree of burning, where the vesicles, in contradistinction to ordinary pemphigus, are unilocular. The horny layer is loosened, the prickle and columnar cells are well-defined. The interpapillary

processes are longer and broader than normal. In several, varying collections of pus-cells surrounded by flattened rete-cells can be easily recognized. These nests gradually increasing in size, finally come to occupy a site immediately beneath the horny layer; here they form the macroscopic vesicles which on rupturing form the moist points.

The *derma* is the seat of granular degeneration, the papillæ are increased, and the connective tissue cells contain numerous pigment granules. The vascular loops are dilated, and filled with blood; the adventitia shows well-marked, round-celled infiltration. The hair-follicles show club-like excavations, filled with cells from the outer root-sheath; the wall of the follicle is infiltrated with round cells, and the orifices are distended with cellular detritus. The sebaceous glands are filled with friable sebum. The ducts of the sweat glands are dilated, the spiral segment filled with horny cells. The lymphatics, always difficult to recognize unless previously injected, are easily recognized in the papillæ. No change can be detected in the non-striated muscular tissue or in the nerve elements.

The most striking pathological changes in *pemphigus vegetans* are to be met with in the epidermis and upper layer of the derma; the deeper layer, the pars reticularis, with the exception of the sweat glands, has undergone but little alteration. There are circumscribed collections of pus, originating in the prickle layer, which gradually increase in size, come to the surface, and there form pustules. The papillæ are enlarged; the blood and lymph vessels dilated; the follicles, the walls of which are the seat of active proliferation, become plugged; the cutis structure undergoes cloudy swelling and granular degeneration, and the fixed connective-tissue cells become loaded with pigment.

These observations agree in the main with those of Kaposi's on *frambœsia syphilitica*, and thus tend to confirm the identity between this disease and pemphigus vegetans. The presence of exudate cells—not only in the upper layers, but also in the interpapillary processes of the epidermis—clearly indicate this structure to be most implicated in the morbid process. Furthermore, the ducts of the follicles are the seat of well-marked primary changes which gradually extend downwards. The enlarged papillæ, the thin walls of the blood-vessels, the dilated lymphatics, seen in sections made from skin where

derma and epidermis were undergoing disintegration, convey the impression of acuteness of the disease. The thin walls of the blood-vessels point to their comparatively recent development.

The rapid growth of the papillæ suggests great irritation of the cutis, due to the presence of a superjacent disintegrating process, and this has a more powerful action than normal physiological secretion, which under favourable circumstances may produce condylomata acuminata. If we sum up the clinical symptoms, we have well-marked marasmus, speedy failure of the patient's powers, and towards the close distinct evidence of spinal cord irritation (three examples). In the first, Case VII., there were painful spasmodic contractions of the right knee and left elbow, and distinct exaggeration of the patellar and cubital reflexes. In the second example, Case VIII., the spasms were absent, but both skin and tendon reflexes of the lower extremities were increased. In the third example, Case IX., there were persistent contractions of the adductor muscles of the right thigh; the right knee was drawn up spasmodically towards the left, and as a result the movement of both hip and knee joints was impeded. Patellar and cubital reflexes were exaggerated to a high degree, the slightest tap being sufficient to elicit violent muscular spasm. The plantar reflex was not increased, and there was no ankle clonus. On the other hand, the epigastric reflex was considerably heightened; further, the patient suffered from ptosis on the right side, without any accompanying derangement of movement of the eyeball. The mental powers were appreciably affected; these nerve disturbances lasted for 3 weeks without any sign of remission.

Sensation was not implicated in any of the three cases; the exaggeration of the reflexes, the presence of mental derangement, along with the absence of any motor or sensory disturbance, were prominent nerve phenomena.

In the light of these observations and researches, it is evident, then, we have to do with a disease *sui generis*—a disease in which it is of the utmost importance to make an early diagnosis, and exclude *syphilis*.

The course of *pemphigus vegetans* is acute; the eruption appears first in the genital region, and then on the inner surface of the thighs, in the axillæ, on the mucous membrane of the mouth, and elsewhere on the skin. From these sites it may

spread to the vaginal mucosa and cervix uteri to the pharynx and larynx. The anal folds rarely if ever escape. The button-shaped vegetations, looking like condylomata lata, go on developing as long as the patient's vital powers last. Death results from marasmus and inanition, frequently preceded by irritation of the spinal cord and acute œdema of the brain.

OBSERVATIONS ON YAWS

AND

ITS INFLUENCE IN ORIGINATING LEPROSY.

BY

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[The Essay was awarded the Gold Medal of the Senatus Academicus of the University of Edinburgh.]

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III. Yaws attacking the toes.

IV. Yaws ulcers.

V. Crab yaws and running yaws as they attack the soles of the feet.

The plates have been omitted in the present reprint.

Dr. Maxwell wrote, as he says, to supply a long-felt desideratum, and to furnish the practitioner with a treatise, to which he may confidently refer as a guide. He also wished to dissuade from the employment of mercury in the treatment of the disease.]

OBSERVATIONS ON YAWS.

By James Maxwell, M.D.

CHAPTER I.

Ludford, Winterbottom, and Thomson have described yaws as an exanthematous disease, accompanied with an essential eruptive fever, having its periods of efflorescence and decline, and appearing only once during the lifetime of the patient. This is taking a very superficial view of the disease, and is drawing its character more from certain appearances which occasionally occur, than from the combined phenomena usually observed during its progress through the system.

There can be no doubt that, in the generality of cases, there are cutaneous precursive eruptions ushered in by febrile symptoms, but they are so extremely irregular in their appearance, character, and duration, that even admitting they were exanthemata in the strict nosological meaning of the term, and that they had their regular periods of efflorescence and decline, it would still be insufficient to restrain the consecutive and diversified eruptions of yaws within the limits of the exanthemata.

The series of morbid changes which result from the introduction of the poison of yaws, from the primary cutaneous efflorescence, to the various appearances assumed by reiterated crops of fungoid excrescences and depascent ulcers; the tendency which the disease has to reappear at indeterminate periods during life, producing all the phenomena of local and constitutional symptoms, and its power under certain circumstances of transmitting itself by hereditary descent under an assumed form, render it exceedingly difficult to assign it a proper place in nosological arrangement.

The truth of this remark becomes apparent when we consider the number of distinguished writers who have failed to arrange this disease in a satisfactory manner. To place it in the class Cachexia would be very erroneous, as we occasionally observe

yaws to run a favourable course without a symptom of constitutional disturbance; to arrange it as a tubercular disease would display a want of knowledge of its varieties, as it sometimes passes through the system in the form of one or more ulcers; and to call it "a rash" would be to restrain it within imaginary bounds, and to pourtray its character from occasional contingent appearances.

Precursive Eruptions.—Yaws is generally preceded by symptoms of constitutional derangement, which not unfrequently appear for weeks before the development of the primary eruptions. The patient loses flesh, becomes unusually pallid, listless, and inactive; is affected with pains of the larger joints, aggravated at night, and to these are superadded distinct febrile accessions, succeeded by a cutaneous efflorescence.

There are two common varieties of precursive eruptions.

The first consists of dry tesselated scaly patches, not unlike pityriasis versicolor, and exhibits a remarkably distinct appearance upon the skin of a negro, as if lime-water had been dashed over the surface.

This eruption is considerably influenced by constitutional peculiarities, and is sometimes a precursor to each successive crop of yaws; its duration is so uncertain that in some rare instances it accompanies the disease to its termination; but in by far the greater number of cases its continuance varies from 10 to 15 days. The parts most commonly affected are the bends of the arms, hams, chest, neck, and forehead; and, if viewed through a glass, groups of minute papulæ may be observed interspersed amongst these exfoliations of the cuticle, shaded by a slight erythematous blush, and attended with intolerable itching. By watching the progress of these papulæ, some may be seen gradually to increase without suppurating, and to acquire a granular fungoid character, while the greater part will recede and desquamate with the superficial eruption.

In the second variety, the patient complains for several weeks of diurnal accessions of fever, severe harassing pains of the large joints and cylindrical bones, which become exceedingly annoying during the night; he loses flesh and turns sallow; but is partially released from these symptoms by the appearance, on various parts of the body, of numerous smooth ovoid or circular blotches, of a dark brown or dull reddish colour, varying in size

from a shilling to a crown piece. These blotches are occasionally succeeded by a profuse vesiculo-pustular eruption, more particularly on the forehead and face, of a straw-colour, with stigmatized apices, which contain a sparing quantity of lymphy fluid. The smaller dry up and gradually disappear with the exfoliation of the cuticle, while a few of the larger assume a fungoid form, and progressively increase to full-sized excrescences. This eruption is well known to the negroes under the name of *guinea-corn* yaws, from its resemblance to the small, round, whitish seeds of that grain; and when it occurs in a person of a cachectic habit, it very often ushers in the ulcerated form of the disease. Sometimes these varieties co-exist, and recede as the yaws eruption becomes developed. It is impossible to speak with certainty of the duration of these dark discolorations of the skin, but they are generally more chronic in their nature than the scaly efflorescences, and are more frequently the precursors of ulcerative than fungoid yaws.

Varieties.—For the sake of convenience the yaws may be classed into the fungoid and ulcerative, and every other variety ought to be considered as modifications of these two forms. These varieties depend upon constitutional idiosyncrasy, and not on any specific difference in the morbific poison; for we are warranted in believing that the fungoid yaws is the normal state of the disease, from daily observing every other form to spring from this source.

The first, or fungoid, is by far the most common, while it is also the mildest variety of yaws.

The term tubercle has been applied to designate this eruption, not in its usual pathological sense, but agreeably to Willan's definition, in his order Tubercula, where he defines it to be "a small, hard, superficial tumour, circumscribed and suppurating partially." This does not appear to me to convey a sufficiently precise meaning of the nature of the eruption of yaws, indeed it is difficult to fix upon any term sufficiently characteristic of the disease; but I give the preference to "fungus," with some modification, as approaching nearest to the real nature of a yaws excrescence, more especially the larger groups of them, where they are soft, excessively tender, and bleed from the slightest irritation.

Shortly after the appearance of the preliminary eruption, or contemporaneous with it, small pimples or pustules may be

observed in detached clusters on various parts of the body, some of which assume an active form, and gradually and imperceptibly increase in circumference, until they have acquired their greatest magnitude, and vary from the size of a split pea to that of a fig. These spots acquire a rough granulated fungoid character from a very early period, and never contain purulent matter, but are covered with a glutinous film formed from the exudation of fluid from their surface, which gives them an appearance as if coated with yellow varnish, and which does not fill up the deep irregular fissures peculiar to these excrescences. If this glutinous crust be rubbed off, the surface beneath displays a florid red and extremely irritable appearance, is excessively tender and painful, and bleeds from the slightest touch. If left undisturbed they are soon coated with an opaque amber-coloured secretion, which serves to protect them from external influences; and if no peculiar constitutional symptoms supervene, the principal yaws preserve their character with but little deviation during the continuance of the crop. The time which these yaws excrescences take to arrive at maturity is so obviously influenced by peculiarities of constitution and other causes, that no definite period can be assigned for their duration, and we may expect to see differences in the eruption as these circumstances exist. In young persons, in the plenitude of health, the fungoid excrescences are often fully developed in a month, whereas on the other hand, when the system is impaired from previous ill-health, they require several months, and after all never form properly. In some cases the crop of yaws appear to shrink or recede from accidental circumstances, leaving dark-coloured blotches, and upon a favourable reaction taking place they again emerge and arrive at their full size. "The same constitution may be apt to receive or produce it at one time more than at another, and if it is produced by external infection may hasten or retard the symptoms. This I know by experience, that negroes who were lusty and in good plight, and had full nourishment allowed them, in a month after discovering the white spots, have had several yaws as big as a mulberry; and the negroes that were low in flesh, and have had but a poor scanty diet, in 3 months' time none of the yaws have exceeded a common strawberry in size."*

* A Description of the African Distemper called Yaws—Medical Essays and Observations, Edin., vol. v., part II., edition 4, p. 313.

When the eruption of yaws has acquired its full magnitude it remains stationary from a period varying from 2 months to as many years before it makes room for another crop, and during the whole of this period yaws of various sizes may be seen successively to advance, arrive at maturity and recede, without influencing or changing the character of the larger excrescences, and these desultory eruptions continue up to the time when the disease is about to make a temporary retreat, when they simultaneously disappear. The usual character of this variety is circular or nearly so, of a convex form, indented with irregular linear fissures or furrows projecting from the surface a few lines, and sometimes environed with whitish and faint reddish-coloured areolæ close to their base. In this, as in all other diseases, deviations from the normal state may be occasionally observed, and instead of the eruption advancing in a progressive manner, from minute points to form into yaws, they are sometimes to be seen opening to view as large as the flattened heads of brass nails, smooth, upon a level with the skin, and protruding slowly through the receding or absorbed cuticle, shaded with an annular border of a darker hue than the negro skin, and becoming in time large amber-coloured excrescences.

After an eruption of yaws has acquired full maturity, it begins to decline by gradually shrinking or receding without the formation of either crusts or scabs, and the process with some is accomplished in a few days, while in the majority it will take several weeks. The parts previously occupied by yaws, more particularly the larger excrescences, are marked by an evanescent dusky shade, and have a puckered, shrivelled appearance, but the cuticle soon regains its natural colour, and the corrugated spots become so perfectly obliterated that an indent of the skin cannot be perceived. Ludford, Adams, and others assert that the larger excrescences invariably leave persistent scars, but this is only observed in very rare cases of yaws, where the parts have been destroyed by ulceration, and never in the fungoid form of the disease.

A solitary fungus has sometimes been all that has appeared of the disease, and where this happens it frequently occupies one of the toes. The circumference of the skin contiguous to the nail becomes smooth, shining, and inflamed, and assumes a vesicated appearance, or it originates beneath the nail like a

whitlow, quickly destroying it, and forms into a bright florid fungus, which acquires the size of a lime, is excessively irritable and painful, and bleeds from the slightest touch. If at any time the disease bears a similitude to a raspberry, it is where the distal phalanx of the great toe is affected in this way, and it is perhaps from the faint resemblance which it then has to that fruit, that early writers applied Frambœsia as a general term. Through the medium of this granulated great toe alone, the susceptibility of the disease is now and then as effectually destroyed as if successive crops of well-defined yaws had appeared, not however before the patient has very frequently lost one or more joints of his toe. The extent of the fungoid eruption varies from a single excrescence to confluent yaws, where the whole surface is covered so thick that they encroach upon each other; in the latter case there is a remarkable turgescence of the skin from increased capillary circulation, and the face assumes an unnatural aspect as in aggravated cases of small-pox.

The neck and arms, the nates, perineum, labia, inside of the thighs, and the skin over the orbicular muscles of the mouth, are most frequently occupied by this variety, and it is by no means uncommon to see the scrotum involved in one fungoid excrescence. The prepuce is also frequently affected, but in no instance do I recollect having seen the glands the seat of fungoid yaws. Mr. Mason, who writes a sensible Essay on Yaws, has fallen into an error in supposing "the mucous tissues incapable of producing yaws tubercle."* That an attack on these membranes is an unfrequent occurrence I am ready to admit, but cases have occasionally come under my observation where the mucous tissues, not only of the throat and nostrils, but also of the ears, were affected, and although much inconvenience was experienced from these delicate parts having been the seat of yaws, they always disappeared with the general eruption, and when the constitution was unimpaired no disagreeable consequences followed. The yaws fungus in the throat has not inappropriately been likened to a piece of toasted cheese, and I have, in a few cases, seen the palate and fauces occupied with excrescences when the dermoid tissue was very partially affected.

Dr. Thomson is inclined to think that each successive crop

* Edin. Med. and Surgical Journal, vol. xxxv., p. 55.

becomes fewer in number and larger in size till the disease is expended; such is occasionally observed in very favourable cases where nothing interferes with the regular succession of the eruptions in a vigorous constitution; but when this form of yaws exceeds its ordinary duration,* and the visits are of more frequent occurrence than usual, or when it reappears, as it occasionally does, after an absence of several years, the health becomes impaired, and each succeeding crop is so palpably influenced by these circumstances, that the disease generally loses its fungoid character and merges into ulceration. Symptoms of a more serious nature now arise, marked by racking, deep-seated pains in the bones, periosteal swellings and nodes, followed by ulcers in the nose and throat, extending to the larynx, which render the case exceedingly difficult, and the patient often dies in a state of extreme emaciation.

Instead of the eruption appearing in the usual form of round convex excrescences, it occasionally assumes a crescentic or almost annular shape, sometimes completing the circle, and leaving the skin in the centre untouched; but, in many cases, where the system has been reduced, from severe irritation, it is partially suppressed and never becomes fairly developed, till at length an ulcerative process is induced, which terminates in the breaking up of the constitution, unless the health be speedily improved.

This has been called "the ring-worm yaws," from a supposed resemblance which it has to that disease; and its deviation from the normal state may generally be attributed to an impaired state of health. I have frequently endeavoured to change the features, both of this and the ulcerative form of the disease, by inoculating from healthy persons, in whom the large benignant yaws existed, but, as might be expected, without success; and it was only by improving the general state of the health by remedial and dietetical means that a change could be effected, and when the habit was sufficiently improved the subsequent eruption displayed the fungoid character.

In persons of a cachectic habit, who unfortunately contract yaws, instead of the raised excrescences displaying the usual

* When the disease is left to itself in good constitutions, or, what is much the same, when treated by the negroes with native simples, the majority of cases terminate with the third crop of yaws.

amber colour they are flattened and assume a dull lurid appearance, and have, as a frequent accompaniment, ecthyma cachecticum interspersed.

In infants and children labouring under hectic fever, marasmus, or other chronic diseases, the consequence of incessant irritation, the eruption becomes dark and melanotic before it strikes in, and either dysentery supervenes and proves quickly fatal, or it terminates more slowly by effusion in the chest or abdomen.

There are other trifling varieties, which depend altogether upon causes affecting the constitution and not from any specific difference in the virus, as it is well known that the whole children on a plantation may be inoculated from a favourable case of yaws, and that the disease will present as many shades of difference as there are peculiarities amongst the persons affected.

The Second or Ulcerative Variety only occurs where the general health is impaired, and where the system is inadequate for the development of the eruption in its more prominent form. In this variety the patient is long harassed with bone-ache, swelling of the large joints, and restless nights from nocturnal exacerbations of pain; and after suffering in this way for weeks together partial eruptive blotches and scaly efflorescences appear, introducing in some cases a few fungoid excrescences, which are generally quickly absorbed and their places supplanted by ulcers. In some cases the first indication of this form is a dull, smooth, shining appearance of the toes, followed by ulceration, depriving them of their nails, and when it assumes a chronic state some of the phalanges are occasionally destroyed. If during these desultory attacks a favourable change can be effected in the health of the patient, we may have the gratification to see the normal disease prevail over this exceedingly annoying variety, but notwithstanding all our efforts it sometimes pursues its sullen course and imperceptibly glides into a form which will be more fully noticed hereafter. Persons labouring under the malus corporis habitus, or those whose systems are deeply tainted with hereditary leprosy, are more liable to ulcerative yaws than those whose constitutions are sound, and under such circumstances the disease may be invariably regarded in an unfavourable light.

The slightest atmospherical vicissitudes, or the accidental

occurrence of fever, often cause the eruptions to recede, and the ulcers prematurely to dry up, and puffy swellings of the joints, deep-seated pains of the bones, nodes and exostoses pave the way for a fatal termination of the malady by dropsy. In many instances this imperfectly-developed form of yaws is accompanied with blotches and scaly eruptions throughout, and these combined circumstances exhibit an index to the general state of the constitution; and the danger of ultimate bad consequences will be in an inverse ratio to the healthy state of the system.

Those conversant with the disease know that, after the preliminary eruption, many pass through yaws with no other sign than an ill-conditioned ulcer situated on the lower extremity, possessing the following pathognomonic characters: An ulcer of a dull livid character, covered with unhealthy fungoid granulations, which occasionally rise higher than its edges and bleed from the slightest irritation, discharging a peculiarly disagreeable fœtid ichor, with edges environed with a whitish elevated turgid border, from half an inch to an inch in breadth, rough, spongy, and as if partially vesicated, and attended with acute pain. This ulcer is technically called the Mamma Yaw by the negroes, and through it alone the susceptibility of the disease is at times exhausted. In some patients it assumes a modification of form and appears on a line with the adjacent skin, thickly studded with minute whitish spongy flattened granulations like millet seeds, unattended with pain, and having a few large fungoid eminences interspersed as if rising from a diseased bone. Should these ulcers not possess characters sufficiently diagnostic to enable those slightly acquainted with yaws to form a due estimate of their nature, their judgment may be assisted by attending to the scaly eruptions, or copper-coloured ovoid blotches which precede or accompany them, and it sometimes happens that upon minute examination one or more fungoid excrescences will be found concealed in the axilla or about the perineum, which will banish all doubt of the real nature of the ulcers. The virus of yaws appears to have been directly applied to such ulcers while they were in a healthy state, and I have frequently seen the truth of this verified, when common sores progressing favourably towards a cure would suddenly assume a suspicious character, remain stationary, and the granulations be absorbed. If any doubts existed relative

to the exact nature of the change which the ulcer had undergone they were soon dispelled by the development of concomitant eruptions, obscure febrile symptoms, and pains of the larger joints.

In an excellent anonymous paper, which was intended by the author, Dr. Downer, as an answer to my circular relative to yaws, but which, by some accident, was published without his permission before it reached me, that gentleman, in reference to the probability that the morbid poison may be occasionally exhausted through the medium of an ulcer, says, "The yaws thus originated in an ulcer may run its course without the formation of any tubercles elsewhere than in the ulcer, which may continue for many years, and perhaps to the termination of the patient's life. But even in these very irregular cases, constitutional derangement and discoloration of the skin are not awanting, neither do I think, on strict investigation, would it be found that the usual febrile symptoms are ever absent. This mode of attack is certainly not very common, yet I am quite sure that the disease occasionally proceeds in this form."*

Crab-Yaws is an affection of the soles of the feet, occurring as sequelæ of the disease. The etymology of this adjunct I am unable to trace, unless it be derived from the sinister manner in which the land crab (cancer ruricola) walks, as applied to the helpless state of those whose soles are covered with these painful excrescences, causing them to walk on the sides of their feet with extreme caution. From negroes going habitually without shoes, the cuticle of the feet is subject to much pressure, and consequently becomes excessively thickened; the formation of fungi on the subjacent cutis, and their confinement under the dense unyielding cuticle, produce intense pain, and strong constitutional disturbance when they are approaching to the surface, and unless assisted in their progress, it will require several weeks before their transit be completed; this is accomplished by the gradual process of absorption of the indurated mass, which at length cracks, and allows the crab-yaws to protrude. Negroes are very expert in paring the thickened cuticle, to allow both these and collections of matter to escape. They are exceedingly prone to subcutaneous inflammation, which

* Jamaica Physical Journal, November, 1836.

erminates in an abscess, vulgarly called "stone-bruize," and which, if not early opened, frequently insinuates itself amongst the muscular and tendinous structures, and either appears at the sides or the top of the foot, and in some cases produces extensive sloughing. In rare cases crab-yaws affect the palms of the hands, causing much uneasiness, and in a case of secondary yaws I have seen a fungus appear as a sequela of the disease at the point of the thumb, close to the nail, attended with great pain and proving very obstinate. This affection sometimes appears as a primary eruption, without being followed by the disease in its usual form, and in this way the virus has been exhausted; it likewise occasionally happens during the first, second, or third crop of yaws; but these rare visitations may be considered exceptions to the general procedure of the disease, and their occurrence may be strictly classed as sequelæ of the original affection. Crab-yaws often appear in profusion in cases where the progress of the normal eruption has been improperly arrested by injudicious treatment, and in some instances they exude a corrosive ichor which destroys the neighbouring skin, and in this state they are highly contagious.

Running Yaws is a loose expression for another consecutive affection. It principally consists in a diseased state of the cuticle, at times involving the subjacent tissues, and forming into linear ulcers and honeycomb perforations. The soles of the feet and palms of the hands are occasionally extensively invaded, and portions of the cuticle not engaged in this cribriform ulceration become dry, indurated, and disorganized, and resemble the bark of a decayed tree.

The *Yawy Whitlow* is sometimes observed as a concomitant affection, but it may be more strictly regarded as a sequence of the disease. In most cases the inflammation appears to be of a sub-acute kind, and is not attended with that inordinate pain which accompanies the various forms of paronychia. It commences with obscure pain, and is followed by an inflamed shining state of the distal phalanx of the finger or toe, which partially forms into a superficial abscess, and is usually succeeded by the loss of the nail. The part then assumes an ulcerated character, devoid of granulations, and is covered with a straw-coloured matter, which, when removed, displays a smooth, red, irritable surface. I have known the whole toes and part of the

fingers affected at the same time with this chronic ulceration in persons whose health was undermined by the virulence of long-continued yaws; and it not unfrequently happens that children affected in this way have recourse to eating various kinds of earth and clay to afford a temporary relief of a morbid state of the digestive organs. When this complication of evils are allowed to exist for any length of time they prove fatal.

The precise seat of yaws appears to be in the cutis vera. In the progress of the virus towards the surface an inflammatory process is set up in a papilla, the structure of which becomes gradually enlarged, and the morbid action is quickly communicated to others; and in their advancement to the surface they form into fungoid excrescences of greater or less magnitude, and the superincumbent cuticle is removed by absorption as in crab-yaws, or it flakes off in scales. In parts unusually vascular, and where the cuticle is thin, as in the lips, scrotum, labia, axilla, &c., the excrescences acquire a greater size than in other situations; and it is by no means uncommon for the whole mouth to be surrounded by a continuous fungus, elevated to about a $\frac{1}{4}$ inch or even more, and extending to 1 inch in breadth.

Latent Period of Yaws.—With the exception of the late Dr. James Thomson of Jamaica, and Mr. Mason, I am unacquainted with any authors who have described the latent period of this disease, nor have I been successful in obtaining information on this interesting point in answer to queries addressed in a circular to my medical friends in that island. I have ascertained, by experiments, that the period which intervenes between the insertion of the virus and the appearance of the fungoid eruption varies from 6 weeks to 3 months. In a few cases of inoculation performed by Mr. Mason, the yaw fungus appeared at the end of 3 weeks. My former partner, Dr. Robertson, whose opportunities for observing this disease were exceeded by few, writes me, that "from 2 to 3 months after the insertion of matter febrile symptoms supervene, the skin becomes scurfy, and small pustules appear over the body, which gradually proceed toward the formation of glutinous excrescences." Dr. Thomson arrived at a similar conclusion, and makes the latent period extend from 7 to 10 weeks; and, in addition to a number of direct experiments, he says, in further illustration, that "a number of healthy children were removed from a

mountainous situation to a sugar estate. The children were mixed with those already on the property and had their meals together; 7 weeks after their intercourse, three were seized with fever and pains, the eruption appeared all over the body; the rest, at the end of 10 weeks, showed symptoms of the disease, and in 8 months they had all recovered." A healthy girl of colour under my inspection was inoculated by inserting matter taken from a favourable case of yaws into an abrasion on her arm. The part healed up, and exactly 3 months afterwards a few large yawy excrescences appeared on different parts of the body, attended with no perceptible constitutional irritation, and in 3 months more they disappeared and never returned.

The difference of time which elapses from the insertion of the virus to the appearance of yaws is no doubt influenced by idiosyncrasy and the state of the patient's health, but the concurrent testimony of those who have attended to this point agree that it does not exceed 3 months. Dr. Adams relates the case of a Danish nobleman, in whom he says yaws appeared 10 months after he left the West Indies; but, with every submission to that talented author's general accuracy and judgment, I am inclined, from its history, to think it was a different disease, and an intervening period of 10 months is of itself sufficient to establish my position.

When the matter of yaws is inserted into an ulcer, either by accident or design, if it be of any considerable size it rarely heals until the eruption appears and declines; and, as has already been stated, should the patient labour under an impaired state of health, the yaws may never be fully developed, but will lay dormant in the system, and appear at a future period in the form of an inveterate constitutional disease. When the virus of yaws is introduced into a slight wound a persistent scab is sometimes formed, under which a yawy excrescence protrudes, quickly followed by a general eruption, or it heals up, and the matter is carried into the system, afterwards to be developed in parts remote from the original site of inoculation. It is by accidental inoculation that negro children generally contract yaws. The healthy are allowed to mix with the infected, and those with porrigo or itch, or abrasions of the cutis, have the disease readily communicated, either by actual contact or by flies, and in this way it is indiscriminately propagated, and unfortunately but too

often from those whose constitutions are deeply tainted with hereditary maladies.

Dancer says that "an abrasion of the cuticle, or wound, does not appear absolutely necessary; the matter applied to the surface is sufficient."* It would require something more than bare assertion to invalidate the united testimony of the medical men of the present day, who are unanimous in opinion that yaws can be communicated in no other way than through the medium of an abraded cutis.

It is by no means uncommon for servants who have yawy excrescences on parts of the body beneath the clothes to conceal their complaint, in order that they may not be sent away, and who, during the time that they laboured under an active form of the disease, performed their domestic duties, had constant intercourse with the family, and washed and dressed the children; yet, nevertheless, it was seldom that yaws was imparted under such circumstances. I knew a white man whose child had a regular crop of fungoid yaws, who kissed and handled it with impunity, because his skin was free from abrasion; and Dr. Robertson communicated to me the case of another white man who slept with two of his children while they had yaws, and escaped owing to the clean unruffled state of the cutis. Instances of this kind might be multiplied, were it necessary, to show that yaws is never communicated through the atmosphere; and there are no persons practically acquainted with the disease who believe that it is capable of being propagated in any other way than by inoculation.

Alibert considers the dermoid tissue of negroes to be endowed with an unusual share of sensibility, and asserts that they are more susceptible of yaws than the whites. Hillary and Dancer incline to this hypothesis. The latter says, that "independent of the circumstance of their being more exposed to it from contact with others, they seem to have a disposition to receive it more readily than white people."†

It may seem unnecessary to refute an opinion so perfectly gratuitous, but as it is one of those vague assertions which is copied from one author to another, it is time that it should be laid aside. White children, as well as children of colour, are carefully

* Dancer's Medical Assistant, Jamaica.

† Dancer's Medical Assistant, Jamaica, p. 221.

secluded from negroes affected with yaws, superior habits of cleanliness are observed, and consequently cutaneous affections of a contagious nature are propagated with more difficulty. During the prevalence of epidemics, children of all classes and colours are indiscriminately affected with exanthematous diseases, and wherever a disregard to cleanliness was evinced porrigo and itch affected white with the same facility as black children. Most medical men in the West Indies have opportunities of knowing that white people contract yaws as readily as blacks, if they are exposed to similar causes of contagion; so that the assertion of a superior degree of susceptibility in the negro to receive this disease is without foundation. Alibert's idea that negroes are vested with an increased share of sensibility, is entitled to an equal share of credence with the converse opinion of Mosley, who affirms that they show an extraordinary indifference to pain. I have invariably found them give vent to their feelings under severe operations in a similar manner to white people.

It is a very general opinion that measles and small-pox occurring during the eruption of yaws exert a specific influence in destroying the susceptibility of the disease. Dr. Ludford, in his excellent "Essay on Yaws," says, that "Frambœsia laborantis aliis exanthematibus, qualis sunt rubeola, et variola, obnoxii sunt. Hæc arte seu insitione induci potest, quæ melius fatiscente Frambœsia tentantur; tunc enim Frambœsiam variola vel penitus tollit, vel saltem per aliquod tempus coercebat; neque dein perstabunt fungi, si forte iterum in superficie se ostendunt."*

Dancer quotes Dr. Nembhard to prove that yaws gives the pas to small-pox: "During the universal prevalence of the small-pox in this island in the year 1784, it was remarked that several negroes, affected with yaws, who had the yawy pustules on the surface of the body, and had been a considerable time under the afflicting circumstances of the disease, were inoculated promiscuously among many other negroes. The result was that upon the decline of small-pox and drying away of the pustules, the yaws also gradually disappeared, as if both might be considered in the light of one congenial disease." Dr. Dancer very properly remarks, that if such a result could be obtained, "the

* Loc. citat.

discovery would be little short of that which prevents small-pox by the cow-pox."

Dr. Robertson, already alluded to, speaks in positive terms of the efficacy of small-pox in destroying the virus of yaws in the system. "Upon my arrival in Jamaica," says he, "about 30 years ago, I was requested to inoculate all the children upon several large estates with small-pox, indiscriminately, without reference to any local affection; and that most of them had yaws, in all its stages, from the scurfy eruption to the yellow sordid glutinous excrescence. During the eruptive fever of variola, the yaws retained their station, without the slightest variation of colour, but, upon the maturation of small-pox, both eruptions disappeared together. No distinction could be perceived in the character of variola in those who had previously gone through it. In 1831, the last time the small-pox made its appearance, I observed the same effects, and no solitary instance can be adduced of the yaws returning at any period where both diseases have existed together."

I have examined these opinions with that consideration which the experience and respectability of such gentlemen are entitled to, and during two of the most extensive epidemics which ever visited Jamaica, had ample opportunity of observing the principal phenomena to which they severally allude, so far as the temporary retrocession of yaws was concerned; but beyond this I cannot agree with them, as my observations lead to diametrically opposite conclusions; and as this is a subject of great physiological importance, affecting the welfare of a dense population subject to one of the most deplorable diseases that ever blighted the happiness of mankind, I shall briefly state my reasons for dissenting from those who have advanced the opinion that the yaws is thoroughly eradicated from the system by the introduction of small-pox. In the first place, I have no hesitation to admit their premises, that small-pox, during its progress through the system, usurps the place of yaws; but dissent from their conclusions that it possesses the power of destroying the future susceptibility for the disease; and, in the second place, I will endeavour to show the source of fallacy which led them to such inferences.

In the extensive epidemic of measles in 1821, and of small-pox in 1831, which ravaged Jamaica, yaws of a fungoid form

underwent a manifest change in its character, as soon as the exanthematic eruptive fever became fully developed, and from that period it began to retrocede, and finally to give the pas to the prevailing epidemic. The effects produced by the repulsion of one disease upon the appearance of another were various in different individuals. In those whose health was little impaired by the primary eruption, and where the yaws had nearly completed its course, the disagreeable consequences were trivial compared with those who had the disease in a recent state, and who were suffering from great constitutional irritation. In the measles of 1821, dysentery appeared in a congestive form as a consecutive affection, selecting those of a cachectic habit, more especially those of them who had yaws thus repelled, setting all remedial measures at defiance, and proving fatal to a lamentable extent over the whole island. This was one of the most extensive epidemics which had appeared for many years, and few persons escaped who had not been previously affected.

Now, as measles has also been thought by some to have the same influence in destroying the susceptibility of yaws as small-pox, how did it happen that, a few months after the cessation of the epidemic, this disease was as generally prevalent as before the appearance of measles? Simply for this reason, because although rubeola had the power of superseding the progress of yaws *pro tempore*, it possessed no specific influence to eradicate the disease.

In 1831, small-pox appeared as a very general epidemic, and proved exceedingly fatal to those affected with yaws. The eruption gradually receded upon the appearance of variola, and, where the course of the disease was nearly completed, it disappeared not to return. It was otherwise when yaws was only in its early stage, or had made little progress; here it likewise dried up, but invariably returned whenever the system was able to develop the repelled disease.

A few months after the decline of small-pox, yaws was observed almost as prevalent as if no epidemic had occurred; and had variola possessed the power attributed to it, yaws, owing to the extremely slow manner in which it is propagated, never could have appeared so generally, and in such a short time after the decline of small-pox. Another circumstance which militates against the supposed sanative influence of

small-pox over yaws is, that during the prevalence of the epidemic, although the fungoid eruption underwent a change, the character of the yawy ulcer was little affected, showing in the most unequivocal manner that a temporary effect was only produced upon the disease similar to what daily happens from other causes.

The opinion of Dr. Adams on this point is so consonant with my own, that I have no hesitation in quoting it. "It is probable," says he, "that the irritation from small-pox and measles being greater than that from yaws, may intercept the latter at any time. But the laws of that poison requiring a certain course to be pursued, if the new irritation is induced before the course is completed, the disease must return as that new irritation ceases. If, on the contrary, that irritation has not been induced till the course of the yaws is completed, and nothing remains of it but an habitual ulceration, the new irritation will not only supersede the old action, but, by breaking the habit, very much expedite the cure."*

There is no cutaneous affection more easily influenced by accidental circumstances than yaws in its fungoid state, and, whenever febrile symptoms supervene, they invariably have a tendency to repel the eruption. An attack of inflammatory anasarca, the occurrence of chronic diarrhœa or dysentery, the inveterate propensity of "dirt eating," or any thing which suspends the functions of the skin, has a decidedly detrimental effect upon the disease. The retrocession of yaws, from imprudent exposure to cold and moisture, is very common, and, from whatever cause it is repelled, the symptoms are nearly the same. The patient assumes a leucophlegmatic appearance, becomes bloated, which is sometimes partial and confined to the face, but more frequently the whole cellular substance is infiltrated. There is a peculiar distressing dyspnœa, with short, dry cough and strong febrile symptoms, the skin turns dry, furfuraceous, and discoloured, and is marked with stigmata, or blotches upon the former seat of the eruption. The lungs appear to be primarily affected with inflammation, variously modified according to circumstances, while the external dropsical symptoms are generally of an active nature, not unfrequently terminating in erythema, œdemasotum, or confirmed dropsy.

* Adams on Morbid Poisons.

In drawing conclusions relative to the supposed specific influence which small-pox has over yaws, the great sources of fallacy are that, in the latter disease, the intermediate periods of the eruption are so uncertain, and its reappearance so indefinite, that few persons have taken the trouble to watch the future progress of the affection with a sufficient degree of accuracy. Besides, there is an almost insurmountable barrier in doing so, from the patients being removed, and so secluded from observation amongst the negro houses, that few medical men have sufficient opportunities of correcting their judgment on the point in question, and by thus seeing the yaws succumb, in the first instance, to small-pox, they have hastily and erroneously concluded that the disease is thoroughly eradicated from the system, whereas it is only held in abeyance till all constitutional irritation from the more recent disease be removed.

One of the most painful and distressing consequences of suckling a child with fungoid yaws surrounding the mouth, is that a destructive species of ulceration is sometimes communicated to the breast of the nurse, who has already been affected with the disease in its usual form. The ulceration begins and insulates the nipple by excavating a border of more or less breadth around its base, which often stops here, but in some cases it extends laterally, destroys the greater part of the breast, and the nipple is now removed by ulcerative absorption. If the disease be not arrested, it spreads towards the axilla, strong constitutional disturbance supervenes, and ultimately both breasts may become affected ; the child, in the interim, is attacked with febrile symptoms, and, unless weaned, it dies in a state of great emaciation, and the nurse becomes hectic and gradually sinks from the irritation of a painful disease.

There are certain family lineaments peculiar to yaws, syphilis, and sibbens which bear an affinity to each other, although they do not stand out in sufficiently broad relief to prove their identity with precision at the present day. It is by no means unreasonable to suppose that they are descended from one common origin, and are now varieties modified and altered by a long train of circumstances, in their transmission for ages through people of various nations, who differ as widely in their character and external appearances from the race to which they owe their descent as the disease in question.

The primary eruptions, blotches, condylomata, excrescences, nocturnal pains and affections of the bones, are, with modifications, common to yaws and syphilis and the secondary symptoms of sibbens described by Dr. Gilchrist,* where the whole surface was mottled, of a dusky copper-colour, with pustules, scabby eruptions, excrescences about the anus, and fungoid tubercles resembling raspberries, are likewise common to yaws and syphilis, and afford strong presumptive evidence that the assertion relative to the common origin of these diseases is not altogether hypothetical.

Syphilis, as it appears in the present day, is comparatively a mild disease to that described by early writers, and sibbens, which a few years ago attracted so much notice from the frequency and severity of its symptoms, has almost disappeared. However closely allied these diseases might originally have been, they have now so far lost their relationship as no longer to be considered kindred affections. It therefore becomes necessary to exhibit the characters which at present distinguish them.

Diagnoses between Syphilis and Yaws.

1st. Syphilis appears in 6 or 8 days after contagion. Yaws takes from 6 weeks to 3 months.

2nd. Syphilis may occur frequently from distinct infection. Although yaws may recur oftener than once, from the susceptibility not having been destroyed, yet it cannot be communicated by future inoculation, so as to display the disease in its normal state.

3rd. The constitutional symptoms of the venereal disease are generally progressive, and seldom disappear without the aid of medicine. The yaws generally admits of a spontaneous cure.

4th. Syphilis is capable of affecting the fœtus in utero. Yaws never has been known to do so.

5th. Exanthematous eruptions and febrile affections have a temporary power in suspending yaws. Not so in syphilis.

Diagnoses between Sibbens and Yaws.

1st. The primary local action of sibbens is superficial ulceration of the uvula, tonsils, lips, and gums, with a small rising of

* Observations, Physical and Literary, of a Society in Edinburgh, vol. iii., 1771.

the skin, of a pearl or whey colour. Yaws never originates in this way.

2nd. Sibbens is communicated by a foul pipe or spoon to a whole family. Yaws cannot be communicated unless the skin be abraded.

3rd. Sibbens never attacks the bones. Bone-aches are amongst the first symptoms of yaws; and in chronic aggravated cases it frequently produces nodes and exostoses.

4th. Sibbens readily yields and is cured by mercury. Yaws is invariably rendered worse by that mineral.

5th. Sibbens does not admit of a spontaneous cure. It has been shown that yaws frequently does.

CHAPTER II.

General Observations.

The manner in which yaws appears in different individuals is extremely diversified. Some have only one crop in a mild and modified form, without the usual accompaniments of severe constitutional irritation, while others will have three or four; a few will escape, with the system rendered unsusceptible for future attacks, in a few months, while others, apparently under similar circumstances, require as many years before the morbid action be exhausted. A solitary fungus in the shape of a crab-yaw, unattended with any of the acute symptoms, or any of the subordinate eruptions, sometimes relieves the patient from a more troublesome form of disease and insures him against its reproduction, and a deep excavated ulcer, with a pale spongy surface, with or without the preliminary eruptions of normal yaws, is an occasional substitute for a more complicated disorder.

It is impossible to speak definitively with regard to the time which a crop of yaws requires to complete its course, and much more so to state the precise time which the disease will take before it exhausts itself in the constitution. The character and duration, as well as the recurrence of the several crops, depend upon age, habit, and peculiarity of constitution, and much may be done in modifying and shortening the disease by judicious treatment.

If the patient be young and healthy, and is descended from parents uncontaminated with an hereditary taint, and has likewise been fortunate enough to have received the infection from a person with the full developed fungoid variety, the yaws may spontaneously disappear in about 12 months, and, if properly treated, in less than half of that time ; but should a converse state of things happen, and the health be impaired from previous disease, or what is at all times peculiarly unfortunate, if the system is deeply imbued with a leprous diathesis, and to these are superadded infection from an unfavourable case of ulcerative yaws,* instead of having two or three crops terminating favourably in a few months, it will take years before it be exhausted, and each succeeding crop will have more and more a tendency to assume the ulcerative character, and at length terminate in confirmed constitutional disease.

I have spoken of the yellow elevated fungus appearing in the throat and nose, and disappearing with the general eruption, without producing any disagreeable consequences. Occasionally a deep excavated yawy ulcer appears on the uvula, or tonsils, or palate, or back part of the fauces, sometimes at an early period of the disease, but more commonly at an advanced stage, preceded by and accompanied with acute inflammatory symptoms and tumefaction of the neighbouring parts ; a similar ulcer also attacks the nose, and unless prompt treatment be adopted in both cases the ulceration will spread, and part of the bones of the palate may be scooped out, or the face be disfigured from the destruction of the nasal bones.

In chronic cases of unusually protracted yaws, where the system is apparently saturated with the virus, the symptoms eventually begin to assume a confirmed constitutional character, attended with periosteal inflammation, deep-seated pains of the bones, ulcers in the nose and throat, &c., which gradually merge into a disease possessing the power of transmitting itself from generation to generation. Dr. Hume has fallen into a palpable error with regard to a supposed change which the hair undergoes in yaws, and this, as well as most of his other observations,

* Although I believe the morbific poison of yaws to be originally the same, still experience teaches us that the character of a disease may be considerably influenced by the peculiar source from which the virus is derived; a circumstance which is frequently exemplified in syphilis, and was very well illustrated in Portugal by the appearance of the *Black Lion*.

have been servilely copied by succeeding authors, down to the present day, without the least acknowledgment. He says, "That the black hair that grows out of the parts now covered with the yaws, changes gradually white. I do not mean appears white by the ichor of the yaws drying upon it, as all the skin does towards the end of the distemper, but the substance of the hair itself is changed from black to a transparent white, like the hair of an old man."* Hillary almost uses his identical words: "The black hairs which grow out of the places where yaws are, gradually turn to be perfectly white, like the hair of an old man."†

Winterbottom has committed a similar mistake, in asserting that "where these eruptions appear upon any part of the body covered with hair, it is gradually changed from black to white"; and Lagneau has copied Hume's error in these words: "Les poils des parties qu'elles affectent tombent ou deviennent blancs avant l'epoque fixée par l'age."

In the 13th chapter of Leviticus, Moses, in several places, points out the change of the hair to a white colour as one of the most prominent and distinctive marks of the plague of leprosy, a circumstance which sets at rest the often repeated assertion of authors relative to the identity of yaws and the plague of the Egyptians. I have attended minutely to the assertions of these and succeeding authors, relative to the supposed change which the hair undergoes in the immediate vicinity of yawy excrescences, and having had ample opportunities of testing their opinions have no hesitation in saying that they are incorrect, for the hair never turns white under any circumstances, and their speaking in such positive terms of this occurrence induces me to think that they were careless observers of the disease. I have frequently, as in Cases VI. and X., seen the hairy scalp affected with yaws without a single hair changing its colour, and did such an occurrence take place it would be daily observed amongst excrescences situated upon the perineum, pubis, labia, and in the axilla.

Bajon has asserted that yaws can be communicated to domestic animals, but from experiments made by Dr. James Thomson, the assertion has proved to be incorrect. Dr. Mosley's assertion that it is of beastly origin, is equally fanciful

* Medical Essays and Observations, Edinburgh, vol. v., part ii., edition 4th.
† Diseases of Barbadoes.

Alibert has quoted Desportes to prove that yaws originates amongst certain of the Gallinaceæ from the use of unwholesome nutriment: "Un pareil genre de nourriture influe sans doute sur le développement de cette maladie. Ce qui semblerait le confirmer, c'est l'observation intéressante de Pouppé-Desportes, qui a vu la framboesia se déclarer spontanément chez quelques gallinacées de Saint-Domingue, surtout chez les pintades et les dindons qu'on alimente uniquement avec les semences de l'holcus spicatus."*

The young fowls of Jamaica, especially turkeys, are very liable to a tuberculated disease of the head and wattles, which is vulgarly called yaws, and occasionally appears whether they are fed upon guinea-corn or maize, or cocoanuts or any other food, but it is no more allied to that affection than the rough tuberculated state of the feet of pigs, which now and then arises from chigoes.†

An opinion has received a currency from a very early period, and prevails to the present day, that yaws attacks a person only once during life. Each succeeding author has copied his predecessor with great fidelity, and has perpetuated an error which an attentive observation to the progress of the disease would have rectified. "It is one of those complaints," says Thomas, "which affects a person but once in his lifetime," and Grainger and Wright express a similar opinion. "Simul tantum," says Ludford, "in vitæ decursu aliquem afficit." Dr. Thomson concurs in these sentiments, and quotes Dr. Owen to show how exceedingly rare the recurrence of the disease is as an exception to the implied general law. Dr. Owen only saw two cases where yaws occurred in the same individual, and that at an interval of 20 years. I am convinced that yaws can only be communicated once by inoculation so as to produce the usual phenomena of the disease, but I could show by numerous well-authenticated cases, contrary to the opinion of these authors, more explicitly expressed by Dr. Owen, that it reappears in the same individual much more frequently than is supposed, and that whenever it does recur at a subsequent period of life it assumes the characteristic features of the original disease, so as not to be mistaken. I knew a negro

* Diction. des Sc. Méd., Tom. xvi., p. 563.

† Pulex penetrans.

who after having yaws in the regular way had a partial return of the affection annually during his lifetime; and I have seen several cases recur, after the lapse of 4 or 5 years, in the usual form, and this circumstance is so well known to negroes themselves that an occasional return of a few fungoid excrescences excite no surprise amongst them, and when the disease appears in this erratic way they call it memba-yaws, because its irregular visits remind them that the disorder is not thoroughly eradicated from the system. Cases V. and VI. will serve to illustrate my meaning without entering into minute details, and will show, contrary to the general opinion of authors, that subsequent visitations of yaws are not imaginary.

The yaws is considerably modified during pregnancy, and it is never communicated to the fœtus in utero. It is very common to see young children at the breast with the disease, but the earliest case which I ever witnessed was the following:—A young healthy woman, in her second month of pregnancy, had a scurfy eruption of a pretty general description, unattended with constitutional derangement, shortly afterwards followed by yaws in a mild form, which spontaneously healed before her delivery. Her infant boy, when 3 months old, was seized with stiffness, appeared to be in great pain, and cried almost incessantly. The symptoms were attributed to a fall, when an eruption of benignant yaws suddenly broke out. At the time this happened there was not a case of the disease upon the plantation, and as the mother was apparently clear of it, the relatives conjectured that it must have been contracted in utero; but a more rational explanation would be to suppose that the mother had some remnant of yaws about the labia, and that it had been communicated to her infant through the medium of a scratch *in transitu*.

The following inferences may be drawn from what has been adduced:—

1st. The greater the susceptibility for the disease, and the farther the patient is removed from his usual healthy state, the greater will be the severity of the affection.

2nd. That the susceptibility is most likely to be destroyed when the disease has been fully developed, and where the health has been little impaired, and *vice versa*; that yaws in its suppressed form, accompanied with a cachectic habit, is more likely to pass into a constitutional disease.

3rd. That other morbid actions may temporarily suspend yaws.

4th. That the poison may be exhausted through the medium of an ulcer.

5th. That whites are as susceptible of the disease as blacks.

6th. That yaws has the power, under certain circumstances, of producing leprosy.

The following cases will be found exceedingly interesting, and are given to illustrate what has been said of yaws. I have selected those which were not under medical treatment, purposely to show the disease in its natural state, and although medicines were not administered from beginning to end. When it is taken into consideration that yaws may be safely and effectually cured in from 3 to 6 months by the means here recommended, it is to be hoped that the advantages of this over the mercurial treatment will become apparent, and that in time the disease, like the leprosy of Europe, and the sibbens of Scotland, will soon cease to have a local habitation or a name in the Western Archipelago.

Case I.—J. B., a mulatto boy, early in March, 1829, had the preliminary scurfy eruption, succeeded by a large amber-coloured yaw-fungus upon his left elbow, which was quickly followed by others on different parts of the body, more particularly on the chin, lips, wrists, nates, hams, and ankles; one on each side of the anus increased to the size of a dollar; they are irregular, ragged, oblong excrescences, and rise about one-eighth of an inch above the surface. The scrotum is almost entirely occupied by a fungus, and the dorsum penis has one upon it of the size and shape of a nutmeg split through the middle. A large excrescence is also situated over the right calf, of a sulphur-yellow colour, with an inflamed base. The febrile symptoms which preceded the eruption were unaccompanied with bone-ache, and the boy enjoyed previous good health.

April 2nd: The master-yaw on the left elbow assumes a dry appearance, and the one on the calf is the size of a dollar, elevated above the surface, and environed with a whitish border. The others remain in a moist state; the fungus under the lip is irregularly circular, yellowish on its surface, and studded round the base with whitish granulations.

May 5th: The master-yaw has nearly disappeared, the one on the calf is dry, and is reduced to a level with the skin. The excrescences in other parts of the body are subsiding rather prematurely owing to partial attacks of fever.

May 10th: The fever has abated, and a few dark-coloured blotches the size of a sixpence have appeared on the nates, the yawy excrescences appear in a suppressed state, with the exception of one in the left nostril and another under the lip.

May 21st: In consequence of the improvement in the boy's health the fungi, since last report, have changed from a dull, dry, striated appearance to a moist sulphur-yellow colour; in negro phraseology, they "look fresh." The disease remained in this stationary way till the middle of June, and gradually disappeared upon the occurrence of slight accessions of fever, which ushered in an eruption of a dull, papular nature, precursive to the second crop, and which shortly afterwards displayed itself in a modified form, neither so numerous nor so large as the first. From repeated attacks of fever, with harassing bone-aches, he fell into a bad state of health, and continued so up to the 11th February, 1830, before this crop disappeared.

April 26th, 1830: About a couple of weeks ago, a partial eruption of papulæ is stated to me to have appeared and declined. The back part of the legs are now stained with large, irregular, oblong and circular blotches, from amongst which six smooth amber-coloured yaws are emerging; one is of a larger description with an inflamed base. There is a small, round, whitish excavated ulcer under the penis, a little behind the glans, without granulations, and it discharges a thin ichor. General health improved. This is the third crop.

June 10th: More blotches have appeared on the thighs, circular in form and of a copper colour. A few of the fungi have their apices darkened, and another excrescence has appeared on the back of the leg. The feet are covered with crab-yaws.

July 5th: A congeries of small pustules, the size of millet seed, surround another small fungus at the angle of the mouth; one upon the lumbar region is also presenting, encircled with a scaly ring, and numerous scaly circular patches have appeared on various parts of the body. From this time his general health

improved, and, with the exception of a few crab-yaws, he was clear of the disease by the end of the year, having had it for a year and 10 months.

CASE II.—R. A., black boy, ætatis 10. For several weeks complained of deep-seated pains of the joints, with smart febrile accessions, loss of flesh and colour, followed by a scurfy eruption, interspersed with small yaws, which gradually increased to the size of peas, in clusters of from three to six, joined at the base, the apices of which were of a shining straw-colour without any discharge.

These fungi are most numerous about the face, extremities, scrotum, and penis. The principal yaw is situated over the left tibia, the size of a shilling, of a bright vermilion colour, and bleeds from the slightest irritation. Towards October the eruption became almost confluent, and acquired a large size. The mouth was surrounded by a fungoid excrescence. Constitutional irritation was severe, and a scurfy efflorescence occupied the interstices of the yaws. By the end of the year this crop subsided, and was followed by another slight eruption of 3 months' duration, and the third and last crop invaded the feet superficially. In 18 months he was well.

CASE III.—R. B.; this boy had a regular attack of yaws when an infant, and recovered completely. Is now 5 years old.

May 6th: After enjoying good health for upwards of 3 years he became feverish, lost flesh and colour, and had a profuse scurfy eruption followed by several yawy excrescences, one of which is situated over the left orbit, the size of a garden bean. There is a fungus on the sternal extremity of the right fourth rib, slightly elevated above the surface, covered with a crust, and appears like a confused congeries of papulæ. The inside of the thigh is occupied by a circular excavated ulcer, the size of a dollar, filled with spongy granulations, and its edges are ragged, turned out elevated.

Sept. 26th: The yaws of a secondary description have healed, leaving the ulcer on the left thigh in an open state, discharging an ill-conditioned puriform fluid. The constitutional disturbance is great, he is racked with the bone-ache, especially during the night, and both his elbow-joints are enlarged, shining, and

painful. He continued in this state till January, when the ulcer healed up, leaving nodes on the tibiæ and swelling of the elbows and wrists.

Case IV.—J. M., a black, parents healthy, contracted the yaws in 1818, when 15 years of age. The disease first appeared as an ulcer on his ankle, followed by a general eruption of large yellow excrescences. The duration of the attack was 18 months, and he enjoyed perfect immunity from the disease till 1821, when an eruption of fungoid yaws appeared, and literally covered the body; it followed a similar course to the former.

In 1824 the yaws again appeared, preceded by severe bone-aches, nocturnal pains, and loss of flesh and colour. An excrescence, the size of a nutmeg, occupied the root of the nose, and several large fungi formed on the trunk and extremities. The attack was abridged both in duration and violence, and during its continuance in an open state he improved in health, and attended to his ordinary duties till 1827, when his merciless visitant again re-appeared. A few fungoid yaws, about the size of a shilling, were scattered over his body, attended with constitutional irritation, and after continuing for 8 months, vanished. In 1830 a solitary fungoid yaw the size of a gooseberry appeared, which continued for a few months and healed up, leaving him a strong, healthy-looking man. In 1835 copper-coloured blotches of a circular form broke out on different parts of his body, he became sallow, had frequent febrile attacks, and complained of deep-seated pains, particularly of the frontal bone, and his nose began to swell. On examination, a deep excavated ulcer was discovered in the posterior fauces, and another on the inside of the right inferior maxilla; shortly after which the malar bones became enlarged, and the ulceration extended by degrees from the lower jaw to the tongue, cutting deep into its side towards the root and threatening its entire destruction. The whole of the soft palate became involved in this destructive ulceration, the bones were eroded, and the nose fell in. An urgent husky cough, with hectic fever, and expectoration of purulent matter succeeded, and reduced him to a skeleton, and after 9 months of unparalleled suffering he died.

This is a most interesting case in several respects. First,

as it serves to refute the common opinion that yaws only appears once during life; and, secondly, that it merged into that form which is allied to leprosy, and which I shall afterwards endeavour to prove owes its origin to yaws. The boy, when first attacked, was one of my servants, and I was obliged to put him aside, but, notwithstanding the obstinacy of the disease, he could not be prevailed upon to take medicines regularly till too late. I had opportunities of observing the progress of the malady from first to last, and it convinced me, at an early period, that yaws occurred oftener than once in the same subject, a fact which I have frequently seen verified since.

The next two cases will illustrate the annular or crescentic form which yaws occasionally assume.

Case V.—A healthy negress, about 6 weeks previous to the appearance of yaws, experienced deep-seated wandering pains of her legs, which were particularly severe in her ankle joints during the night, and had frequent attacks of fever, which reduced her considerably. These symptoms were followed by a scaly eruption on her neck, which was studded with minute papulæ of a yellowish colour and attended with great itching.

March 2nd: A yellow flat fungus, with an inflamed base about the size of a pea, begins to appear on the fore part of the neck.

March 24th: Several small fungoid yaws are appearing about the neck; on the 2nd of April they were observed to assume a crescentic form, and by the 10th had acquired various sizes, from that of a split pea to a shilling and upwards.

April 15th: The left foot is swollen and painful and the scurfy eruption remains. A few more fungi have appeared on the side of the neck. The yawy excrescences have assumed generally a crescentic shape, of an amber colour, and elevated several lines above the surface.

May 10th: The edges of the lunated excrescences have almost subsided to a level with the skin, and are drying up. The bone-aches have never left her, although they became more tolerable on the appearance of the yaws. She is in her fourth month of pregnancy.

June 1st: The yawy excrescences remain stationary. Has been lately suffering from severe harassing bone-ache, which continued till the 12th of August, when the crescentic-shaped

yaws became elevated, and on the 21st changed from an amber to an inky colour. Her health improved shortly before her delivery; the excrescences resumed their amber colour, and gradually disappeared. The scurfy eruption was an accompaniment throughout the disease. This woman was considerably annoyed by the appearance of crab-yaws two years afterwards.

CASE VI.—March 12th: W. P., a black child, 13 months old, and weaned. An incision was made into each arm, as is done in vaccinating, and matter taken from a healthy boy who had yaws was inserted. Had a slight pustular eruption on his head, into a few of which virus was also inserted.

March 22nd: The incision on the right arm has not closed, the left has healed, and the eruption on the head is drying.

April 2nd: The child is in good health, the eruption on the head is well, and the right arm is healed.

May 24th: The part on the right arm where the matter was inserted begins to rise up like a small button, smooth, whitish, and afterwards scurfy. A few detached pustules are appearing in other parts of the body. No perceptible fever.

June: Patches of a white laminated nature, not elevated above the surface, appear on the arms, and a miliary eruption of a straw colour on other parts of the body. A circular yellow yaw begins to rise over the right pectoral muscle towards axilla, leaving the central portion of the skin entire. General health impaired.

July: The yawy excrescences are beginning to appear over the body, interspersed with lenticular vesiculæ of a faint yellowish colour. Where virus was inserted into the arms there are peculiar-looking circular scurfy eruptions of a whitish hue, gradually shaded lighter towards the borders as if dusted with flour. The excrescences have generally assumed a crescentic or circular form, considerably elevated above the surface, leaving the skin within entire.

August 13th: The scalp is thickly studded with circular and crescentic-shaped yaws, leaving the hair of its natural colour. The appearance on the arms continues in circular discolorations an inch in diameter. The miliary eruption, formerly noticed, disappears and resumes its station on various parts, chiefly the face. The forehead is principally occupied with it at present.

August 21st: One of the annular excrescences has acquired the size of a dollar. Towards the beginning of October the mouth was surrounded by a fungoid excrescence of an amber colour, and very little alteration was observed in the character of the disease for 2 years afterwards, when the child contracted a chronic state of ill-health from eating dirt, and the yaws continued in a suppressed form for 5 years more, and finally disappeared upon the restoration of health.

The next two cases are given to show the disease existing in the form of an ulcer.

Case VII.—March 10th: A negro girl, aged 9; after the preliminary eruptions which usually usher in yaws, a foul ungranulated ulcer appeared on the top of her left foot, close to her toes, with elevated edges, which discharged a glairy corrosive ichor, and had healed up and broken out twice within 18 months, at the expiration of which time a yaw appeared in the left nostril.

April 2nd: The ulcer looks cleaner, and shows a disposition to heal round the edges.

May 6th: The left nostril is entirely occupied by a fungoid yaw, and the ulcer remains stationary, having lost its former formidable appearance. Both the yawy excrescences and the ulcer remained, with little alteration, to the end of the year, when the latter assumed an active state, and by the end of February healed, and was followed by the disappearance of the fungus in a couple of weeks more. The skin remained free from any eruption till the end of April, when an ulcerative process was set up at the root of the great toe, which destroyed the nail, and terminated in a large round vermilion-coloured fungus the size of a lime, which, after continuing for 6 months, healed up. From the commencement of the disease, in its open state, till its termination in the healing of the fungus on the toe, it occupied 3 years and 6 months.

Case VIII.—A negro boy, 12 years old. Has had an ulcer on his heel for 2 years, of the size of a dollar; it is of an irregular oblong figure, with ragged everted edges and smooth ungranulated bottom. It is surrounded by a spongy whitish border, of a straw-colour as if vesicated. Before the ulcer

assumed the yawy character, it was an insignificant sore, and attracted little notice, until its obstinacy in refusing to heal upon the application of the usual dressings, and the appearance of a scurfy eruption, with numerous copper-coloured blotches, excited suspicion. The boy was likewise harassed with bone-ache about this time, and lost his healthy colour. He was treated with the hydriodate of potass and sarsaparilla, and by perseverance for 3 months his health improved and the ulcer healed.

The next case, where the yaws assumed a dark colour, is occasionally observed in persons of a cachectic habit of body, and is sometimes accompanied by ecthyma cachecticum.

Case IX.—A negro boy, 5 years old, of a cachectic habit. After frequent irregular attacks of fever numerous ovoid blotches appeared on his face, arms, and legs, from the size of a sixpence to a dollar, on a level with the skin, surrounded by an outer reddish elevated crust resembling dried gelatine, within which is another ring of a deep black colour in its extreme margin, gradually shaded lighter towards the centre of the patch. The skin continued dry and constricted, and several fungoid excrescences came out, of a dark lurid hue, which continued in that state for 3 months, when his health was improved and the yaws were fully developed in their normal state.

There are several interesting particulars in the following imperfect case:—The sore through which the virus passed healed up, contrary to what is commonly observed when the system is affected through the medium of an ulcer; the preliminary eruptions were of a mixed nature, being both scurfy and miliary, and the yaws were partly fungoid and ulcerative. I have had frequent opportunities of observing this irregular form of the disease assume a favourable aspect by improving the health; and when this can be accomplished, and all constitutional irritation removed, we may confidently predict that the second crop will appear in a fungoid character, which is at all times to be desired, as it is less liable to be followed by constitutional disease.

Case X.—B. P., a negro boy; had a healthy ulcer the size of a shilling, which gradually healed, during which time he freely

associated with a number of children affected with yaws on the plantations; and, as his skin was clean, and free from abrasions and eruptions, his parents attributed the disease to infection received through the sore. About 4 weeks after the ulcer healed an eruption the size of millet seeds appeared, partially diffused over the trunk and neck, but more copious on the face and forehead. They did not at any time contain matter, but when laid hold of a film or crust came away, leaving a whitish spot. They were stigmatized on their tops, and gradually enlarged by the skin ulcerating at their base, allowing the incipient yawy excrescences to form. Contemporaneous with this miliary-looking eruption, the body was in part affected with an efflorescence as if dusted with flour, and which continued for 3 weeks.

Previous to these precursive eruptions, the boy suffered severely from bone-ache, and became sallow and dejected from repeated attacks of fever.

About 20 days from the disappearance of the scurfy efflorescence an elevated conical yawy excrescence appeared on the knee, and soon acquired the size of a crown-piece; it was surrounded by a scurfy eruption, and was the only well-formed stationary fungus to be observed, for no sooner did they arrive at the size of a pea or a sixpence than an ulcerative process was set up, and they were absorbed, leaving ulcers with edges slightly elevated and covered with a yellowish glutinous film. There were about a dozen of yawy excrescences on the head amongst the hair, the colour of which was not changed, and which also underwent the ulcerative process. With the exception of the fungus over the patella, none of them retained their fungoid character for any length of time. This case came under my notice shortly before I left the island, and I have not heard of its result.

The next case, the disease never became fully developed, but merged into ulceration, and proved fatal in a few months.

Case XI.—A negro boy; after suffering from frequent febrile attacks and severe bone-ache, a yawy fungus appeared on the bottom of the right foot, close to the small toe, and after remaining for nine months healed. Shortly afterwards it was succeeded by an ulceration around the mouth, of a fungoid

character and of a dirty yellow colour. The palate, velum, and throat were subsequently affected with ulcers of a dull whitish hue, the constitutional disturbance became great, and irritating cough, hectic fever, and emaciation hastened the fatal termination of the disease.

The following is illustrative of both forms of the disease existing together:—

Case XII.—B. P., a negro boy, 4 years of age, contracted yaws, without much previous suffering, in January, 1830, and by the middle of February it was pretty fully developed.

February 11th: The mamma yaw, situated on the right malleolus, is a shallow ulcer of a lunated form, with a hardened base, and is studded with large spongy granulations. The lower lip is occupied with a ragged excrescence of a dull reddish tint, and the surface is here and there sprinkled with straw-coloured spots, the size of peas, on a level with the skin. By the end of April an amber-coloured, convex, yawy fungus, the diameter of a dollar, formed on the calf of the right leg, and at each angle of the mouth an excrescence, the size of a sixpence, likewise appeared. The ulcer on the malleolus continues to increase in a circular form. The straw-coloured spots continue, and, when examined through a glass, appear to be composed of a congeries of minute stigmata. There is no constitutional disturbance, and he has never had any bone-ache.

June 10th: The mamma yaw has closed into an irregular ovoid, its centre is filled with fungoid granulations which protrude beyond the level of the adjacent skin. Above the large yawy excrescence on the calf and towards the ham, a circular ulcer, with a yellowish margin and detached spongy granulations, has appeared, and one of a similar kind has formed on the left hip. The back is covered with a scurfy eruption as if dusted with flour.

June 26th: The yawy ulcer on the external malleolus shows a disposition to heal, and by the 5th of July it had gradually contracted, leaving a part of a semicircular form. A yawy fungus has appeared in the left ear, and occupies the whole meatus externus; the scrotum is covered with a fungoid excrescence, the inguinal glands are tumefied, but the health continues pretty good.

This case continued with little variation for 18 months longer, at which time numerous small superficial ulcers, discharging a bloody sanies, were interspersed among the yawy excrescences. The fungus on the scrotum, and the one in the meatus of the ear, had disappeared; the boy now laboured under great constitutional irritation, became sallow, and was considerably emaciated. The case had hitherto been treated by the female superintendent for yaws, and although I had an opportunity of observing the progress of the disease, it was only when she had exhausted her skill that my services were solicited. By the administration of the hydriodate of potass, and the occasional use of a warm bath, giving the compound infusion of sarsaparilla as common drink, and increasing the nutritive qualities of his diet, his health improved, the ulcers gradually healed, and in less than 4 months more the disease was eradicated.

The following incipient case, as well as another fully formed, will show the temporary influence which measles possesses over yaws, and will also answer as an illustration of the manner in which small-pox repels that disease for a time.

In January, 1837, a negro child had a white scurfy eruption generally diffused over the body, which remained for 3 weeks, and was succeeded by a profusion of copper-coloured blotches, which continued for a month, when measles, then prevailing as an epidemic, attacked him, and the blotches entirely disappeared as the eruptive fever of rubeola formed. The negro child recovered from the measles in the usual time, and no more signs of incipient yaws appeared till the middle of April, when a flat, white, raw, yawy fungus was observed on the perineum, unattended either with scurfy eruption or fever, and from this time the disease gradually displayed itself till it acquired a very general form.

A child on Fort Stewart estate, who was covered with a profuse eruption of yaws of 3 months' duration, was seized with measles. During the eruptive fever the excrescences underwent no change, neither was much alteration observed during the progress of the rubeolus affection; but upon the decline of the measles the yaws dried up and disappeared, without leaving the least vestige of the disease except the faint-coloured blotches on the seat of the former yaws. The child continued in a very debilitated state for 2 months, when an evident re-action took

place, and, as the health improved, a numerous crop of yaws re-appeared, at first of a subdued character, but which spread out into full-sized excrescences as it gained strength.

CHAPTER III.

HAVING, in the preceding chapters, considered yaws in its normal character as a primary or local affection, and described its various appearances, I shall now exemplify the secondary, or more properly speaking, the constitutional symptoms of the disease, and briefly trace their progress through the system, to that form where it takes on a new and independent action, and produces a hereditary affection, reserving to a period when I shall have more leisure some observations on the affinity which it bears to syphilis, scrofula, &c.

Both yaws and leprosy are possessed of an identity of phenomena in many of their operations, and exhibit sufficiently satisfactory and distinct generic marks to show that they are closely allied to each other. When we survey the leading features of these diseases apart, we are struck with a parallelism of character which indicates their near relationship; but when we approach closer, and analyze the symptoms, and trace the progress and operations of both, we feel convinced that the one is the immediate offspring of the other.

The virus of yaws does not necessarily affect the system with an hereditary taint in all cases, any more than the local effects of syphilis uniformly excite the secondary symptoms of that complaint, but under certain peculiarities of constitution it undoubtedly possesses the power of producing leprosy, which, when once established, afterwards becomes capable of transmitting itself from generation to generation, till modified or exterminated by causes similar to those which arrested the progress of that disease a few centuries ago in Europe.

The most direct and satisfactory way to establish the opinion that yaws is the source from which leprosy originates, will be to select a few cases bearing upon this point of an abundant collection in my possession, and afterwards to make such observations and draw such inferences as the premises may justify.

Case I.—Edward, a negro. Parents and family healthy. Has had yaws in the usual way. A crab-yaw was removed from the sole of his foot by corrosive sublimate, leaving a deep, foul, ragged ulcer, which gradually became more superficial by healing on one side and excavating on the other. After continuing in this state for 12 months, it assumed a disposition to heal, when suddenly it extended by an ulcerative process over the greater part of the bottom of the foot, and remained so for 2 years more, when it healed. About 3 months afterwards he complained of deep-seated pain of head, aggravated at night with febrile symptoms and loss of colour. The skin was unusually dry and scurfy, and became spotted with livid blotches. After suffering for some weeks, the nose began to swell, and the speech became nasal. On examination, ulcers were discovered in the nose and throat, with rugged edges, giving out an intolerable fœtor, and the pains and fever moderated from this period. The ulceration in the nose and throat made rapid progress, destroying the soft parts, and corroding the bones of the palate and nose. The orbicular muscles of the mouth and eyes, the cartilages of the nose, and the skin and cellular substance of the face, were destroyed by ulceration, and the unfortunate patient presented a most hideous appearance. In 2 years from this time, the disease having lulled, the face was cicatrized, and he enjoyed tolerable health for 18 months, when he became feverish, and complained of deep-seated pains in his legs, followed by nodes on the tibiæ, and a large, deep, uneven ulcer opened on his right foot, and afforded him temporary relief from his sufferings.

The above is a very common way in which the constitutional effects of yaws terminate. The unhappy sufferer is often harassed during the remainder of his life with ulceration of a migratory nature, which after destroying the soft parts in one place heals up and passes on to another, traversing at a slow pace over the whole of the surface until checked; and it often happens, as in this case, that the appearance of an ulcer in an extremity partly arrests the disease, and affords a sort of compensation for nocturnal pains and bone-ache, not, however, without being in some instances encumbered with elephantiasis of the foot and leg. Although this man's family were healthy, he is now capable of bequeathing leprosy to his offspring as if he had been descended

from a long line of ancestors hereditarily affected with that disease.

Case II.—A fair young man, descended from a healthy family as far back as they could be traced, contracted the yaws when a boy; it assumed at one time a confluent form, and was 7 years before it admitted of a spontaneous cure. Several years after the disappearance of the disease, he had occasional intercourse with a negro woman affected with the yaws, who had a large fungoid excrescence upon the labium,* and attributes the present symptoms to this cause. A few small pustules appeared upon the prepuce, which coalesced and formed into a yellowish-looking ulcer, superficial towards the centre, and deepened around the margin; it spread with rapidity to the glans, and involved the whole in one ragged, deep-spreading ulcer. He put himself under a gentle course of mercury without relief. I saw him 3 months after the appearance of the disease.

March, 1831: A livid circular spot, the size of a shilling, appeared on the left great toe, which became elevated and fluctuating, and giving way, discharging a thin, whitish, glairy matter, and leaving a round ulcer.

The ulceration of the genitals has progressed, half of the penis is consumed, and hæmorrhage is of frequent occurrence. A month after the appearance of the ulcer on the toe, another of a similar nature formed at the external canthus, and discharged a thin puriform matter; the conjunctival lining of the eye is involved in inflammation of a chronic kind. The ulcer on the stump of the penis has thick ragged edges, and is covered with a foul yellowish slough; it continued to spread, and by the end of September the whole of that member was destroyed; the ulcerative process then ceased. About this time an excavated ulcer broke out on the front part of the tibia, the other sores remained open, and the nocturnal pains were very severe. Towards the end of October the distal phalanx of the great toe dropt off, the ulcer on the tibia discharged a copious, thin, puriform matter, leaving the bone denuded; and in the latter end of November a piece of tibia, 2½ inches in length and ¾ inch in breadth, exfoliated. From this time he improved in health, and by the end of the year all these symptoms disappeared.

* I had an opportunity of ascertaining this fact, as this woman was put under my care for the cure of the disease.

In September, 1832, he complained of hoarseness and difficulty of swallowing, but no pain. On examination, a deep ulcer was discovered on the back of the fauces, covered with a brownish slough. The tonsils were suffused with an erythematous blush, and shortly afterwards an ulcer formed on the lower part of the forehead, close to the root of the nose, all of which in time healed, and he appeared in apparent health till June, 1833, when he exposed himself to a heavy shower and got wet; he was immediately afterwards attacked with bone-ache, his nose and face were destroyed by ulceration, and he became an object of horror and disgust. He has been bed-ridden since that period, and is now (1837) covered with scales from head to foot, attended with intolerable itching, and they fall off in flakes when he applies the least friction.

The most prominent symptoms in this case bear a strong identity to those of syphilis, and it would require some diagnostic tact to discriminate the difference. Such occurrences resulting from the effects of yaws are by no means unfrequent, and as they appear under circumstances that preclude the possibility of their having arisen from syphilitic infection, we are warranted, from reiterated observation of such phenomena, to conclude that the constitutional effects of yaws exercise a morbid influence *sui generis*.

It is well known that a child at the breast, with yaws around the mouth, occasionally communicates an ulcer of peculiar malignancy to the nurse who has previously had the disease, which corrodes the nipple, often destroys the breast, and spreads towards the axilla, undermining the health from constitutional irritation, and eventually proves fatal unless arrested.

This patient had connection with a healthy female, whom he kept for a short time after the primary symptoms appeared on the penis, without infecting her.

Case III.—A negro boy, 10 years old. Parents healthy. Contracted yaws of a confluent form and recovered after 3 years' suffering. Two years afterwards he was attacked with obscure, deep-seated pain of the bones, lost flesh and colour, and had frequent accessions of fever which, after continuing for a month, ceased upon the appearance of a soft glistening tumour under the left trochanter, which terminated in an ulcer the size

of a dollar, with indented ragged edges, the bottom of which was studded with granulations the size of small shot. The ulcer spread from one side and healed up directly opposite, the ulcerating and healing process keeping pace with each other, till it extended round half of the thigh and then gradually cicatrized. Numerous blotches appeared on various parts of the body, followed by another tumour the size of a walnut cut through the middle; this discharged its contents and formed into a sore similar to the former, advancing on one side and healing up on the other until several inches were involved in ulceration. This also healed, and almost immediately afterwards similar tumours appeared on the forehead and shoulders. The nose and throat became ulcerated and threatened to destroy these parts, but by counter-irritation, inserting setons into the extremities, and the administration of proper remedies, the destructive progress of the disease was stayed, and he recovered until some exciting cause may renew the malady.

The brother of this boy, after the cessation of yaws, when 12 years of age, was attacked with long-continued, deep-seated bone-ache, followed by numerous copper-coloured blotches, and these symptoms were succeeded by tubercular or Arabian leprosy, in a very general form.

Case IV.—A young man of fair complexion, whose parents were healthy, had yaws when a boy, and shortly after its disappearance was affected with bone-ache, with eruptions of a copper colour, circular in form and varying in magnitude from a silver penny to a shilling. These were succeeded by a persistent ulcer on his left foot, which resisted every remedy. From constitutional irritation the glands in the groin became occasionally tumefied, his foot swelled and acquired a rough tuberculated appearance, and finally terminated in an enormous mass of elephantiasis confined to the foot and leg.* (Fig. 13.)

Case V.—May, 1824: J. G., a negress. From the time she had the yaws when a girl, has never been free from copper-

* Some confusion is made by applying the term elephantiasis to the smooth, shining, enlarged state of the extremities, described by Hendy and called the Barbados-leg. Elephantiasis of the extremities is characterized by a hardened tuberculated state of the feet and legs, which occasionally acquire an immense unwieldy size and are indented with sulci and thickly studded with rough spinous projections.

coloured circular blotches, with ulcers on the lower extremities, which frequently heal and break out. This month had frequent accessions of fever, the veins of the legs became tortuous, enlarged, and painful to the touch, the inguinal glands swelled, and the feet assumed an œdematous appearance.

In June several tubercles, the size of kidney-beans, were observed on her left foot, and the heels acquired a rough granulated character. Towards the end of the month the tumefaction of the feet increased, accompanied with intolerable itching, small superficial ulcers formed between the toes, and discharged a thin, corrosive ichor.

July 31st: Has had occasional attacks of fever. A reddish line extends up the leg to the groin, in the direction of the vena saphena, and the inguinal glands continue swollen. The left foot increases in size, the tubercles extend in a lengthened direction, especially about the instep, where they are forming a deep sulcus. She says that her foot feels tighter, and enlarges after every febrile attack. The disease remained nearly stationary till the end of the year, when the right foot increased in bulk and became partially tuberculous.

June, 1825: The left foot has increased to an enormous size, and is thickly studded with hard tubercles, and the heel and sides of the feet have acquired a rough spinous appearance, like the fruit of the artocarpus integrifolia, hence negroes call this peculiar roughness in elephantiasis the "Jack-fruit heel." The superficial ulcers between the toes continue to discharge freely, and when this secretion is stopped she experiences great pain, and the swelling increases rapidly. The skin is covered with dark-coloured blotches, interspersed with papulæ, which excite troublesome itching. The foot acquires a perceptible increase after each accession of fever, and she has an idea that this occurs more particularly about the full of the moon.*

She requests to have her left leg amputated, but as the right is also affected, and there are numerous leprous blotches, her wishes cannot be acceded to with propriety.

The disease remained in a chronic state till 1829, when her left heel became affected with a deep uneven ulcer; the face swelled, and acquired a tuberculated appearance, and she con-

* Negroes have an idea that the moon possesses a peculiar influence over elephantiasis.

tinued in this state till 1833, when her health failed. The ulceration increased, and she died in a state of extreme emaciation.

This woman had two daughters, one of whom is affected with elephantiasis of the labia, with a profusion of dusky-coloured blotches on various parts of the body, and the other is a puny, sickly girl, never free from cutaneous eruptions.

Case VI.—A young man, after an attack of yaws, having been similarly affected as case V., had ulcers between his toes, from which an incessant copious discharge of thin fœtid ichor exuded, which made it very disagreeable both to himself and others. The ulceration extended to the ligaments and tendons, and destroyed them, the toes dropped off one by one, as in Fig. 14, and after the disease had removed part of the foot it remained stationary. I pressed upon him the necessity of having such a burdensome annoyance removed, but certain superstitions which he entertained, connected with the cause of the disease, induced him to withhold his consent. During the progress of the malady frequent eruptions of copper-coloured blotches appeared, and subsequently symptoms of tubercular leprosy were displayed on his face.

Yaws and Leprosy.

These few cases are selected from those whose parents and families had never been subject to leprosy, in order to show the power which yaws possesses of originating this disease under circumstances not easily cognizable. From having seen Arabian and Grecian leprosy and elephantiasis of the extremities occur in different members of the same family, and having likewise observed the character of the ulcers which accompany these affections to possess an identity not to be mistaken, I think there can be little doubt that they are only varieties of one disease which has originally sprung from yaws, and being invested with hereditary qualities they have, at a very remote period of antiquity, spread over extensive portions of the globe, and are now propagated by the same laws which regulate hereditary maladies. As the leprosy of the Greeks is the most common form which results from yaws, I shall take a short view of the disease as it at present exists in Jamaica, under the garb of hereditary leprosy.

Leprosy seldom begins to be developed till the age of puberty, unless in those peculiarly predisposed to it. Like gout, scrofula, and some other diseases, it is hereditary, obeys similar laws, and is influenced by peculiar habits and constitutions. When it has been confined to a long race of ancestry, it becomes possessed with powers of great inveteracy, and *vice versâ*. When there has been a plentiful intermixture of healthy people by marriage amongst those affected it acquires a modified form, and no doubt from these causes, combined with other favourable circumstances, such as diet and cleanliness, it became more and more mitigated in Europe till at last its virulent character was lost, except in a few sequestered parts of Sweden and Norway, where it still exists under the name of vradesyge.

The disease may be described under the following heads:—

1st. The latent period, where the health is unimpaired.

2nd. The incipient, where the patient begins to complain of anomalous symptoms before the disease develops itself.

3rd. The ulcerative and confirmed state.

4th. The period of repose, when the virus becomes expended.

The latent period of hereditary leprosy under ordinary circumstances continues to the age of puberty, and in some persons favourably circumstanced, or those who have been little exposed to exciting causes, it may slumber until adult, or even senescent age, and occasionally spares the present generation to attack the next. During this period they enjoy apparent good health, but are seldom able to undergo the athletic exercises of those not tainted with the malady, and during the visitation of an epidemic are less able to bear active treatment or withstand the impetus of the disease than those not similarly circumstanced. If by some unusually strong disposition the disease attacks the infantile frame, the child becomes dull and fretful, loses flesh and the bloom of health, and the jet black colour of the skin yields to a dingy yellow, dry, constricted state of the surface; febrile symptoms, with a permanent, quick, irritable pulse, supervene; the digestion fails; the abdomen becomes enlarged and tympanitic, and the patient pines away with emaciation of marasmus; and when these symptoms do not prove presently fatal, the disease appears in an open state of ulceration.

Previous to the development of this disorder, while yet in its incipient state, it displays an endless proteiform variety of

anomalous symptoms. There is scarcely a disease which it does not simulate in its progress to open ulceration ; the periosteum, bones, ligaments, and bursæ mucosæ are alternately affected with deep-seated parts of vital importance, but the most frequent seat of this morbid affection in its obscure form is in the cylindrical bones and their envelopes. Of these bones, the tibia and radius are oftenest affected, commencing with deep-seated pains resembling rheumatism, aggravated at night, and terminating in inflammation of the periosteum and nodular swellings.

The patient is frequently affected with distressing pain of head and dimness of sight, and the frontal bone becomes the seat of nodes. Contemporaneous with these chronic affections, the pathognomonic signs of the disease appear in pustules, blotches, and scales ; at the same time one or more dull, cineritious, smooth, circular patches arise on the shoulder or forehead, or extremities, on a level with the skin, and give way by a sort of punctuated ulceration around the extremity of the spot, and sometimes in the course of 24 hours the central portion is removed by rapid absorption, and discharges a thin, corrosive, puriform matter. There is now a temporary immunity from racking pains, and life is rendered tolerable till another accession. The joints, especially the larger, are affected with acute pain, the capsular ligaments are occasionally eroded, and discharge a synovial fluid, and another stage of the disease is commenced. Certain perplexing obscure phenomena sometimes occur, and deep-seated organs, as the heart, lungs, &c., are sympathetically affected.

A patient will complain of great anxiety, palpitation of the heart, difficulty of breathing, cough and sputa of a mucous nature, with irritable pulse, and pain under the sternum, all of which are aggravated at night, and phthisis pulmonalis is occasionally so closely mimicked, that it is only by attending minutely to concomitant circumstances that an accurate diagnosis can be arrived at. Another patient will have deep-seated pains in the loins, stretching down the thighs, with hectic cough, sympathetic fever, loss of colour and adipose substance, and the eyes will assume a wild glistening appearance, with most of the symptoms which indicate some renal affection or lumbar abscess. These anomalous symptoms bear the sufferer to the verge of the grave, when a sudden and

unexpected accession of periosteal inflammation, precursive to the open state of the disease, again affords a season of comparative repose. These operations teach us to imitate nature by counter-irritants, and often with happy effects, especially in weak constitutions, where the conservative powers are inadequate for the development of suppressed symptoms, as well as to draw the affection by such means from the face and throat. It unfortunately happens too often that nothing affords relief, and the unfortunate patient sinks before the disease appears in its open form.

The metastical or migratory tendency which these symptoms at times assume, before the actual appearance of leprosy, are very remarkable. The periosteum may be attacked with inflammation, and deep-seated pains of the bones be so severe, that those possessed of the greatest fortitude will writhe under the torture and give way to feelings of inexpressible agony; then suddenly, without any apparent atmospheric change or other cause, the tension, pain, and swelling will subside, leave the lower extremities and travel to the shoulders, or take up its position on the forehead, or in the articulation of the elbows or wrists, shifting from joint to joint and from bone to bone, till the parts ulcerate, and discharge a puriform matter, followed by an abatement of pain.

Where a strong hereditary disposition exists, it is sometimes excited by accidents and diseases; and injuries, which on ordinary occasions would heal without difficulty, become under such circumstances very tedious to manage. Gonorrhœa not unfrequently awakens leprosy which might otherwise have remained dormant for years, and probably for life. A person contracts this complaint, which progresses favourably towards a cure, the acute stage is about subdued, and when we expect the complaint to disappear, a train of inveterate symptoms supervene which resist all remedies. The discharge from the urethra stops, but the ardor urinæ occasionally continues, although more frequently that sensation is only experienced toward the termination of making water, the lower part of the abdomen becomes hard and painful, there is a copious deposit of mucus or muco-purulent matter mixed with blood in the chamber glass, and a constant, heavy, dull pain is felt about the neck of the bladder, which creates much uneasiness. These symptoms are not attributable

to stricture, but to a peculiar morbid irritability or sub-inflammation of the mucous surface of the bladder, which is of very common occurrence amongst persons hereditarily tainted with leprosy, who have the additional misfortune to be infected with gonorrhœa. A patient of mine received a trifling injury of the knee-joint, which for some time advanced favourably, but suddenly stopped; the cartilages of the joint were absorbed, producing a rough, grating motion. Shortly afterwards a shining blotch appeared on the tibia, which extended to the size of the hand and subsequently formed into a well-defined leprous ulcer, which explained the reason why such a simple injury terminated so unfavourably. To enumerate instances of this kind, where the disease was called into action from the extraction of a chigoe to a compound fracture, would extend to an indefinite length.

After the appearance of the preliminary eruptions of blotches and scaly efflorescences, and the patient has suffered from periosteal inflammation, and numerous painful symptoms, the disease gradually appears in an open ulcerated state, and its extent, severity, and duration depend upon a variety of circumstances. Some persons are partially affected, and never have more than one attack; others again suffer severely, and either have repeated attacks, or it continues in an open form, and accompanies them to the grave; in some the extremities are affected, in others the head, while a few are so unfortunate as to be covered with the disease. Its ravages are confined to the surface in some, and in others the nose and throat are destroyed by ulceration, and the bones become extensively affected with nodes, exostoses, and caries.

Various forms of papular and pustular eruptions precede the march of this disease, but as they are not uniform in their appearance they may be considered adventitious affections. A very common form of cutaneous eruption is where numerous copper-coloured blotches, varying in size from a shilling to a crown piece, of an oval or circular figure, arise, giving to the face a shining appearance, attended at same time with great itching. Amongst these blotches, small, smooth, round fluctuating elevations may be observed, of various sizes, which suppurate, and discharge an ill-conditioned pus: they form into superficial ulcers, and progressively extend over the whole body, healing up in the rear, and invading fresh portions, till few

parts remain unaffected. After the continuance of these local affections for months or years, a more grievous train of ills succeed in many cases. The functions of the skin become suspended, it acquires a rough scaly appearance, and the countenance assumes a withered, haggard look. Large circular ulcers form on the extremities, trunk, and head, which keep up a constant drain, with extensive constitutional disturbance, and produce extreme emaciation; the joints are attacked with chronic inflammation, their cavities are penetrated by ulceration, the toes and fingers become carious and drop off in succession, sometimes destroying the whole foot, and involving one or both hands in an unwieldy, morbid mass. The humeri and thigh bones are rendered fragile, and are occasionally fractured from the action of the muscles. This I have seen in several instances, and after the disease has expended its fury the helpless beings drag on a wearied existence.

This is not permitted in all cases, for after a temporary truce the work of destruction is occasionally resumed. The genitals, both of males and females, are liable to attacks of ulceration, which at times destroy the penis and cut deep into the labia; but, unlike syphilis, such ulcers are incapable of propagating the disease. It is fortunate for mankind that this malady is not contagious, or who would be safe in a community where every variety exists? That such is the case, we infer from numerous examples of sound and diseased persons cohabiting together without being necessarily affected; and I have further satisfied myself of its non-contagious nature, by inserting matter taken from such ulcers on the genitals into healthy sores without being followed by any disagreeable consequences.

The manner in which leprosy invades various parts of the body, especially the head and face, is so parallel to that of syphilis, that, were contingent circumstances left out, they might easily be confounded with each other. The pericranium covering the frontal bone is affected with inflammation, the superincumbent part becomes shining, tense, and painful, accompanied with deep-seated headache, dimness of sight, and unremitting nocturnal pain. Considerable tumefaction, of a dull, red colour, is observed extending over the forehead and spreading towards the eyes and cheeks; after a time a soft fluctuating tumour appears on the os frontis, and gives way by a sinuous opening,

and discharges a glairy matter. This is sometimes followed by an abatement of pain, and the part heals up slowly, occasionally leaving an indent or excavation the size of half a hazel-nut. In less favourable cases the puffy tumour opens into a spreading ulcer, with hard everted elevated edges, the frontal bone becomes carious, the skin of the forehead is destroyed by ulceration, and boggy tumours arise in various parts of the head, burst and discharge a puriform fluid, the bones beneath are eroded, and the skull in some patients is literally riddled. The superciliary ridges in such cases are also destroyed, the eyelids are removed, and the ulceration extends into the nose, undermining it by the erosion of the nasal and spongy bones. The soft palate participates in this destructive process, together with the palatine arch, and the tongue, in rare cases, is attacked. The muscular substance of the mouth is destroyed, displaying the teeth and alveolar process, and imparting to the patient a hideous and unsightly appearance, which, combined with an intolerable fœtor, render him an object of pity and disgust. The uvula and tonsils are successively removed, the ulceration extends to the larynx and trachea, and a species of laryngeal and bronchial inflammation of a chronic nature destroys the voice, and after a lapse of time the patient.

Such is leprosy as it exists in the West Indies, involving a greater share of misery and far more lamentable consequences than many are aware of; for it would not be overrating it to estimate the amount of the disease amongst the blacks in certain districts at one-tenth* of the whole population.

The brief notice of this disease which I allowed to myself, precludes my entering into the statistics and treatment of this formidable malady; but it will be well to remark that, like yaws, leprosy is invariably aggravated by every preparation of mercury, and the use of this mineral uniformly accelerates its progress. The same treatment recommended for yaws answers eminently well in the primary stages of this; and it is to be hoped that, by abolishing the use of mercury, using a more generous diet, and attending to cleanliness, that these kindred diseases will in time be disarmed of their terrors, and by degrees vanish from the Western world as the leprosy has done from the shores of Europe.

* That is, existing in all its forms.

DESCRIPTION OF PLATE II.

The front view of a young negro covered with the secondary or early eruption of Yaws. This eruption usually shows itself about two months after the infection, and may vary somewhat in type. Its most common type is that of framboesial granulation-masses which do not ulcerate and which may disappear without leaving scars. The eruption is general and is arranged with symmetry. It is not usually attended by sore throat. The plate has been executed from a photograph.

NOTE.—These four plates illustrating the *secondary eruption of Yaws* are all from photographs which were supplied to Mr. J. Hutchinson by a medical friend in the West Indies. They are given as typical illustrations of the disease, and are not in connexion with any of the Essays now republished. They have been printed from stones lent to the Society for that purpose.

West, Newman chromo.

DESCRIPTION OF PLATE III.

The subject of this plate back of the same patient as Plate II., and the description there given will suffice for it.

Plate III.

West, Newman chromo

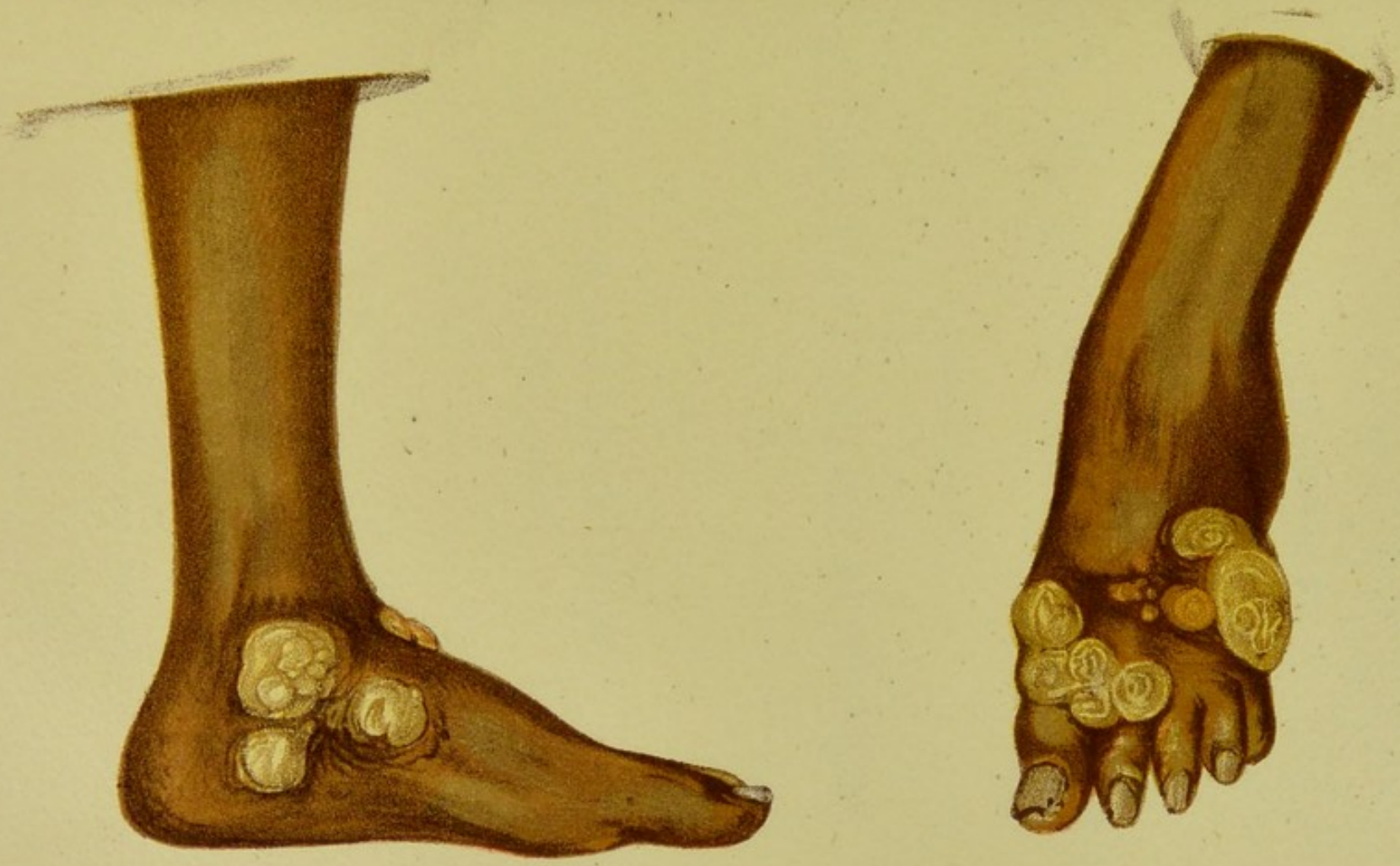
DESCRIPTION OF PLATE IV.

In a later stage of Yaws the granulation and papillary excrescences become much larger than those shown in Plates II. and III. and are covered with thick dirty crusts. This condition is shown in this portrait. Even in this stage ulceration is said to be unusual, and conspicuous scars are exceptional.

West, Newman chromo

DESCRIPTION OF PLATE V.

This plate shows the feet of a patient in an advanced stage of the Yaws eruption. Thick large pus crusts are heaped up over the sores; superficial scars are seen in the dorsum of the foot.



West, Newman chromo

AN EPITOME

OF

DR. A. NICHOLLS' REPORT ON YAWS

COMPARED WITH

BRITISH GUIANA AND FIJI EXPERIENCES.

BY

J. S. WALLBRIDGE,

Medical Inspector,

AND

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Late Fiji Medical Service.

[Reprinted from a Government Report.]

AN EPITOME OF Dr. A. NICHOLLS' REPORT ON YAWS COMPARED WITH BRITISH GUIANA AND FIJI EXPERIENCES.

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The subject of the increase or decrease in the prevalence of any contagious disorder in a country is one of such great importance that we have thought it would be of interest to our readers to consider Dr. Nicholls' report on "Yaws in the West Indies" in connection with the history of the disease in this colony, and the results of our own observations. In doing so we follow with some variation in order the chief points covered by his inquiry.

I. *The disease.*—Its nature, clinical history, and treatment.
II. *Progress of the disease.*—Each island considered separately.
III. Methods adopted to check it in each island, and their success or otherwise.
IV. A digest of the opinions of medical men.
V. Results of the inquiry.
VI. Suggestions for the future, with an appendix containing the account of some micrococci discovered by him, and some pathological remarks and experiments.

I. *The disease*, as far as the West Indies are concerned, is of African origin, and has been at various times confused with syphilis. As it is rare here, it is thought well to compare it with the Fijian disease "Coko," with which it is identical, though as Dr. Nicholls throws some doubt on their identity, it will be necessary to enter fully into the question.

The resemblance between the diseases was, as far as I* am aware, first pointed out in the appendix to "Marinon's Tonga,"

* C. W. D.

by a doctor of West Indian experience, about 1820. At present in Fiji no doubt is entertained on the subject, either by medical men who have studied the description given of yaws, or by planters who have had West Indian experience of it. Further, the few cases we have had of it in the Public Hospital here were diagnosed by the one of us as "Coko" from Fijian experience, and diagnosed as yaws by the other, and by men with local, West Indian, or West African experience of that disease.

The plates, both coloured and black and white, in Dr. Nicholls' report would serve equally well for "Coko," especially II., III., part of IV., VI., IX., X., and XI., and particularly XIII., and these were the plates selected by the Surgeon-General, Dr. Ross, of considerable Jamaican and West African experience of the disease, as most typical. In my* opinion there is no doubt that the cases of yaws I have seen here are identical in appearance, in course for the limited period whilst under observation, and in behaviour under treatment, with hundreds of cases of "Coko" I saw in Fiji.

Dr. Nicholls quotes a description of "Coko" by Dr. MacGregor (1875), and lays stress on the protrusion of separate papillæ, $\frac{1}{8}$ of an inch in length, from the excrescence, and the frequent formation of a cap over the excrescence, beneath which pus is found, as showing a distinction between the diseases.

In plate XXII. of his own report a section of a small granuloma is given showing very markedly the enlargement of the papillæ.

In cases of yaws now in the Georgetown Hospital there were on several of the excrescences yellow caps, removable entirely, and with pus beneath them, though in by far the greater number of excrescences the typical surface is seen to be partly covered by yellow deposit without pus beneath.

The stages of the disease as described by Dr. Nicholls are very similar: there is a prodromal stage with more or less pyrexia, pains, mainly muscular, preceding the eruption. In one case these pains (in the back) were so severe (the temperature being 103° F.) that the hospital attendant, a Eurasian, who had been head dispenser on a coolie immigrant ship, and had had considerable experience of small-pox, diagnosed it as a case of the latter complaint.

* C. W. D.

The prepapular stage I have not noted. The papules when formed may remain small, but more usually spread to a limited extent so as to form excrescences, rarely exceeding the size of a shilling, covered with a thin bright yellow adherent crust, through gaps in which red points are seen. These excrescences persist for some time, become slightly cupped, and slowly subside, forming a scab which separates, leaving no depressed scar but some excess of pigment which gradually disappears. Dr. Nicholls describes the scar as lighter in colour. This I have not seen, and Dr. J. Jackson Clarke and others refer to the temporary hyper-pigmentation of the scar in yaws in the coloured races.

Another crop usually appears before the subsidence of the first, and successive crops follow.

They may be limited to the face, usually near the muco-cutaneous surfaces, and in children are commoner round the anus and genitalia in addition, but all parts of the body may be affected. In the later stages they are most common at all ages on the soles of the feet and palms of the hands. The duration of untreated cases varies. Under a year was considered short by the Fijians, and cases sometimes run on to 3 years without including sequelæ. Anything resembling the mother yaw described in the text-books is exceptional, although I have seen it. The same statement is made by Dr. Nicholls regarding yaws.

Pains in the limbs and joints are common, and may persist after all traces of the eruption are gone. The eruption itself is not painful, except when the soles of the feet are affected, before the granuloma has burst through. In infancy, when the epidermis of the sole is not hardened, there is little or no pain.

The physique of the Fijians is excellent, and many live to old age, so that the disease does not appear to permanently impair the constitution.

II. *The progress of the disease.*—This is treated of separately in each island, and for practical purposes in three periods: 1, Slavery; 2, After emancipation; 3, Within the memory of present practitioners.

1. During slavery fresh cases were constantly being imported, so that the disease was common, well understood, and isolated in yaws houses in almost all the islands reported on. In this colony this was also the case. It is referred to particularly in

Pinkhard's notes on the diseases of the colony at the time of its capitulation by the Dutch in 1796. Mr. Rodway informs me that, "I find continual references to yaws and yaws houses on nearly every estate. There was a yaws house at the back of Georgetown about where the Alms House now stands. The main point was isolation, and for which reason the houses were generally placed on the back dams, those affected being made to look after the kokers when they were not too infirm. There was some confusion between yaws and leprosy, and the houses were used for both."

That the disease was by some clearly distinguished from leprosy and from other skin diseases is shown by the admirable account given of it in Demerara by R. Easton in 1834, from which the following extracts are taken :—

"Omnes corporis partes his patent, sed majores et numero et volumine in inguinibus, pudendis, axillis, et facie inveniuntur. Aliquando apud servos, pedes morbi vi praecipue afficiuntur, ibi sub digitis et plantis pedum pustulæ erumpunt, magnum creantes incommodum, et progressum valde difficillimum facientes."

"Non semel et unâ vice apparent; novis erumpentibus, exsiccantur aliæ, escharam furfuraceam linquentes; variæ sunt magnitudinis ex volumine Rubi Idæi usque ad volumen Mori; nullus in iis est ichor sed materiem glutinosam effundunt."

"Pauca gaudent sensilitate neque dolent in genere, nisi in plantis pedum ubi dura et densa est Cutis et motu ambulatorio comprimuntur."

"Sed per longum tempus in eodem statu manent sine ullo periculo vitæ, nisi ab male directa arte promptam tentante curationem."

"Interdum per duos tresve annos perdurant, antequam ad sanationem tendunt. In pueris autem citius decursum suum percurrunt, et sex mensium spatio vel intra annum terminari solent."

"Alii Mercurium commendant, sed quanquam pro brevi tempore nitidam reddit cutem, tamen morbus sub hac tractatione recidivus fieri videtur, nam fere semper redit cum pejoribus symptomatibus, et diuturnior molestiorque fit."

"Sed alioquin morbus fere semper sibi relinquitur ut sua stadia percurrat, quod in genere sine periculo fit."

No one with experience of the disease can, we think, read these extracts without seeing that they give a clear description of its main points quite sufficient for diagnostic purposes.

"Pustulæ," as in Dr. MacGregor's account of "Coko," is unfortunate, as an accumulation of pus is thought a not uncommon accident only met with in a small minority of the excrescences. The axilla is a place where Dr. Nicholls states it was not observed. In another portion of the same paper by Easton he refers to the hair turning white in the affected skin. This certainly does not take place in "Coko," in the cases of yaws we have seen here, or in those described by Dr. Nicholls. It is probably a confusion with leprosy.

2. *After emancipation* in the West Indies the yaws houses were abandoned, as well as any other attempts at isolation, and the disease does not seem to have attracted the attention of medical men.

Dr. Nicholls very plausibly urges that it was becoming generalized, the former inmates of the yaws houses scattered over the country acting as foci.

In British Guiana during this period little attention seems to have been paid to it. It is not mentioned by Blair in the introduction to his work on yellow fever, in which most of the diseases of the colony are mentioned. Mr. Rodway believes that it was "much less" prevalent.

As, however, methods of treatment were handed down from this period to present practitioners, it must still have been recognized.

The yaws houses were disused and no means were taken to isolate cases of the disease. In the sixties we have proof that it was common in the adjoining islands of Leguan and Wakenaam, and that cases occurred elsewhere.

3. *The third period.*—The third period is that within the memory of present practitioners, and during this period Dr. Nicholls shows that there has been on the whole a decided and in some cases an alarming increase in its prevalence in most of the islands.

The steady increase has been diversified by more or less abortive attempts at stamping it out, by segregation, voluntary or compulsory notification and treatment.

At the outset these attempts had to encounter a prejudice in

favour of native remedies for the disease and dislike of hospital restrictions.

These difficulties were in some cases increased by the bad accommodation and inadequate water supply, inferior food, and insufficient treatment accorded in hospital.

In most of the islands these attempts afford an instructive example of partial measures and ill-timed economy (sometimes exercised when on the brink of success), almost always resulting in failure to eradicate the disease and in the waste of much money.

The third period in British Guiana dates from 1863, at which time it was certainly common in Leguan, and according to Dr. Shannon a moderate number of cases were to be met with in Wakenaam. In the former of these islands, in 1869, Dr. Shier reported that it was still spreading, and in 1875 Dr. Watt, then Medical Inspector, advocated the erection of a yaws house in that island, "the careful supervision of the people and their dwellings by the headmen on the estates, and in like manner of those who reside in the villages by the rural constabulary."

On the estates he advocated monthly medical inspections.

He states that the planters had expressed their anxiety as to the spreading of the disease amongst the immigrants, and would be glad to co-operate with the Government; and that the immigrants themselves were impressed with the loathsome nature of the complaint, and would, he was assured, readily resort to a yaws hospital of their own accord.

He deprecated compulsory measures in the first instance, considering that the people could be induced to go voluntarily.

He paid great attention to the means of securing personal cleanliness, including hot baths and liberal supplies of soap, measures also advocated in Jamaica in 1819. He advocated a liberal diet, including fresh meat in addition to ordinary hospital dietary.

In the same year Dr. Hillis reported from Leguan 88 cases out of the total population, which was under 3,000.

A year or two later the yaws house was built. In 1886 Dr. Godfrey reports that it had fallen into disuse, though cases were still fairly common. Dr. Fernandes, at present in Leguan, rarely sees it (only about 4 or 5 cases since 1892), but believes that the majority of the inhabitants are protected by a previous attack.

Dr. Irving, now in Wakenaam, states that there have been five

cases in the estates' hospitals in 1895, and several others in Maria Johanna village, and that though the disease is diminishing at present, it appears to break out in "recurrent epidemics." These two adjoining islands are in close communication and close together, whilst to some extent isolated from the mainland. That the disease still maintains a hold there, though to a diminished extent, is shown by the fact that the only cases met with in Georgetown and the East and West Coasts have been imported from them.

As regards the colony as a whole it does not seem to have been prevalent to a large extent. Dr. Massiah states that he has not seen a case in his 14 years' service here, though 4 years' experience previously in Grenada had made him familiar with its aspects.

Dr. Edmonds, who had seen much of it in Dominica and Montserrat, was struck with its rarity on his first arrival here in 1878. Dr. Shannon, outside Wakenaam, has rarely seen it.

All the senior practitioners are unanimous in saying that cases are much rarer than in former years, and as regards the greater part of the colony the disease is non-existent.

In my * own experience, dating from 1865, I have seen little of it outside Wakenaam and Leguan, and in the course of my official inspections on all the estates during the last 8 years I do not remember seeing any cases except in those districts.

	E. Coast.	W. Coast.	Demerara River.	Berbice.	Islands.	Arabian Coast.	Total.
Estates' population	20,500	12,200	11,000	14,300	6,100	8,800	72,900
1881	...	13	1	4	1	4	23
1882	1	4	1	...	17	2	25
1883	...	4	5	...	4	1	14
1884	...	3	2	3	4	...	12
1885	...	...	...	6	4	1	11
Totals	1	24	9	13	30	8	85
Average	·2	4·8	1·8	2·6	6	1·6	17
1893	...	1†	1	3	7	...	12

* J. S. W.
† Imported from Wakenaam.

This table does not show the marked diminution which the universal testimony of practitioners states is the case, but it does show that in the two most important districts, the W. and E. Coast, there is now a complete absence of the disease.

The islands, with their smaller population, have all along had a larger proportion of cases.

As regards Berbice we have little evidence. It seems to have been in the past more prevalent there, and cases in most years have appeared for treatment in the Public Hospital there, whilst cases are also met with in the estates' hospitals at times. It is probable that it still lingers in some part of that district.

One case in the Suddie Hospital came from the Pomeroon, and Dr. Ferguson states that he is informed on lay authority that it is common in that region.

To summarize our results :—

(1) In the best known, wealthiest, and most populous parts of the colony the disease is now extinct, with the exception of imported cases.

(2) In the islands of Leguan and Wakenaam the disease is still present, though not to so great an extent as formerly, and from these islands occasional cases travel to the mainland.

(3) That in some of the remoter parts of the colony there is a probability that the disease still lingers.

The measures adopted in the West Indies to check the spread of the disease need hardly be taken in detail. Compulsory notification, with compulsory segregation, both efficiently carried out, were attended with considerable success, while any other measures failed.

In British Guiana no measures have been taken except the erection of yaws houses for local purposes in Leguan and Wakenaam, and yet contrary to the experience of the West Indies, the prevalence of the disease has steadily declined, though the conditions for its spread are at least as favourable here as elsewhere, with one important exception, namely, the scarcity of flies, which undoubtedly are great carriers of infection.

Though the varieties of these are numerous here, yet for a tropical country the numbers are small, and are nowhere sufficiently numerous to be a pest.

Though going into some detail as to this mode of contagion, Dr. Nicholls does not give any comparisons between the pre-

valence of the disease in the West Indies and the numerical prevalence of flies in the islands.

Another point which must have tended to the diminution in risk of infection is the extraordinary care taken in the early treatment of even the smallest ulcers on the plantations, and the great diminution in their frequency during the period of which we have definite medical knowledge.

In 1874, 15,572 ulcers were admitted into the estates' hospitals, forming 13 per cent. of the total admissions, whilst in 1893 there were hardly 6,000, forming 4·4 per cent. of the admissions.

This comparative absence of contagion carriers and of open sores peculiarly susceptible to the contagion may to some extent at least explain our increasing immunity.

IV. The opinions of medical men on various points connected with the disease in answer to certain questions are given, and

V. The results of this inquiry. We shall deal with these points together.

Question 1st.—As to the prevalence of the disease, and whether this prevalence was limited to localities or districts, or uniform.

The general consensus of opinion was, even when the disease was universally prevalent, that some districts were permanently more infected than others, and that these acted as foci of the disease.

In British Guiana the same holds good.

Wakenaam and Leguan have been for long the hotbeds of it, and it still persists there, especially in Wakenaam, though to a reduced extent, whilst it is almost absent in the rest of the colony.

Questions 2nd and 3rd relate to the hygienic conditions (usually bad) and to the diet, and ask whether any relation is observable between the two. In Dominica alone have the houses mainly wooden floors, but it is not less prevalent there than in the islands where most of the floors are earth. The general opinion seems to be that amongst the lowest classes (the dirtiest and worst fed) the disease is most prevalent. No connection can be traced to any particular article of diet. The consumption of salt fish varies from 60 lbs. to 19 lbs. per head, but the disease is more prevalent where salt fish is least consumed.

In Fiji the mass of the diet is excellent—fresh vegetable food with fresh fish, and pork at times. Salt fish is unknown and tinned meats are a luxury. The people are clean in their persons, but the houses have earthen floors covered with grass and again with mats, only the top layers of which are cleaned or changed.

In this colony in 1849, 78 lbs. of salt fish per head were consumed, and now only about 28.

Question 4th relates to the classes affected. The general tenor of the replies shows that this depends on the degree of exposure to infection, the most careless suffering most. Europeans occasionally get it, and East Indians are said to be highly susceptible.

In Fiji all classes of natives are infected, but this is artificial. The belief in the greater severity of the disease in adults, and in the impossibility of avoiding it, makes mothers put children to sleep with infected ones, or even if late in getting it to practise actual inoculation. In a few isolated families of higher rank infection has been avoided, and one of these was one of the few cases of adult natives getting the disease I* heard of. Half-caste and European children living in native villages get it as well as an occasional adult. The East Indians mix little with the natives, but I saw perhaps 35 cases (all adults but one) amongst them, though no cases had been known 3 or 4 years before.

In British Guiana the disease has always been looked upon as essentially a negro disease, and cases among the East Indians, who until recently have held themselves aloof from the negroes, have been rare, and the disease has been still more rare among the white races.

Question 5th asks for any instances of yaws and syphilis occurring in the same person. A fair number of such cases are recorded; and in all of these the syphilis preceded the yaws. I* only heard of one such case in Fiji. In this, a European, the syphilis preceded the yaws (or "Coko"), but the latter disappeared during a voyage to England, and on the return of the patient to Fiji he had a well-marked tertiary syphilitic eruption. I* did not see the case, and quote from memory, but the case was well known at the time, and well authenticated by medical men.

* J. S. W.

The relation between yaws and syphilis is of great importance, as whilst it is certain that they are closely analogous, it is equally certain that they are separate and distinct diseases.

No doubt most people on seeing their first case of yaws without knowing of its existence in a country would think, as I did, that "this must be a syphilide," though I never saw one like it. When, however, instead of one you meet with hundreds all alike, its recognition as a distinct disease is easy, and once the characteristic appearance is known, diagnosis is unmistakable in most cases.

The chief distinguishing feature in our minds is the uniformity in all essentials of the eruption all through the disease. Each excrescence in the infant, adult male or female, negro, coolie, or European is the same, modified only slightly by the thickness of the epidermis, as on the soles of the feet, or by constant movement, as at the angle of the mouth. The early excrescences are the same in appearance as those which develop later, perhaps even as long as 3 years later. Surely this in itself is conclusive evidence against the identity of yaws with so polymorphous a disease as syphilis.

That yaws is not a congenital syphilide is shown by the fact that the usual age for the attack is over 2 years, and that it is very rare in the first year. In fact, early congenital syphilitic diseases and the later manifestations, such as interstitial keratitis, or pegged teeth, are unknown in Fiji.

If "Coko" is a form of syphilis, then with a universally present syphilis congenital syphilis should be common, but against this, of course, it may be alleged that as "Coko" is acquired in childhood, the chances of transmission by procreations would be small.

That the disease in many cases effects a permanent hold on persons attacked is seen by the persistence with which, long after all signs of the disease elsewhere have disappeared, papillomata arise in the soles of the feet, and burst through the thickened epidermis. These rarely reach a large size, and hardly rise above the level of the skin. They are painful, but readily relieved by enlarging the epidermis, opening and touching the papilla with a caustic. There is no pus, as a rule.

They continue to appear even in late life, and are undoubtedly

sequelæ of the "Coko," which appear on the feet earlier in the disease.

There are a series of pseudo-syphilitic phenomena met with in the natives, thought by some to have a connection with yaws. Syphilis is unknown among the natives (*vide* note).

First amongst these is a destructive ulceration of the soft palate and fauces and sometimes of the nose. With or without this, there may be a destructive ulceration of the nasal cartilages resembling lupus excedens. Occasionally, either on the face or elsewhere, is a cutaneous affection resembling lupus vulgaris. All these show a very marked improvement or cure under potassium iodide. Where both syphilis and yaws are present we do not know how these could be distinguished from syphilitic affections, but Dr. Numa Rat describes a similar ulceration of the pharynx as a sequela of yaws.

I have twice seen this ulceration under 10, and it is common about 20. In rarer cases it occurs late in life, and in one woman about 60, on whom I made a post-mortem, the larynx was involved; there were no tubercles in any of the organs, and neither gummata nor other signs of syphilis were present.

Hillis records that 5 lepers had had syphilis and yaws "in the order named" before the leprous disease made its appearance.

Questions 6th and 7th deal with the relation between yaws and leprosy, tuberculosis and vaccination. That yaws may precede or follow either leprosy or tuberculosis, but is independent, is the general testimony.

A vaccination sore like any other sore may be infected, or yaws existing in a child when vaccinated may give its distinguishing features to the vesicle. Cases are alleged to have benefited by vaccination, the eruption rapidly drying up. That this sometimes occurs in chronic cutaneous eruptions is well known, and the analogous action of small-pox in Jamaica, as recorded by Nembhard in the 1784 epidemic, in curing yaws is noteworthy in this connection. This also holds good in British Guiana.

Question 8th deals with variations in prevalence with the time of year and climatic changes. There seems to be some relation between the prevalence of the disease and wet weather. Dr. Nicholls explains this by assuming that the excessive

moisture favours the more rapid growth of the micro-organisms (found by him in the earth in the floor of the houses inhabited by yaws cases, as well as in the yaws tubercles themselves), but may not this be due to the greater confinement indoors during wet weather in company with other persons affected with the disease?

Question 9th deals with cases of contagion and the period of incubation. This appears to be variable. The only case I had, definite history was that of an incised wound which looked suspicious 3 weeks after the injury, and was a decided yaws tubercle 2 weeks later. The general eruption was about a month after that. In two other cases (East Indians) the period of incubation was under 2 months.

Of the period in cases of direct inoculation we have no personal knowledge, but it is said to be a few weeks.

Question 10th asks for particulars as to the frequency of relapses after apparent cure. These appear to be common. In our experiences relapses are the rule.

Question 11th deals with second attacks at long intervals. Several cases are given, some of which were under competent medical observation in both attacks. Dr. Nicholls writes to the effect that the immunity conferred by one attack is not absolute, and is weakened by lapse of time.

The Fijians considered a previous attack absolutely protective. Cases in adult life were extremely rare, and when they did occur were attributed to the fault of the parents, who had not taken care that they should have the disease in childhood. Certainly some of the adults affected were persons of sufficient rank to cause the circumstance of their having the disease as children to be remembered.

Question 12th.—Treatment: practically mercury now, as in the early times, holds the first place, although its risks are clearly pointed out.

As a result of his inquiries Dr. Nicholls gives the following table showing the proportion of medical men using the following drugs:—

Mercury	41·5 per cent.
Potassium iodide	36·6 ,,
Iron	36·6 ,,
Arsenic	26·8 ,,
Sarsaparilla	14·6 ,,
Sulphur	2· ,,

Most observers were opposed to the practice of destroying the yaws, and Dr. Nicholls supports this observation on theoretical grounds.

The methods of treatment in British Guiana seem to have been practically the same, mercury and iodides holding the chief place. Dr. Shannon used iodides and arsenic. Dr. Watt (1875) laid most stress on personal cleanliness, and postponed mercurials until the eruption was well out, and substituted iodides in children and weakly persons. A favourite local application used to be iron rust and lime juice, a plan adopted also in the slave times in Jamaica to rapidly dry up the yaw, as is recorded by Daneer, though he lays more stress on personal cleanliness, and particularly hot baths, than on local applications.

In my experience in Fiji, I after a time discarded all drugs in favour of potassium iodide. Both it and mercury in many cases cause speedy disappearance of the eruption, in fact, often more markedly than in the case of syphilis. Under either treatment relapses are common, and I did not observe any material difference in that respect, and doubt whether either materially shortened the course of the disease.

The same observations about mercury have been made from the early times, when slaves were treated with mercury in order to conceal the disease when they were exposed for sale.

Iron and arsenic I have only used as tonics, and sulphur only externally. Caustics, especially phenol, nitric acid, and nitrate of silver, are useful in regions of the body where the eruption causes pain or inconvenience, as on the soles of the feet. In other regions I usually used ung. hydrarg. nit. My experience of this treatment of yaws in this colony is that the disease reacts in the same way as "Coko" does in Fiji under the same treatment.

Question 15th deals with treatment by unqualified persons. Beyond pointing out the frequency with which mercury is used by such persons in the West Indies to a dangerous extent, the matter is of little interest. The mass of cases everywhere seem to be treated by "native" methods.

The Fijians in most cases left the disease to itself. The scraping with oyster-shells mentioned by Dr. Nicholls is not the rule now, at any rate.

VI. Suggestions for the future.

Dr. Nicholls states that no system of dealing with the disease can even approach efficiency that does not provide for—

(*a*) The isolation as far as possible of infected houses.

(*b*) The thorough disinfection afterwards of these houses, and the destruction or disinfection of the clothes or bedding used by the sick.

(*c*) The demolition of the wretched hovels that are a danger to the public by reason of the clinging of the contagion to them.

(*d*) A rigid enforcement in all instances of ordinary sanitary precautions.

Dr. Nicholls also insisted on—

(1.) The necessity of compulsory notification of cases, and shows that in every case where this has been carried out the disease has been found to be far more prevalent than had been hitherto supposed.

(2.) He considers that a dispensary system, combined with asylums for disabled or refractory patients, and compulsory attendance, would be the most economical plan likely to be attended with success.

(3.) The necessity of having a special officer in each island with sufficient authority to direct "the yaws affairs," and to compel those under him to perform their duties satisfactorily.

Divided responsibility and absence of central control he considers responsible for much of the want of success in preventing the spread of the disease. He also advocates one directing head, responsible alone to the Secretary of State, for all the islands, stating that instructions from the Colonial Office have been disregarded by the local authorities with disastrous results, and also that at present the West Indies are so isolated from each other that the authorities are ignorant of the working of measures in force in neighbouring islands.

In this colony generally the disease does not seem to be of pressing importance, as it interferes but little with life or labour, and the money required for preventive measures might, we consider, be more profitably spent in the prevention of other diseases, more particularly anchylostomiasis and venereal disease. Compulsory notification with our system of Rural Police and Village Councils might however, if found necessary, be very cheaply

enforced, and would give timely information of any increase in the prevalence of the disease sufficient to call for more stringent measures.

We are of opinion that special measures might be applied to Wakenaam and Leguan, where the disease has always been prevalent. The fact that cases from there have been met with in other parts of the colony shows that its presence there is a permanent source of danger not only to the cultivated portions of the colony, but even to the more inaccessible regions of the goldfields.

Under these circumstances it would seem to be a question for the Surgeon-General's consideration, as the Medical Adviser of the Government, whether a yaws house should be established there, compulsory notification and registration be enforced, and restrictions be placed on infected persons leaving those islands or any district declared to be infected.

Dr. Nicholls concludes with some excellent plates of the disease, and of sections of involved tissues, and an account of the discovery of a micrococcus constantly found in the new growths. This was cultivated, but on inoculation in various animals gave negative results, as also did direct inoculation from the granulomata, the animals being probably immune.

NOTE.—That syphilis is unknown amongst the Fijian natives is the experience of every medical man in that group.

Opportunities for its observation if present are good. A large proportion of the adult male population pass through gaol, for in addition to many trivial offences against native laws, fornication and adultery are punished by imprisonment. In all the larger gaols each prisoner is examined by a medical man. Adult unmarried males when indentured on plantations are under medical care and are by no means averse to lie up for most trifling sickness, and are examined then by the Medical Officer.

When a Medical Officer visits a village, it is usual for the headmen to show him all the sick, including all not working.

As regards my own experience, though acquired in a district where not only the largest number of coolies were employed, but also including two of the largest native villages and most frequented in old times by Europeans, as is shown from the number of half-castes, I never saw primary or secondary syphilis except in Europeans and East Indians, proving at least its rarity.

The experience of every medical man, including Dr. Corney, the Chief Medical Officer, who has not only had long experience, but a most intimate acquaintance with their diseases, language, and customs, is to the same effect.

The native practitioners, who see in their training in the Suva Hospital cases of syphilis amongst the East Indians also, say they see nothing like it amongst the natives.

Stronger negative evidence would be difficult to obtain.

Though not a licentious race, that the Fijians have had both from Europeans and East Indians abundant opportunities of acquiring syphilis is certain, and as a speculation it was frequently suggested that the yaws were to some extent a protection, and in this connection it is especially noteworthy that in all the conclusive cases of persons being attacked with both syphilis and yaws the syphilis *preceded* the yaws, though as the latter is usually acquired in childhood, we should expect to find yaws precede syphilis in the larger proportion of cases.

C. W. D.

A CONTRIBUTION

TO THE

CLINICAL AND BACTERIOLOGICAL STUDY

OF THE

BRAZILIAN FRAMBŒSIA OR "BOUBAS."

BY

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TRANSLATED

BY

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[From the Archiv für Dermatologie und Syphilis, 1895.]

A CONTRIBUTION TO THE CLINICAL AND BACTERIOLOGICAL STUDY OF THE BRAZILIAN FRAMBŒSIA OR "BOUBAS."

By Professor Achilles Breda.

Whilst hygiene, acclimatization, and civilized surroundings are tending to render diseases already introduced less virulent, commerce, colonial undertakings, and temporary emigration threaten us with a constant supply of fresh morbid types. Such interchange of diseases has never been more active than at the present day, when the potent aid of science fortunately affords to the thoughtful physician effectual weapons of defence, but at the same time imposes upon him the duty of investigation of the most searching character. Such investigation promises to lead the more surely to the knowledge of fundamental truths because it enters upon a territory free from erroneous traditions.

Isolated cases of special diseases have long been imported from time to time into France, England, and other countries, from regions within the tropical zone. Our African possessions,* and the special ties which connect us with South America, have of late brought to us many surprizes in the shape of types of disease, which now for the first time come under the notice of our medical men.

For the designation of the morbid conditions of the skin and mucous membranes, which may be observed in tropical countries, a superfluity of names are in use. Many physicians describe by different names the various stages of one and the same skin affection; whilst others apply the same designation to disorders of obviously different characters. This multiplicity of names is in part to be explained by the variety of dialects spoken in the countries in which many of the diseases imported into our own land have their origin, and is moreover favoured by the fact

* Prunner has met with a few cases of frambœsia even in Abyssinia.

that morbid types, originally identical, undergo modification in the course of time under the influence of race, habits, methods of treatment, as well as various complications. Nor must we overlook the fact that diseases endemic in tropical regions exercise, on their part, an influence upon affections differing from them entirely in nature, so that it may even appear convenient to include the latter among the former. As a matter of fact, Geber, during his latest sojourn in the East, heard skin affections, which are among the very commonest in our own country, diagnosed as "Aleppo boil." It is not surprizing then that Tilbury Fox (1872), who regards the "Delhi faruncle," "Biskra boil," and "Aleppo boil" (which skin diseases are, according to Willemin, Besnier, Rocard, and others, identical with the "Bessara boil," which, originating on the banks of the Ganges, has spread along the north coast of Africa as far as Morocco) as clinically identical, grouping all these affections under a single clinical category, which he would designate by the name of "Oriental tubercle," suggested by Willemin.

In the same way Savage, as long ago as the end of 1768, included, under the collective name of "Frambœsia," a group of endemic contagious diseases of the tropics, namely, "Pian," "Yaws," and "Boubas," of which diseases Lancereaux (1874) also asserted the clinical identity. Again, Van Lient, Rocard, and Rocchas (1879) described as identical the "Pian" of the French colonies, the "Yaws" of the Antilles, the "Boubas" of Spanish America, the "Patek" (or boil of Amboina and the Moluccas), as well as the "Tonga" of Melanesia.*

Rocchas, who had undoubtedly studied the above-mentioned lesions on the spot over a long period, states that the words pian, yaws, and poubas (or boubas) are one and all derived from African dialects, and relate to a single pathological entity. He further states that in one and the same locality many persons call pian the affection which others describe as yaws or boubas, and that each European nation has accepted that designation of

* The term frambœsia was, before 1876, in very general use among European medical men as a collective name for affections of various origins, which have only this in common, that they exhibit fungo-papillomatous vegetations. Kaposi (1869) gave the name of *dermatitis papillomatosa capillitii* to various lesions of syphilitic, lupous, and other natures characterized by the production of vegetations.

the disease which was in use among the earliest cargoes of slaves. In the same way Dr. Paulet, who studied framboesia in Jamaica and boubas in the French Antilles (both in negroes born in the islands, and in those recently arrived from the coast of Africa) asserts the identity as regards symptoms, course, and anatomical lesions of yaws, boubas, and pian. Charlouis, a Dutch army-doctor in Samerang (Java), points out that framboesia, yaws, and pian are the same disease, and that they occur in all parts of the tropics. He proposes for their designation the quite superfluous name of *Polypapilloma tropicum*.

Pontopiddan, an English physician, writes (1882) that in tropical regions a disease occurs which the native physicians, as also certain English ones (Milroy, Imray, Bowerbank, Nichols, T. Fox), regard as an affection *sui generis*, which is known in the Lesser Antilles as yaws, and in the Island of St. Domingo as boubas. In 1894 Broca and Jacquet associated together the above forms under the designation of yaws; whilst Unna assigns to them the collective name of framboesia.

In a word, then, able physicians who have studied the diseases under discussion in their native localities, and others who have had opportunities of seeing and acquiring a thorough knowledge of these affections, have shown that pian, boubas and yaws all represent a single chronic morbid condition of a contagious character, which occurs in endemic form in tropical countries. All are characterized by the situation of the lesions on the skin and at the orifices clothed with mucous membrane, as well as by the production of fungating outgrowths which present a strong resemblance to strawberries or raspberries. I propose to speak of these lesions under the collective name of framboesia; but it must be borne in mind that, in addition to such characteristic outgrowths, a large number of more or less deep and less exuberant ulcers may be present.

Like falcadina, scherlievo, radezyge, &c., and even more than has been the case with these affections, framboesia has been looked upon as acquired or, more frequently, as hereditary syphilis, which has merely become modified by racial, geographical, and other influences. Nevertheless, as soon as serious investigation began to throw light upon the subject, the notion of such an origin necessarily gave place by degrees to the recognition of causes which had previously been looked upon

as merely favourable ætiological conditions, and the conclusion became inevitable, that in frambœsia one is dealing with an independent affection, which has no more intimate connection with syphilis than with any other disease.

It was no easy matter, as a first step to the establishment of this view, to differentiate frambœsia from the many diseases which resemble it. In this connection it will suffice to recall the facts that diseases, which in other zones are quite benign, are apt to assume grave forms in the tropics; that ulcers of various kinds offer a favourable nidus for the development of lower organisms of the most various natures; that scrofula, lupus, tubercle, and syphilis in rare instances complicate frambœsia, and that in these ways the several affections may come to be confused; that the slightest breaches of surface in individuals of certain races, who are in a condition of lowered vitality, are apt to exhibit a remarkable intractability, as is exemplified in the phagedænic ulcers of tropical lands. Moreover, frambœsia must not be confused with such ulcers as develop upon the skin in cases of inveterate scabies, or which follow the bites of Zangane flies; nor must it be confused with the inflammatory lesions produced by *Pulex penetrans* or *Dermatobia hominis*, the bites of which insects may give rise to boils on the back, in the axillæ, or on the scrotum and thighs.

Again, there must be considered the effects produced by certain carnivorous larvæ, such as that of *Lucilia hominis*, a fly which deposits its eggs upon ulcerated surfaces, and even in the outer ear, mouth, or nostrils, with the result that severe and very dangerous effects, even implicating the bony structures, may ensue. Yet by far the greatest difficulty which had to be encountered was in the complete differentiation of frambœsia from syphilis, and in demonstrating that the two diseases were absolutely independent of each other. It may be mentioned that the considerations which, for the majority of medical men, have contributed to the establishment of this differentiation are the following:—The differences in the localization of the two affections, and their different courses in most cases; the frequently observed possibility of pure inoculation, and of auto-infection with the morbid products of frambœsia; the occasional concurrence of the two diseases in the same individual; the liability of sufferers from frambœsia

to contract syphilis, a fact which has been experimentally proved (Charlouis); the possibility of inoculating animals with frambœsia, as with Oriental boil.

We may also recall the fact that Guglielmo Pisone, on his return from the voyage to Brazil (1648), which he undertook in company with the Duke of Nassau, related that he had observed a disease, imported by negroes from the coast of Calabar, which went by the local name of bouba, and which, in his opinion, had nothing in common with syphilis. In the same way the distinction between bouba and syphilis was accepted by Bernardo Antonio Gomez (1815).

On the other hand, the two diseases were declared to be identical by Clemente Pinto (1835), Imbert (1839), and of late years by the Brazilian physicians and professors, Gioachino Silva, Giosue Benedetto da Rosa, Murelles, and Melto Morais ("Annales de Medicina Brasiliense," xviii., 1868).

Imbert laid before the Medical Society of Pernambuco (October 25th, 1848) a thesis on boubas, which was replied to by the Brazilian physicians Pietro Darnellas Pesoa, Serpa Taxeira, and Para. All of these were agreed as to the African origin of bouba, and its identity with yaws, pian, and frambœsia, but they differed on the questions of its contagiousness and relation to syphilis.

Rocard, Roux, and Roncière frequently met with syphilis in Martinique, whence bouba has entirely disappeared, and showed that among the native New Caledonians syphilis is rare, whereas bouba is common.

Dr. Lobo (of Albuquerque) states, in a monograph published in Rio di Janeiro in 1893 (which contains nothing original, but is an abstract of another work) that bouba is a variety of that protean disease syphilis.

We offer then, after what has gone before, as the first question for consideration:—

Is that variety of frambœsia, which is called boubas, an absolutely independent form of disease or no? *

Let us now proceed to see what data bearing upon the para-

* Dr. di Toffoli Clementi, who was for some months second assistant in my wards, and who undertook a journey to St. Rocco (Brazil) for purposes of study, writes to me (in a letter dated February 21st, 1895) that if he wishes to ascertain from a patient whether he is syphilitic, he always inquires whether he has had bouba, for in that place syphilis generally goes by that name.

sitic nature of boubas are contained in the literature of the subject.

As is well known the presence of *Distoma hæmatobium* is among the causes which has been assigned to Oriental boil (Flemming and Schlimmer). More recently Carter has ascribed the Biskra boil to the action of a specific fungus.

Heidenreich and Ducleaux (1884) have described micrococci either isolated or united into zooglæa, which are capable of being cultivated, and which on inoculation reproduce the original disease; but it has been since shown that the organism in question was nothing more nor less than the *staphylococcus pyogenes aureus*. Poucet (1887) stated that he found bacilli 0·25 μ in breadth and 1·8 μ in length. Riehl (1886) found endocellular cocci. Unna was unable to discover these in the same portions of tissue, although he had seen them in sections forwarded to him by Riehl.

The uncertainty which still surrounds the question whether or no micro-organisms play a part in the causation of Oriental boil, does not affect the positive results following inoculation of the pus from Biskra boil in about 3 days, and the positive results obtained alike of Weber (1876), Boinet, Deperet, and Chantemesse.

Turning to the Peruvian "verruga," Carter has found in this disease an organism similar to the tubercle bacillus. In the "phagedænic ulcer of hot countries" Boinet met with a fungus, which he believed to be specific. Gavino reported to the International Congress in Rome (1894) that in the course of examinations of sections of skin affected by "mal de Pinto" (a disease which occurs in Mexico at an elevation of 1,000 metres above the sea), he had found a bacillus, which he believed to be the cause of the disease. On the other hand, no mention has as yet been made of parasites in pian, yaws, and boubas, and even Dr. Lobo gives no hint of the presence of any such. Unna stated (1894) that the micrococci, which are to be seen in places in the scabs of tissues affected with frambœsia, must be regarded as mere secondary developments.

Nevertheless, in St. Domingo those who suffer from bouba are subjected to quarantine (Nicholis, 1879, Pontoppidan, 1882), and the natives of St. Domingo (mulattoes) in their anxiety to avoid infection with boubas, prefer to spend whole nights in the

primæval forests of the island to sleeping in Cevico or other places infested by the disease.

It will be clear, from what has been said, that we are in possession of no sure data regarding the cause of Oriental boil, and that no one has established a parasitic basis for the development of frambœsia. No observer has demonstrated a specific parasite of boubas, or rather no such parasite has been even sought for.

The second question which we propound, therefore, is the following :—

Is the Brazilian boubas a parasitic disease or no ?

As regards the structures affected by boubas, De Brun, Rocchas (1879), Charlouis (1881), McCall Anderson (1888), and Unna (1894) hold that boubas only occur on the skin, and do not extend to the mucous membranes.* The affection is said to begin with a macula, which quickly changes into a bulla, and finally into a pustule. On this point there is more agreement among authors than with reference to the course of development of "Oriental boil."†

According to our own view, the bouba commences with a spot, in the centre of which a bulla quickly develops, and then a crust, which appears later to be covered by a species of scab.

As the basis of our communication we shall make use of the descriptions of patients, some of whom have been observed with the greatest interest for months together, and others over periods of from one to ten years ; but in order not to tax the patience of the reader we shall give as brief sketches of the cases as is consistent with giving complete answers to the questions propounded.

Case 1.—Giacomo Rizzato, countryman, aged 46, was admitted into the wards under my charge, where he still remains, on March 4th, 1894. The patient is lightly built, very thin, fair-haired, and anæmic. With the exception of measles he has had no previous illness. In the year 1888 he emigrated to

* Coré and Charlouis state that the Peruvian verrugas may have their seat on the edges of the eyelids, and on the mucous membranes of the nose, mouth, tongue, larynx, stomach, and intestine.

† According to McCall Anderson the Oriental boil commences with a macula ; according to Besnier with a spot or macular papule ; and according to De Brun and Rocard with a nodule or double nodule.

Brazil, and remained there, in good health, for five years. In October, 1893, the patient was engaged in agricultural work at San Carlo di Pigna (Province of St. Paolo). At that time many of the labourers, and especially the whites, fell ill, developing torpid and indolent ulcers, almost always upon the thighs. Three children of the patient also acquired ulcers of this kind; in one instance upon the thighs, and in another on the thighs and backs of the hands; in the third child we had the opportunity of seeing the scars which had formed spontaneously in the course of the disease (after a month or two) on the external malleolus of the left foot, and the dorsum of the left hand. During the succeeding period the patient was occupied with the picking of the berries from the coffee plants, and the gathering in of rice from the plantations. While thus engaged he developed, suddenly and simultaneously, two bullæ on the palm of the right hand, and a third below the nail of the right index finger. Three sores followed the bullæ, and afterwards continued high fever and inflammation of the knee-joint. The latter disappeared after three months, the fever after four days, without any treatment. A few days after the disappearance of the fever there gradually appeared foci of disease on the skin of the thighs, on the mucous membrane of the lips, the hard and soft palate, in the left nostril (on the septum), on the inner surface of the prepuce, on the back of the left hand, and on the toes. The patient's voice was muffled and hoarse; a slight morning cough led to the expectoration of a small quantity of dry but never blood-stained mucus.

In the course of a day or two there developed spontaneously, quietly, and without causing any discomfort, a spot flecked with red, which hardly itched at all, and upon which a bulla, covered with blackish scaly crust, appeared on the fourth or fifth day. There followed infiltration and necrosis of the skin. In the course of some three months a breach of surface developed (beneath a brownish-black scab, to which the necrosed skin was quite superficially adherent), which in the course of three or four months was of the size of a sixpenny-piece, and afterwards gradually attained to three times that size. The ulcer involved all the cutaneous structures; its edges were somewhat swollen and livid, and its floor was round or oval, and yielded a scanty thin secretion. The floor of the ulcer had a reddish-yellow tint,

was firm, and was covered with a network of pale bundles, and in some instances with coarse granulations and vegetations, having the colour of a raspberry or of red sealing wax. In places the ulcers underwent spontaneous healing beneath the crusts in the course of twelve to eighteen months. The ulcers on the lips, septum, and prepuce passed through practically the same course of development, only very narrow spaces separated the individual ulcers. Those on the nose exhibited a conspicuous tendency to the development of pedunculated, compressed, granular vegetations of the size of a bean.

On the hard and soft palates there was not so much an ulceration as a development of nodules and nodes, which appeared more and more closely crowded together, and covered the whole of the soft and the hinder portion of the hard palate. All of them were firmly attached, compact, and gave rise to no pain even in the acts of chewing and swallowing.

Nor did the movements of the tongue cause the patient any discomfort although they were impeded by the presence of an infiltration larger than a sixpence on the surface and root of the tongue, which was ulcerated in places. Even at the time of the patient's admission similar changes were in course of development on the epiglottis, arytenoid cartilages, and on the interarytenoid fold.

The patient is a well-proportioned man, thin, anæmic, of somewhat lymphatic constitution, with feeble muscular development, and fair-haired.

The hairy scalp and face show nothing abnormal; there is an ulcer on the inner border of the left nostril, which is indolent, raised, and exuberant, and yields a very scanty secretion. It is situated upon a very greatly infiltrated base. Upon the upper lip are two similar raised and painless ulcers of reddish colour, which involve the half of the lip. Opposite to these, upon the lower lip, is a broader ulcer, also elevated upon a deeply-extending infiltration, which was at first much more extensive than the ulcer. The ulcer is not surrounded by any halo. The mucous membrane of the hard palate, from the canine teeth backwards, as well as the entire soft palate, is covered with prominences from the size of a pea to that of a cherry-stone, and of the colour of black currants. Those on the soft palate have a somewhat yellowish tinge. The whole

suggests the appearance of mulberries or raspberries. The elevations are collected into groups, and separated from each other by more or less deep furrows, which are filled with mucous detritus.

The above described nodules are, for the most part, smooth and almost completely, or completely, covered with epithelium. In places the secretion is somewhat serous. There is no tendency to reaction, pain, or bleeding even when the swellings are rubbed with the finger.

How firm these are may be inferred from the fact that they are with difficulty penetrated by a probe or toothpick. The uvula is enlarged at the tip, and everywhere covered with nodules; it is raised with difficulty, but is freely movable forwards and backwards. On the upper surface of the tongue, near the root, is a projecting infiltration, of the size of an almond, which is absolutely painless, and is clothed with epithelium. In colour it is somewhat more pink than the healthy parts of the organ. The epiglottis is swollen, of a deep red colour, and studded with punctiform or miliary projections. The arytenoid cartilages are swollen, but smooth and of natural form, and the epithelium of the interarytenoid fold is macerated. The intra-laryngeal mucous membrane, including that of the false vocal cords, which move naturally, is swollen, and its veins have a yellowish colour. The vocal cords move freely. In the act of swallowing a sensation of dryness is experienced, but there is no dysphagia. The sputum is never blood-stained. The voice is harsh and raucous. The hearing on both sides is impaired, but osseous conduction is good. The right tympanic membrane is perforated, and its edges are thickened. On the dorsum of the left hand is a large oval infiltration (57 by 35 mm.), with steep edges, torpid, and showing with no evidences of activity. Half of the infiltrated surface is occupied by an indolent ulcer, of a yellowish-red colour and compact structure, and yielding a scanty thin secretion. The end of the left index finger is swollen and clubbed, owing to a considerable infiltration surrounding the terminal phalanx, and extending towards the ulcerated matrix of the nail. The secretion is serous, reddish, and exceedingly sluggish. There is no pain. The nail itself is normal. There is a similar perionychia of the right index finger, which has a more livid colour. On the dorsum of the

DESCRIPTION OF PLATE VI.

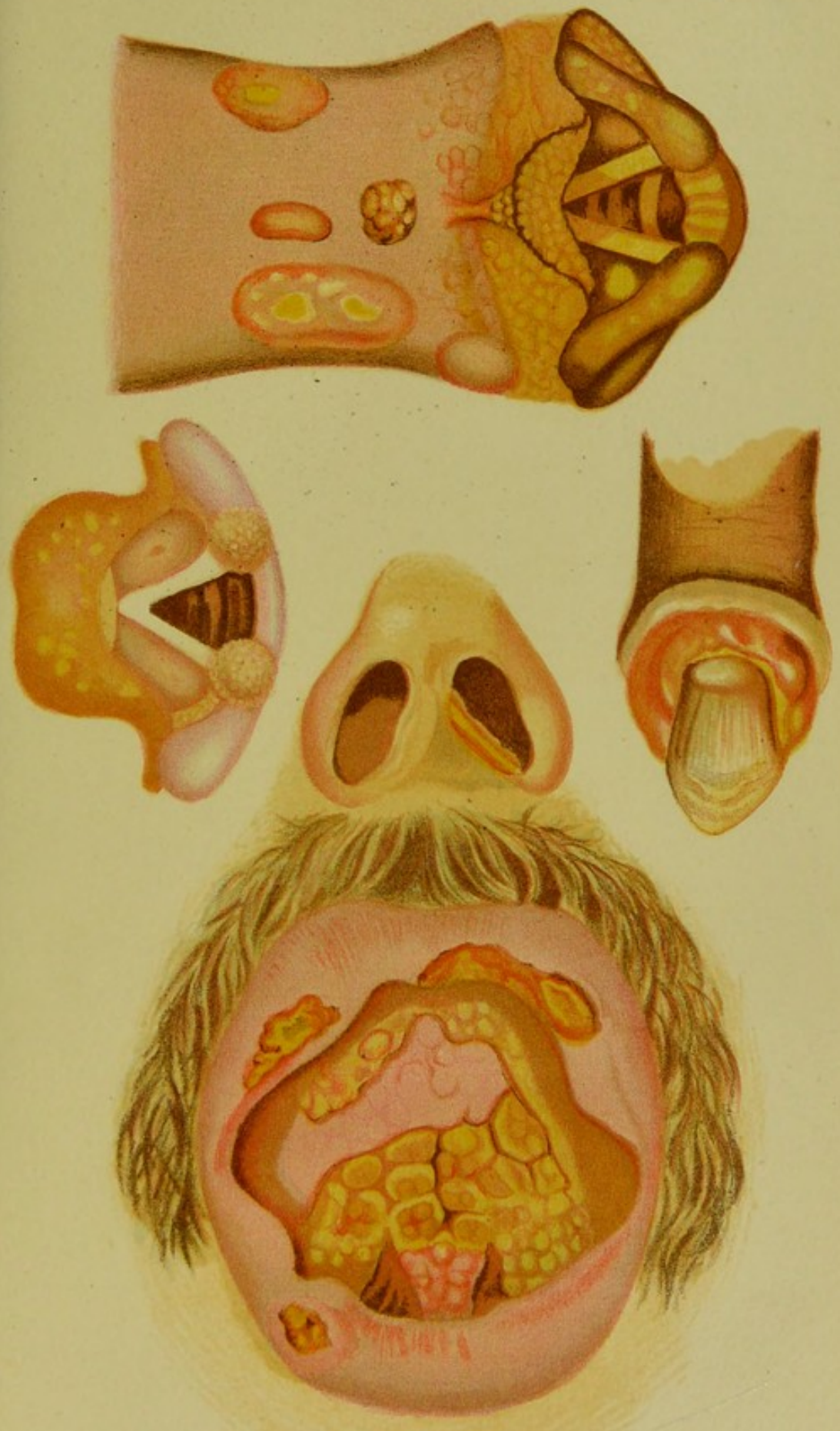
In this plate are reproduced a selection of objects from the illustrations which accompany Professor Breda's Report of cases of "Brazilian Frambœsia." The patients who came under his observation were men who had contracted the disease in Brazil, and who had returned to Europe still suffering from it; they denied having ever had syphilis. The full particulars of the cases are given in the text.

The uppermost figure (from case I.) shows the glottis, epiglottis, and base of tongue with numerous growths and superficial ulcerations. (See page 269.)

The left-hand figure shows symmetrical papillary growths in the mucous membrane over the arytenoid cartilages, and also scattered small ulcers in the epiglottis.

The right-hand figure exhibits infiltration with ulceration around the root of a finger-nail. (See page 270.)

The lowest figure shows the position of various lesions on the prolabia, palate, soft palate, and uvula. (See page 270.)



West, Newman chromo.

Copied from Prof: Breda on Brazilian Framboesia.

first phalanx of the same finger is a rounded ulcer, together with a similar infiltration. In the sacral region are lenticular scars, and three atrophic scars on the left buttock. On the right thigh, in its middle and outer third, is an oval area of infiltration (4 by 2½ cm.) with a livid surface, and another on the front of the lower part of the thigh. This latter infiltration is also oval (4 by 3 cm.) and livid, and is ulcerated in its centre. Similar infiltrations, but with more extensive ulceration, are present on the dorsal aspect of all the phalanges of every toe, with the exception of the fourth on each foot. There is an additional one on the tip of the little toe, and another between the fourth and little toes, and there are three large ones on the plantar aspect of the foot, extending towards the ankle.

On the left foot, in addition to the infiltrations on the phalanges, there is an infiltration between the fourth and fifth toes, and another in the neighbourhood of the metatarso-phalangeal joint of the little toe. Almost all these raw surfaces are covered with brownish-black crusts of necrosed, but firmly adherent, cutis. When this is removed, the irregular floor of the ulcer is seen, covered with pink granulations and vegetations. The edges of the ulcer are steep, swollen, and surrounded by a zone of lividity. The feet also show similar breaches of surface, which are however quite indolent, and infiltrations which show no ulceration. On the frenulum of the penis is an oblong nodule, pink in colour, which has the same appearance and consistence as the nodules on the palate, and is as large as a grain of maize. At the base of the glans are two similar but smaller nodules, symmetrically placed, on either side of the frenulum. The left half of the prepuce is occupied by a compact mass of tissue, as large as a chestnut, situated between the two surfaces, and adherent to the surrounding mucous membrane, having in its centre an orifice, leading into a cavity, from which a drop of yellowish fluid exudes on pressure. Behind the inner fold of the prepuce are three separate small openings, which all lead into a single cavity on the inner surface, the walls of which are of bony hardness.

Four or five inguinal glands, three or four glands in the left axilla, and a similar number of retro-cervical glands on either side appear to be enlarged. There is no pain in the testicles, bones, or joints, either by day or night.

During the patient's stay in our wards sublimate injections administered in the usual way, sublimate applications to the diseased areas of skin, and treatment with iodide, did not produce any modification of the lesions. Other methods of treatment also failed entirely. The destruction of the morbid products, or rather the removal of the infiltrated tissue was always necessary. We were obliged to excise the uvula, the enormous infiltration on the back of the left hand, and those on the lips, as well as the foci on the prepuce and frenulum. In all these localities the parts healed by first intention. The ulcers on the bend of the knee, fingers, and toes were scraped. Neither electrolysis nor the cautery yielded satisfactory results, even when applied to the growths on the palatine arch, which had to be removed completely with the sharp spoon. Under the sharp spoon the consistence of the morbid material seemed firmer than that usually met with in lupus. As to the larynx, inhalations, astringent insufflations, and painting with solutions of nitrate of silver of various strengths, did not prevent an increase of the infiltration, especially on the epiglottis and arytenoid cartilages; and the mischief spread so far that the left true vocal cord ultimately became involved, and a nocturnal dyspnœa resulted, which led us to consider whether the affected region of the larynx should not be treated by scraping. The infiltration of the tongue gradually extended and became ulcerated. On examination of the diseased portions of the tongue and palate, where morbid material had been removed, we found (on March 6th of the present year) the parts healed or materially improved; but, in spite of general treatment and palliative local measures, the condition of the tongue and larynx had got worse, although but slowly, during the past year.

The following is a similar case:—

Case II.—Cesare Bertoldi, of Trient, 36 years of age, a well-nourished but anæmic man, emigrated, in 1876, to Piracicaba (Province of St. Paolo), where he became proprietor of a brick-kiln. He was often obliged to make long journeys on business, and had to pass the nights on his way in bad country inns. In 1879 he suffered (like Rizzato, Case I.) from insect stings upon his feet, which soon healed. In 1891 the patient fell a victim to malaria, which he only got rid of two months before the

onset of the disease now to be described. This commenced in September, 1891, in the feet, and spread consecutively to the lower part of the thigh, the bend of the knee, the backs of both hands, the upper thighs, and the forearms. Then the left nostril became affected, the nasal septum, the lips, tongue, hard and soft palates, larynx, and the gums over the incisor and upper eye teeth. For brevity's sake, it may be stated that a similar slowly extending but indolent morbid process spread to the same parts as in the case of Rizzato, and was attended by similar appearances. In the course of time there developed, under observation, fresh infiltrations on the conjunctiva, and at the outer angle, of the right eye. The edge of the lid became livid, a fissure developed on the commissure, and there developed later, towards the edge of the mucous membrane, firm nodules, which caused him very little discomfort.

In this case we did not have resort to treatment by iodide and mercury. The Brazilian medical men had treated the cutaneous lesions by dusting upon them a powder composed of iodoform, camphor, and calomel. Some of the sores thus treated healed up, but, both in the cases of Rizzato and of this patient, fresh ones developed spontaneously; but in neither case were the scars again attacked. Local palliative treatment did not answer to our expectations, and we were therefore obliged to have resort, in the case of Bertoldi also, to the measures referred to in the account of the first case.

After a stay of four and a half months in our wards the patient was discharged. At that time the lesions on the lips and upper extremities were healed; those on the lower extremities were, for the most part, improved; the palate was smooth, but still somewhat thickened. The upper gums also showed some improvement.

The sores in the bend of the left knee, which the patient was not willing to have treated, were in the same condition as on his admission. The condition of the tongue (which now had an extensive ulcer at its base, which gave very little pain) and larynx had disimproved. There were fresh lesions on the sclerotic of the right eye.

The two patients have the following lesions in common: the atonic ulcers by the nails of the hands and feet; a slight enlargement of the spleen; enlargement of some lymphatic

glands; perforation of one tympanic membrane, and opacity of the other. There was never any fever, and there was never any disease to be made out in other organs than those named. The changes in the skin, mouth, and pharynx never caused any trouble, and nocturnal dyspnœa alone caused the patients distress.*

What will be the end of these lesions of the mucous membranes? Is it possible that, provided that the disease has not assumed alarming dimensions, a spontaneous cure may result? The authors who discuss boubas do not anywhere express a doubt of the possibility of this event, and even the spontaneous cure of lupus is not questioned, when it has not been shown, by an examination of the respiratory organs, that these have been implicated by the disease.

In giving a reply to this question we can make use of the known fact that the cutaneous lesions of boubas are capable of healing spontaneously. As regards the mucous membranes, we will relate the case of a patient who was under treatment in our clinic from July 14th to August 15th, 1886, and afterwards from January 10th to February 17th, 1891, and whom we have since seen from time to time, the last occasion being on March 8th of the present year.

Case III.—Federico Portinari, of Chiampo (Vicenza), peasant, born in 1858, who had always previously enjoyed good health, went, in 1881, to St. Paolo (Brazil). In 1884 he was engaged in railway construction in various parts of the country, and from 1885 he worked for eighteen months in Piracicaba. In 1881 he developed ulcers on the pinna of the right ear, on the upper part of the right thigh, and on the back of the right hand. The ulcers had their origin in round maculo-vesicular spots, which were hard and dry, and after eight months

* We saw the patient again at his home on March 27th, 1895. During the previous three months he had taken, in pill form, about a gramme of mercuric chloride on the prescription of his Brazilian doctor. He had, moreover, tried bathing the parts with cresolin; he had treated the cutaneous ulcers by dusting them with powder composed of iodoform and boracic and salicylic acids. The general condition of the patient, and that of his skin, had improved. The lesions of the mucous membrane of the hard and soft palates, larynx, and conjunctiva of the right eye had got worse. On the sclerotic of the hitherto sound left eye, just at the edge of the mucous membrane, we found a flattened, reddish, smooth and indolent nodule of the size of a hempseed, with no surrounding inflammation.

healed of their own accord. At the same time the patient experienced a slight discomfort in the nose and throat. A Portuguese physician treated the disease as boubas, with mercury and iodide. In 1885 the patient returned home. The treatment with mercury and iodide had proved of no service. On July 25th, 1886, we found scars on the hand and upper part of the thigh, and two atonic, indolent ulcers on the right ear and nasal septum respectively.

The uvula was enlarged to twice its natural size and bent. Its surface was of a grey colour, and resembled that of the soft palate in appearance, as far as the granular and nodular excrescences upon it were concerned, but it was of a paler tint. A scar occupied the inner aspect of the right posterior pillar of the fauces. Two portions of the posterior wall of the pharynx were involved by mottled scars, whilst the remainder was granular, nodulated, and pale.

The uvula, which was excised, was waxy and very hard. The epiglottis was drawn towards the right by a strand of scar tissue, starting from the thickened glosso-epiglottidean ligament of that side. On its lingual aspect it was uniformly swollen, of a pale red tint, and exhibited two or three clearly defined nodules upon its left border. Close to the right border of the epiglottis was a nodule as large as a grain of maize. The arytenoids were less swollen and pale like the rest of the laryngeal mucous membrane, and in places exhibited a reticulated appearance. The vocal cords were of a yellowish tint, and when they were abducted nine tracheal rings could be clearly distinguished. During the interval between July 25th and August 15th the patient had an attack of variola of moderate severity with high fever. Meanwhile the ulcers on the pinna and nose scarred over, the palate became less granular, and it could be seen that the scar upon the soft palate had extended as far as the deeper seated one on the posterior wall of the pharynx, and that this scar again was connected by numerous fibrous rays with a still lower one. In the early months of 1887, Portinari had, according to his own account, a fresh attack in the nose and soft palate. On October 23rd, 1886, we found a perforation of the *membrana tympani*, and three superficial ulcers on the fibrous tissue of the soft palate. The entire epiglottis was slightly granular, was smaller than before, and recalled the appearance of a straw-

berry. The left vocal cord was reduced to a quite insignificant band. On July 15th, 1888, the perforations of the tympanic membrane were closed; there was more ulceration on the surface of the soft palate, which was moderately hard, and did not bleed even when rubbed. The right nostril was ulcerated, the left had healed. The right false vocal cord was swollen to the size of a bean; both true cords had a yellowish-grey colour; the voice was hoarse or falsetto.

On January 9th, 1891, the patient was again admitted to our wards. It was then found that the ulcers on the palate had healed. There was a fresh ulcer on the antitragus of the right ear. The cartilaginous nasal septum was perforated. The vocal cords were abducted normally, and the presence of a round, grey, moderately compact nodule, of the size of a bean, immediately beneath the left true vocal cord, could be detected.

Between January 13th and February 15th we gave thirteen injections of Koch's lymph, beginning with 1½ mg., and increasing the dose to 19 mg. (the total amount injected was 99 mg.). No local reaction was manifested. The temperature during the first days was between 37°·7 to 37°·2 C.

On March 8th of the present year the patient was again seen. No further treatment had been employed. We found scars on the helix, with deformity and loss of substance. The *septum nasi* was covered on either side with compact granulations. On the soft palate there were three convex, prominent areas, of about the size of sixpences, which were separated from each other by a band of connective tissue, which formed a large fibrous nodule above the uvula, and extended along the posterior pillars of the fauces, which were pale and fibrous, to the posterior wall of the pharynx, where the fibres bent under each other in a semicircle. The ary-epiglottidean folds were fibrous and tense. The epiglottis was abnormally thin and deflected and had fibrous nodules upon its anterior border. The false vocal cords were swollen, and ulcerated in places, and hid from view the true vocal cords and the nodule in the trachea. There were symptoms of slight stenosis of the larynx. The patient had gained strength.

The circumstances under which the disease originated in this case, the situation of the lesions, and the appearance and course of the affection, compelled us to class it with those

previously described. As regards prognosis this last case shows that just as spontaneous cicatrization may occur in the cutaneous lesions, so cicatrization may take place on the mucous membranes, although the consequences of the process are different.

It may here be mentioned that in this case, as in Rizzato's, we injected on January 4th, 1895, 1 cm. of Koch's lymph which had been sent to us by Behring of Berlin four days previously. On January 4th we injected a similar dose of this same lymph into a patient with tubercular lupus of the face. In this patient an exceedingly severe general and local reaction resulted, whereas no reaction of any kind was observed in Rizzato's case.

We also made injections of the blood and fragments of the tissues into the anterior chambers and peritoneal cavities of dogs and rabbits, and we further endeavoured to obtain cultures on agar, gelatine, and blood serum, from the blood and serum from the ulcers. Inoculation and the formation of subcultures were attempted at different times, and require to be persevered with further.

Meanwhile we will describe the results of the histo-bacteriological examination of the morbid tissues. Sections were obtained from the skin of the back of the hand and great toe, and from the mucous membrane of the lips and soft palate (at its junction with the hard palate). We had also at our disposal the entire uvulæ of Rizzato and Portinari. The pieces, hardened in alcohol, were embedded in celloidin, cut with a Young-Reichert microtome, and stained for histological examination by the methods most recently recommended for the various structures and tissues. With a view to the detection of micro-organisms, we employed gentian violet, and decolorization with alcohol, or anilin, xylol-anilin, or xylol, &c., with negative results. We were equally unsuccessful with the methods of Weigert, Ehrlich, and Kühne. Again, whenever nitric acid was employed as a decolorizing agent, as was the case in many instances, we met with disappointment. However, the following process succeeded admirably. The method is as follows: the section is left for twenty-four hours in alum-carmine, then soaked for twenty or thirty minutes in water, and is ultimately stained by the method recommended by Weigert

for fibrin. Nicolle's method, viz., staining with Kühne's methylene blue, and fixation with tannin, also proved satisfactory. It has the disadvantage that it only imparts different shades of one single colour. The methods of Ziehl-Nielsen with carbol-fuchsin, and of Lubinoff with boro-fuchsin, also serve for the selective staining of the specific bacilli.

With a low power (Reichert No. 1 eyepiece, No. 5 objective) there was seen in cross-sections of either uvula a thick infiltration from the summit to the base of the papillæ, and an infiltration in the neighbourhood of the isolated capillaries running beneath the acini of the glands, or under the muscle fibres. The fibres were widely separated and convoluted in the neighbourhood of the infiltration. In the palatine mucous membrane the infiltration did not extend beyond the glandular layer. By the sides of the labial ulcers the infiltration is thicker, lying beneath a few separated meshes of corionic connective tissue. In the skin, especially at the level of the ducts of the sweat glands, and their meatus was a hyperkeratosis extending to as much as half the thickness of the derma; the stratum granulosum had undergone fatty change in places; the network was thinned, and the infiltration of the papillæ was thicker than in the mucous membranes, reaching down as far as the subcutaneous vessels, and replacing the fat cells in places.

With higher powers (Reichert eyepiece No. 4, objective 9) the epithelium on the mucous surfaces is seen to be thickened; no mitosis of the deep cells is seen, and the cilia are normal; no leucocytes are met with in the interstices of the plasma-cilia. In the skin the appearances are similar, but the epidermis sends down processes to a great depth, so that the papillæ appear elongated. In the sections of mucous membrane the collogen tissue appears to be increased, whilst the elastic fibres are, so to speak, normal. In all the sections there are seen along the lymphatics a considerable number of cells enlarged to six or eight times their ordinary size, which are, in some cases, in immediate contact with the vessels and glands, in others scattered about apart from them. These are arranged in rows, or in groups of three or four, and exhibit similar nuclei to those of the smaller cells. A considerable number possess an abundant, homogeneous, or granular protoplasm, whilst others are chiefly conspicuous on account of their red-stained nuclei.

These are the "Plasma-cells" of Unna, which are only seen in like numbers in lupus vulgaris. In many ruptured cells a number of granules are seen extruded from a point in the displaced membrane, which partially or entirely surround the cells, and are liable to be mistaken for micrococci. A similar mistake may be made as regards certain endocellular globules, which are products of degeneration, and in sections occasionally appear to lie outside the cell membrane. In addition to these altered cells there are others of less importance, which are in a condition of complete hyaline degeneration, analogous to those met with in rhinoscleroma. The absence of caseous material and of giant cells is important, as also is the almost complete absence of mitosis, and on the other hand the considerable hyperplasia of the connective tissue. In many sections this forms, in places, separate meshes filled with infiltration.

Only with higher magnifying powers (Reichert eyepiece 4, homogeneous immersion $\frac{1}{18}$) a few groups of cocci are seen, which are confined to the surface of the ulcerated mucous membranes, and are not connected with any suppurative tendency of the disease.

We were the first who had the good fortune to observe numerous very distinct bacilli. We first found them about five months ago in certain parts of the reticulum. With higher magnification (Reichert eyepieces 1–4, homogeneous immersion $\frac{1}{18}$) there was an appearance of crevices therein, which appeared transparent, as the result of certain changes (dropsy, vacuole-formation, &c.) in degenerating prickle cells. Afterwards bacilli were detected in association with similar cellular changes beneath the capillary layer, and soon afterwards beneath the peripheral capillary layer. Moreover, we found similar bacilli in the direction of the papillary axis, beneath the middle and deep layers of the corium of the hand and foot, and in the stroma of the uvula and soft palate, in the neighbourhood of the muscular elements and deeper glands.

In a section of half a square centimetre in area twelve bacilli could be seen, and in a single field of view (with Reichert eyepiece 1, homogeneous immersion $\frac{1}{18}$) some were seen lying within a capillary vessel, and others in proximity to it. These bacilli are smooth, and appear as if flattened throughout their

whole length; almost all are straight, only a few being slightly bent, and all show the same deep staining, even in quite thin preparations, in which the bacilli alone appear blue, whereas all the rest of the tissue is of a bright carmine tint. Neither bacilli nor their spores were ever met with in the substance of the cells.

The staining was always uniform in all parts of the individual bacillus, and of about equal intensity in all the bacilli.

On measurement the bacilli were found to have a breadth of 0·08 μ, and a length of 0·3–0·45 μ.

From what disease then were our three patients suffering? Was it some ordinary affection or an entirely new form?

Even at the first examination of Portinari (in 1886) we regarded the presence of syphilis and of leprosy as excluded, and found no sufficient grounds for the diagnosis of lupus or any other form of tuberculosis.

In the cases of Rizzato and Bertoldi we diagnosed frambœsia, basing our diagnosis on the general characters of the lesions of the mucous membranes. *Both patients informed me on a later occasion that the Brazilian medical men had treated their disease as bouba.* That of Portinari too was regarded as bouba, as he told us in 1886, and on March 5th, 1895, he voluntarily repeated the same statement. These same medical men had submitted Portinari and Rizzato to a course of anti-syphilitic remedies, but Bertoldi had been merely recommended by his Brazilian doctors to treat the cutaneous lesions with a dusting powder. Were these physicians justified then in omitting all general treatment in the case of Bertoldi? In other words, is the Brazilian frambœsia a form of syphilis or of tuberculosis, or what is it?

It is certain that in all three patients the lesions of the skin and mucous membranes were, considering all their characters and the factors which constituted the course of the disease, examples of one and the same affection. Portinari and Rizzato had derived no benefit from repeated course of anti-syphilitic remedies. They assured us, as also did Bertoldi, that they had never had syphilis, and the primary manifestations of syphilis and their traces, as well as the subjective symptoms, were certainly wanting in all three cases. None of them exhibited those affections of internal organs or tertiary manifestations, which

are so frequent and obstinate in the tropics. None of the lesions present, all of which, from the merest hyperæmia to the most extensive ulcerations, were most thoroughly investigated by us, showed any indications of syphilis. Even if by any chance this disease had been modified by the peculiar circumstances in Brazil, how came it that the type of the affection underwent no change at all on the return of the patient to Italy, and even after a sojourn there of four years (as in Portinari's case), and did not present those appearances which syphilis exhibits among us.*

How can the Brazilian physicians assert that bouba is nothing else than syphilis, and then add that it undergoes spontaneous cure; that the disease does not run a tedious course; that it does not extend to the orifices clothed with mucous membrane; that it is especially apt to affect natives, &c.? Moreover, if one considers the fact that in the cases of Bertoldi and Rizzato, the same regions of the body showed identical manifestations, and that these were almost the same situations as were attacked by the disease in the case of Portinari, it is difficult to reject the conclusion that in these three cases the disease is one *sui generis*, as the above histories show.

Nevertheless, let us consider whether one may not look upon it as a true tuberculosis. The manner in which the skin is invaded, the slowness of its progress, the character of the cutaneous changes, the spontaneous healing, and the relative benignity of the disease in so large a number of foci, is opposed to such a view.

We are acquainted with nodular indurations on the mucous membranes, which present a certain degree of resemblance to those seen in our patients; but in our disease no local or general reaction or lung affection was ever to be observed although the lesions persisted for months or years together. The fact that under the influence of injections of Koch's lymph no trace of a local reaction was to be observed, whereas such was obtained in a case of lupus of quite old standing, is also against the tubercular view; and also opposed to such a view is the complete absence of giant cells and caseous products.

* We have seen and treated cases of syphilis acquired in our African colonies, and in Tunis and Senegal. All were of exceedingly severe character, and yet it would be hard to say how far the syphilis of those parts shows any difference of form from that seen in our own country.

Again, the cutaneous changes did not suggest lupus in the least. Other arguments which may be brought forward bearing upon both tubercle and lupus are the following:—viz., the slightness of the tendency to the formation of ulcers; the considerable fibrous tissue proliferation; and the appearance and consistence of the lesions of the mucous membranes.

Again, in our cases we had not to do with any form of granuloma, but with a quite peculiar specific disease, which, as we have seen, attacked the most various parts of the skin of the extremities, and of the head, and the mucous membranes of the eyes, nose, lips, and tongue, of the hard and soft palates, of the posterior wall of the pharynx, of the larynx and air-passages (Portinari). The disease gives rise to infiltrations and painless ulcers, in which, as in lupus, plasma-cells are present; and a tendency to considerable fibrous tissue increase (which becomes thinned out as the result of karyokinesis); and, lastly, giant cells and caseous degeneration are wanting.

It is a disease which, both on the skin and mucous membranes, may spontaneously take a favourable turn.

Micrococci are only seen on the surface of the lesions. Special bacilli are found in the epidermis, in the epithelium, corion, and submucosa, and often in the capillaries. In the neighbourhood of these bacilli there are found in various localities many cells in a condition of degeneration. If one regards the disease as contagious, are these bacilli to be looked upon as the carriers of the infection? Are they the cause of its contagiousness?

As the result of our observations we must confine ourselves to the following conclusions:—

1. Many endemic diseases, which have a range from the Tigris to Marocco, are designated by the name of "Oriental boil." Other endemic skin diseases, which are prevalent in Africa and in America, are covered by the generic name of "framboesia."

2. Among the varieties of framboesia, boubas do not limit their effects to the skin and the orifices clothed with mucous membrane, but involve also other parts of the lips, palate, and dorsum of the tongue, the hard and soft palates, the pharynx (and probably the Eustachian tubes and middle ear), as well as the larynx and trachea.

3. "Boubas" have nothing to do either with syphilis, or with

the various forms of tuberculosis, nor have they anything in common with the infectious granulomata, but constitute a special, independent disease.

4. Boubas are probably caused and kept up by a specific bacillus, which we discovered four months ago, and since then have found in very many sections both of skin and mucous membrane, being distributed throughout the thickness of these tissues, on the ulcerated surfaces and in the lumen of the blood-vessels. To this micro-organism we may assign the name of "frambœsia-bacillus" or "boubas-bacillus."

ON POLYPAPILLOMA TROPICUM

(FRAMBŒSIA).

BY

DR. M. CHARLOUIS,

Surgeon in the Royal Dutch Army, Samarang, Java.

TRANSLATED

BY

ARCHIBALD E. GARROD, M.A., M.D., F.R.C.P.

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ON POLYPAPILLOMA TROPICUM (FRAMBŒSIA).

By Dr. M. Charlouis.

In the year 1880 Hirsch, in his "Handbuch der historisch-geographischen Pathologie" wrote of frambœsia as follows:—"In spite of the special attention which has been devoted to this disease in almost all reports coming from those regions, and in spite of all the information about it which is available, many points relating to the pathology of frambœsia still remain obscure."

Even now, after an interval of twenty years, this statement holds good, although much has been written on the subject of late. This need cause no surprize, seeing that the disease does not occur in Europe, and the observations of the majority of medical men practising in the tropical countries may be described as very superficial. Probably the exigencies of active practice have left them without inclination for the requisite study, or they have been prevented by lack of the necessary material from carrying out adequate researches.

One point which especially strikes us is, that the descriptions of physicians in the various tropical regions differ widely even on essential points, and hence one must conclude either that the statements in their reports are very superficial, or that the course of the disease is not everywhere alike. On account of the large number of cases which come under my observation in the military hospitals of the Indies, I have felt impelled to undertake a careful study of frambœsia, and the results of my observations are embodied in the present paper.

The first description of cases presenting a condition somewhat resembling frambœsia dates from the time of Hali Abbas, who mentions, under the name of "safat," a disease occurring in Ethiopia and in India, which was characterized by large ulcerated boils, and resembled small-pox; which in its later stages caused severe pain in the bones; which gave rise to

malignant ulcers on the soles of the feet and tips of the fingers, and was, moreover, highly contagious. Avicenna gives an almost identical description.

Of course we cannot conclude with certainty that the disease referred to was frambœsia, but its localization, the characters and obstinate nature of the ulcers, taken in conjunction with its contagiousness, lead me to think that "safat" was the same disease as frambœsia. However, most definite statements as to the existence of this disease date from the 18th century, such as those of Piso in Brazil, and those of Bontius from the East Indian Archipelago. About the same time the traveller Labat gave an account of frambœsia in the West Indies. Sauvages was, however, the first to introduce (in the year 1768) the name of frambœsia into dermatological terminology. By this name he designated a single disease, occurring alike in Guinea and in some of the Antilles, and which appeared in the form of raspberry-like ulcers, which were very contagious, and affected all parts of the skin, involving that of the genitalia and axillæ with special frequency.

In the work of Willan and Bateman also we meet with an account of frambœsia, based upon the description of Schilling and Winterbottom. The majority of authors and especially Plenck have been in complete agreement with the views of Sauvages.

Alibert was the first to originate completely different notions about the malady, identifying it with syphilis. However, Alibert's description was less satisfactory than that of his predecessors, seeing that his classification is liable to lead to erroneous conclusions. He called all spongy ulcers which occur on the face, head, and genitalia, and secrete a yellowish offensive fluid, by the name of mycosis, and classified the forms of mycosis as follows:—

1. Mycosis frambœsioides (pian, frambœsia, acneform fungus of Bazin); ulcers affecting the head, lips, face, axillæ and tongue.
2. Mycosis fungoides (vérole d'Amboyne, pian fongoide); papillary growths, from the size of a pin's head to that of a nut.
3. Mycosis syphiloides; spongy excrescences, occurring first upon the face and neck.

It is at once evident from this classification that Alibert grouped different diseases under the common name of frambœsia. The cases which he described have been shown to be examples of molluscum, and a case described by Bartos was nothing else than syphilis.

Hirsch asserted that all German, French, and English dermatologists had adopted Alibert's description of this disease, with the result that since his time frambœsia as a disease *sui generis* had been excluded from the domain of pathology by the majority of European specialists. Yet Bazin, who differed entirely from Alibert, was the first to describe frambœsia as a distinct disease. He associated this malady with the mycosis fungoides of Alibert, and gave the morbid history of a man named Herbette, whose case was certainly very like one of frambœsia. Virchow, Köbner, Berliner and others have more recently assigned the name of frambœsia to all papillary growths.

Hebra, again, called all spongy excrescences frambœsia, and included not only lupus exulcerans and hypertrophicus serpiginosus, but also syphilis serpiginosa, sycosis barbæ, sycosis frambœsiformis scrophulosorum and the caro luxurians of chronic ulcers.

Moritz Kohn (Kaposi) recorded in these archives (1869) 282 cases of frambœsia, including four examples of dermatitis papillomatosa capillitii ("frambœsia non-syphilitica capillitii"); a case of syphilis cutanea papillomaformis vegetans (frambœsia syphilitica); a case of lupus hypertrophicus papillaris vegetans; a case of ichthyosis histrix, and one of condylomata acuminata. He further states (p. 422): "In the above account we have included, for purposes of comparison, accounts of several forms of papillomatous affections of the skin, as well as the description of a peculiar form of disease of the neck and hairy scalp, which has not elsewhere received the attention which it deserves."

In the "Berliner med. Wochensch." for 1867 Kolaczek gave a description of a form of papillomatous excrescence, which exactly resembles the description of Sauvages, and the only difference is found in the fact that Kolaczek regarded his case as one of syphilis. Amicis of Naples recorded, in 1876, a case of frambœsia syphilitica.

It follows then from what has gone before, that the majority of European dermatologists, including Alibert, have written little

or nothing about true yaws or frambœsia, and have employed this latter name rather as a collective designation for diseases of various kinds, and with various clinical features and courses, in which papillo-fungous excrescences are developed. They have regarded even the yaws, described by medical men resident in the tropics, as a modified form of syphilis, occurring in Africans only; and have compared it to other forms of endemic syphilis, such as the "radesyge" of Sweden and Norway, the "syphiloid" of Jutland, the "morbus dithmarsicus" of Holstein, the "sibbens" of Scotland, the "skerljevo" and "falcadina" of Italy, "frenga" and the "mal de la Baie de St. Paul," &c.

Indeed, the writings of medical men in tropical regions form the only sources of information as to frambœsia as a disease *sui generis*. Winterbottom, Boyle, Duncan, and Bryson, first met with this disease in Central Africa. Afterwards Baudouin, of Duyon, described its occurrence in Algeria, but, according to Pruner, frambœsia has appeared much less frequently in Eastern Africa than in other regions. He only met with isolated cases in Egypt, and on the coasts of Arabia and Abyssinia.

Bontius, Heymann, and Waitz report that frambœsia is often prevalent in the East Indies, but according to the two last-mentioned authors it is not so generally prevalent there as on the African continent. Labat speaks of the occurrence of yaws in Martinique and Guadeloupe, and the existence of this disease in Guiana has been demonstrated by Schilling, Dumontier, Nielen, Allemand, Bajau, and many others.

Dr. Gavin Milroy, who recently made a voyage to the West Indies, by the direction of the English Government, has published the observations of local physicians as well as his own on frambœsia. His report contains a fairly good description of yaws, with reference to its topographical distribution.

In 1876 there appeared a work "On certain endemic skin, and other, diseases of India, and hot climates generally," by Tilbury Fox and J. Farquhar. In this work frambœsia is described by Drs. Imray and Bowerbank, the latter of whom states (p. 6): "The disease, called also mycosis (fungus) and pian, is, according to all accounts, almost entirely confined to the African race, and was brought to the West Indies by the blacks, who were imported thither as slaves some years ago."

Tilbury Fox adds: "Frambœsia is confined more particularly

to the African race, and is unknown at present in India and China."

That the origin assigned to the disease both by these two authors and by others is incorrect, follows from the fact that Bontius described it, as long ago as the year 1713, as Ambonesian small-pox, at a time when, as yet, no Africans had arrived in the Indian Archipelago. There are, indeed, localities in the more south-westerly islands in which frambœsia prevails, although no Africans have ever been there. It is, moreover, a very striking fact that here in the East Indies frambœsia does not prevail either among the Africans or among their children of mixed Javan and African blood. At any rate, I have never seen a single case, and my elder colleagues who have long resided in the Indies confirm my opinion. On the other hand I have certainly seen this disease in Africans in the West Indies. For my part, therefore, I hold the view that frambœsia is a malady which occurs in all tropical countries.

We pass over the special names which have been given to the various types of frambœsia previously described. Different names have also been assigned to the disease according to the locality in which it occurs, but these point, one and all, to the constant resemblance of the frambœsia tubercle to a raspberry. Schilling says that in America it is called "yaws," which name is probably of African origin. In South America it appears to have acquired the name of "pian" or "epian." The West Indian Negroes call it "patta." In the Indies it is called by the Javan name of "patlek," which is equivalent to "native itch." The Malays call it "nambie" or "kada." In order to put an end, once and for all, to the confusion which prevails in this matter, it would, I think, be best to define the disease as "polypapilloma tropicum," especially as the term frambœsia has been regarded by European dermatologists rather as a collective name for a variety of lesions. Moreover, the name polypapilloma tropicum serves to indicate not only the characters of the disease but also the regions in which it occurs.

Course of the Disease.

Frambœsia attacks Javans and Malays and indeed all the inhabitants of the East Indian Archipelago, but the Europeans and Negroes living there are the least liable to the disease.

In the West Indies, on the other hand, the Africans are especially liable to be attacked. Dr. Bowerbank states, after thirty-five years of practice in the West Indies, "The white population appears to be exempt from the disease." On the other hand I have seen children of pure European blood afflicted with frambœsia, and I have treated two children of European parents, born in the East Indies, for this complaint.

My colleagues here in the East Indies are in full agreement with me in holding as Ludford, Thomson, Kursemüller, Birmstead, Hunter, Ferrier, Hillary, and many others have previously maintained, that frambœsia attacks not only Negroes, but also natives and Europeans living in the tropics.

The disease may commence at any age, but is most frequently met with in children after the first year of life, and I have not been struck by any special liability of either sex to frambœsia. Moreover the majority of the patients appear healthy, well nourished and well developed, so that it cannot be supposed that weakly persons have any special liability to this disease. Since, on the other hand, the natives may be compared with the poorer middle classes in Europe, and it is they who are most attacked by frambœsia, we may almost assume that this disease flourishes chiefly among persons living under poor circumstances. I am certainly of opinion that the natives have a special disposition to yaws.

As to heredity, the results of my investigations cannot be regarded as satisfactory, for the natives give very little information on matters of family history; and seeing that the majority of the natives either have or have had frambœsia, the difficulty of following out an hereditary tendency is increased twofold. Dr. Imray says: "It is doubtful if it be hereditary." A few authors state that frambœsia only attacks an individual once, whereas Bowerbank speaks, on the contrary, of "persons having two or even more attacks, so that the idea that one attack guards the attacked from others is not apparently true." I can safely confirm the statement that frambœsia may attack the same individual more than once, a fact which can be proved not only by observation but also by inoculations.

As regards the disease itself, it usually commences with fever, which develops about a week before the appearance of the exanthem, with rigors at the onset. In the morning the

temperature sinks to the normal, rising towards evening to about 39° to 40°. The duration of the fever rarely exceeds a fortnight. Willan and Bateman make only a cursory mention of this fever as the fever of eruption. The fever is attended by pains in the joints which are severe enough to preclude movement; there is no swelling, but the slightest pressure upon the joint causes pain. As already stated, the pains are confined to the joints and usually last about three weeks; they are quickly relieved by suitable treatment.

Rodschied and Brunce state that frambœsia may be preceded by a prodromal stage lasting for weeks, during which there is loss of appetite, an unpleasant taste in the mouth and, according to Ferrier, vomiting. In all cases under my care I have found that such symptoms only occurred during the period of fever with attendant gastric disturbance.

The skin affection develops gradually; there first appear, here and there upon the body, papules of the size of pins' heads, with yellow points at their summits. Later on the papules acquire dark areolæ, which, in patients with white skins, are red in colour. These papules appear all over the body; and even on the hairy scalp, and, however small they may be, the patient's attention is at once called to them by the great pain to which they give rise. According to some authors the patient presents, as the earliest eruption of frambœsia, red spots upon which the papules afterwards develop. I have not observed such spots, and, in my experience, the formation of an areola has only occurred when the papule had attained the size of a pin's head.

With the appearance of the frambœsia the patients also complain of pains in the glands, and on examination it is obvious that the lymphatic glands are for the most part swollen, and are painful on the least movement. The glandular pain gradually passes off, but the glands remain hard and swollen for a considerable period after the disease has begun to abate.

If, however, the patient remains affected by frambœsia for a long period, the glands undergo softening in their centres, but this softening is never sufficient to destroy the entire gland, for the minute quantity of pus formed is reabsorbed after a time, and the connective tissue surrounding the gland always remains unaffected. Meanwhile the frambœsia papules

undergo a gradual increase in size, and especially in breadth. The surface is covered with a honey-coloured crust, which usually shows specks of red. The enlarged papules develop into oval tubercles, and eventually assume the form of the head of a champagne cork, *i.e.*, are broader above than at the bases by which they are connected with the skin.

These tubercles may be very hard to the touch, and move with the skin; they may reach a diameter of 3 cm., and a very large tubercle may be readily formed by the fusion of a number of smaller ones.

About the anus, mouth and penis, and on the fingers and toes, the tubercles may coalesce in such a way as to form a raised circular wall. As each tubercle grows the areola surrounding it becomes broader and darker. If the crust of the tubercle be removed the papillary character of the surface, which is covered by a small quantity of whitish sticky fluid, becomes very obvious. The appearance resembles that of a raspberry. When the tubercle has reached its fullest development, and the stage of recession is entered upon, it begins to shrink and becomes darker in colour; the crust is detached, and the surface becomes dry. *Squamæ purpuraceæ* appear on the surface, and are somewhat firmly attached to the tubercle. The scales are white in colour. The tubercle itself becomes darker and darker, whilst the surrounding areola fades. Finally, after the lapse of weeks or even months, the tubercles so far undergo involution that there remains nothing visible but a dark spot with sharply defined furrows and enlarged orifices of hair-follicles and sebaceous and sweat glands. Later still, within a year at most, these spots also disappear, and the part on which the framboesia tubercle was situated can no longer be distinguished, the skin having returned to its normal condition both of form and function.

One peculiarity which must be referred to is that in some cases as the tubercle spreads it heals in the centre, leaving only a darkening of the colour, whilst it extends outwards in the form of a perfect ring, which ring is covered with small honey-coloured crusts, and closely resembles a *scutulum*.

To come now to the crusts; on raising these it is noticed that they are only attached at their periphery, and that between them and the tubercle is a whitish sticky fluid. If the crust be removed during the stage of development a fresh one is formed.

If, on the other hand, the crust be allowed to remain from the first appearance of the tubercle up to the time of its absorption, it will be larger, because its development takes place from the periphery, and it eventually assumes the form of a rupial crust of conical shape; but even then it is not unfrequently depressed in the centre. The crusts have a honey colour and often during the initial period exhibit red spots, which are nothing more than specks of dry blood included in the crust and derived from the papillæ which, at this stage, bleed on the slightest provocation. At a later period the papillæ of the tubercle acquire a connective tissue covering, and offer successful resistance to external influences.

Frambœsia may affect an individual for a long time, and ultimately undergo spontaneous involution. Its course is greatly curtailed by appropriate treatment, and should not exceed a few months. One may speak of the course of frambœsia as extending over years, in the sense that whilst one tubercle heals fresh ones are developed in other situations. Although such occurrences are exceptional it is usually noticed that the various lesions do not progress equally. All parts of the body are liable to the disease, including the hairy scalp, the face, the nose, mouth and back, the skin around the anus, the *glans penis*, the skin of extremities and joints, of the palms and soles, and that between the toes and fingers.

In connection with the tubercles on the hairy scalp we must allude to the relation between the hair and the tubercles. Throughout the process the hair is firmly fixed upon the tubercle, much more firmly as a rule than in the healthy skin. On traction the hairs come away completely, and their entire root-sheaths are brought away with them. The following observations serve to prove that the hair remains normal throughout the whole process :—

1. The hairs are not shed where the tubercle is developed.

2. The hair is more firmly fixed in the tubercle than in the healthy skin, and when the lesion follows an excentric serpiginous course, we find in the pigmented area the same healthy hairs as were present at the commencement of the process.

Tubercles developed where the hairy scalp joins the face show no deviation from the normal type. The lesions may

affect any part of the face with the exception of the conjunctiva, on which they have not hitherto been observed. They are frequently met with on the eyebrows. They may occur on the mucous membrane of the nose, but when so situated are usually dry on the surface, and form no crusts. In cases of the serpiginous type they may spread outwards in the form of an arch, but without leaving any scars. If, however, there be nasal catarrh the tubercles present in the nose become greatly irritated by the alkaline secretion, and excoriation and offensive nasal discharge may result. Tubercles also occur on the mucous membrane of the lips where it joins the skin. Those within the mouth are clothed with a soft white covering, and the buccal orifice may be entirely surrounded by tubercles, which form a sort of enclosing wall. I have never seen fissures of the lips produced by the tubercles. I have occasionally seen tubercles in the external auditory meatus, but these were dry upon the surface and had no crusts.

Whether situated upon skin or mucous membrane, and in whatever part of the body they are developed, the tubercles always present the papillo-fungous form. They may be so distributed around the neck as to form a kind of necklace. When they occur in the axillæ the crusts which are at first formed become softened by the profuse sweating in that situation, and the softened crusts are rubbed off by the friction of the clothes. In the same way the formation of fresh crusts is interfered with. Osmidrosis would naturally result were it not that the surfaces are separated by the clothes and that the sweat is absorbed by the linen.

Around the anus the tubercles may be grouped in the form of a ring, but they never cause any pain in defæcation because they do not occur on the mucous membrane of the rectum. Moreover, the tubercles in this situation never exhibit crusts, on account of the friction of the parts on the one hand, and on the other hand on account of the practice, universal in the Indies, of washing the anus after defæcation. Here, too, the tubercles are elevated above the surface of the skin, although they are continually exposed to the pressure of the buttocks against each other or against seats.

The frambœsia tubercles may occur anywhere upon the penis except within the urethra, and those on the glans behave like those

on the mucous membranes. On the other hand I have never met with tubercles in the vagina or on the vulva.

Frambœsia between the toes is attended with softening of the surface of the tubercles and fœtid sweating. Tubercles are met with under the heels, but here, on account of the weight of the body and the tension of the epidermis itself, are impeded in their growth, and extend to some extent beneath the outer skin, so that the epidermis must be removed in order to see the entire tubercle. Nevertheless, in spite of the pressure, the fungous form of the tubercle can still be recognized.

Before proceeding further I must once more allude to the resistance of the tubercles in the stages of maturity and of recession. We have already alluded to the red specks in the yellow crusts which are observed in the initial stages. These red specks are produced by the slightest irritation of the papillæ, which injures them and causes small hæmorrhages. When on the other hand the tubercles have existed for some time connective tissue is formed in the cutaneous papillæ, which renders them more resistant, and this is why no red spots are seen in crusts formed at that stage. The rarity or non-occurrence of ulceration of tubercles in the nose, into the cavity of which the finger may so readily be introduced, must also be ascribed to the same resistant power. Again, the tubercles in the axillæ and about the anus suffer no loss of surface in spite of the pressure and friction to which they are exposed. The same is true of those on the soles of the feet, and this is surprizing considering the weight of the body which is thrown upon these parts, and the pressure of the epidermis.

The course of frambœsia above described may undergo modification owing to external influences. If the tubercle be in contact with some hard object it may break down, and this process usually commences in the centre and frequently extends to a great depth, spreading at the same time in a superficial manner to the neighbouring parts. The edges and floor of the ulcer acquire a fatty appearance and secrete a very foul, purulent and often blood-stained secretion. Such ulcers are met with on the soles of the feet, where the tubercles not only come in contact with hard substances, but are apt to be continually irritated by accumulated dirt. They extend very deeply and, as Rendu has pointed out, may even reach the

bones, giving rise to caries, which is most often seen in the os calcis.

Since in the initial stage the patients themselves are careful to protect the tubercle from contact with external objects on account of the continuous severe pain, ulcers are hardly ever present at this period. Only in the later stages are the tubercles painless, and it is then that the ulcers referred to are formed under the influence of severe external irritation. I say severe irritation because the tubercles are at that period very resistant on account of connective tissue formation, and only break down under considerable provocation.

Throughout the long course of the disease the patients feel quite well, and, therefore, very seldom place themselves under medical treatment on their own initiative. Neither I nor my colleagues have had the experience of the death of a patient from frambœsia. It does indeed happen, but extremely rarely, that in very weakly children general exhaustion ensues as a result of deep and extensive ulceration. But I do not agree with Paulet, Levacher, and Thompson, who state that in cases in which relapses occur, the course of the eruption may be such that the patients waste away and succumb, in consequence of the profuse secretion from the tubercles which undergo colliquative changes.

If fatal cases have occurred, this event is not to be ascribed to the frambœsia but to some other intercurrent disease. The natives fully appreciate this, and have not the slightest dread of frambœsia.

In the West Indies a variety of other names are given to the so-called frambœsia or yaws which have in my opinion no significance. Bowerbank speaks of "watery yaws," in which the tubercles developed by cachectic individuals are œdematous; of "ringworm-yaws" in which the efflorescences unite into a ring; "guinea-corn yaws," in which the tubercles are small and round like grains of maize. Other names employed are "master" or "daddy" or "fadee"; "mammy" or "mother" or "modee," and also "grandy" yaws. If the yaws occur on the feet they are called "tubbae." The name of "fadee" is given to the fungous growths formed in the course of the eruption, and the names "mammy" and "grandy" are assigned to the fungous tumours developed at the seat of inoculation, and preceding the general

eruption. Thompson, Paulet, Boyle and others, refuse altogether to admit the existence of "mammy yaws." European dermatologists call the tubercle which exceeds all the others in size "mamma." In Jamaica there is recognized still another variety, "membra yaws," a name applied to certain fungous tubercles which are occasionally developed by persons who have previously suffered from frambœsia and which are, in all probability, merely relapses. None of these designations have any scientific importance, but are simply of popular origin.

The prognosis of yaws is very favourable, both as regards the restoration of the diseased areas and the constitutional condition.

Frambœsia, if untreated, sometimes lasts for a very long time, finally subsiding without leaving any permanent damage; but if from any cause the tubercles become ulcerated, scars indicate the situations which were occupied by the ulcers.

The aetiology of the disease is unknown. Although syphilis is usually assigned as its cause, it will be shown in the following pages that this view has no foundation in fact.

Morbid Anatomy.

The specimens which I have prepared were all hardened in potassium chromate and absolute alcohol, and most of the sections were stained with picric acid, a few with carmine. A vertical section through a papule as large as a pin's head with a yellow spot at its summit showed that this little yellow point, which is very easily removed, consists of nothing else than the *stratum corneum* of the epidermis, increased to thrice its normal thickness. If, on the other hand, the second crust of a tubercle is examined (and it is known that if the first crust be removed a fresh one is quickly formed) it is seen not to consist, like the first, of *stratum corneum*, but of a dry mass, made up of sebaceous material, granulation cells and prickle cells. There is also seen, beneath the crust, a viscid whitish secretion, which in part clothes the papillæ. If now this secretion be touched with a cover glass a small quantity of it will adhere to the glass; when mixed with a little glycerine the secretion is seen, under the microscope, to consist of a number of granular and prickle cells derived from the outer layer of the *rete mucosum*.

The rete mucosum is greatly thickened, and, in the mucous layers, especially of the larger tubercles, a great number of granulation cells are apparent. The papillæ of the skin are greatly enlarged, partly by swelling and increase of fibrous tissue, and partly as the result of cell infiltration. They not only project above the normal level of the skin, but also extend very deeply into the corium. The papillæ when thus greatly enlarged are separate and straight, but may, on the other hand, become tortuous.

At the junction of the frambœsia tubercle with the normal skin, the enlarged papillæ are smaller and show a gradual transition to the normal size. Wherever the morbid changes are present granular cells are met with, and, in advanced cases, when the tubercles are large, these cells are greatly increased in number and extend quite deeply among the meshes of the collagen tissue, probably along the lymphatic spaces. The vascular networks of the cutaneous papillæ, and of the sub-papillary tissue, are greatly enlarged and have a tortuous course. This is the condition in such fungous growths as are not larger than a pin's head; when the growths are larger the deeper vessels also show a corresponding enlargement. This enlargement starts in the superficial vessels, in such a way that the vessels of the papillary and sub-papillary network are first affected, and next those which connect the superficial with the deep horizontal vessels; and, ultimately, when the tubercles are of great size, and especially when they are of long standing, the vessels of the deepest layer show a similar abnormal condition. At the same time the corium, and especially the papillary portion, is greatly thickened.

As has been already mentioned, in discussing the course of the disease, the hairs remain normal. In all stages of the tubercle they retain their sheaths, but when they are extracted there is seen, in microscopic preparations, an obvious increase of granular cells in and between the layers of the hair-follicle, just where the follicular capillary network of the follicle lies.

The sebaceous glands, on the other hand, are somewhat enlarged, and excrete an unusual amount of sebum, and it is to this that the yellow colour of the crusts is due. The granular cells are also increased in number in the connective tissue which surrounds the glands. The ducts of the sweat glands

appear half to twice as wide again as the normal, and the epidothelium of the ducts is also swollen. The *erectores pilorum* are greatly hypertrophied, and when the tubercles are large the deep cutaneous muscles are in a similar condition. It will be seen then that the process in the skin begins at the level of the corpus papillare, and extends into the depths of the corium.

One naturally enquires, then, whence the granular cells are derived. As a matter of fact, the chief multiplication of granular cells is visible around the vessels, even in the depths of the corium where multiplication of cells is apparent both in the lumen and in the neighbourhood of the vessels. Hence the granular cells are evidently derived from the vessels, and are therefore nothing else than white blood corpuscles.

To summarize the entire process we have shown that the first event is a dilatation and tortuosity of the superficial and afterwards of the deeper vessels and vascular plexuses, with a resulting diapedesis of white blood corpuscles. The consequent enlargement of the papillæ of the skin marches with this process. As the morbid process extends, not only the hair-follicles and the sebaceous and sweat glands, but also the cutaneous muscles are secondarily involved.

As soon as the tubercle begins to retrocede, the uppermost cellular layer of the thickened stratum mucosum, together with the granular cells in the mucous layer, promptly dry up, with the result that the surface of such a tubercle appears as if strewn with fine sand. The granular cells in the corium either pass into the lymph spaces or, having already degenerated, they enter these spaces or even the blood-vessels themselves. The enlarged papillæ only gradually undergo shrinkage, and it is their increased size that gives rise to the deep grooves and furrows, which, together with the enlarged orifices of the sebaceous and sweat glands, indicate for a long time, by a red or darkly pigmented area, the former situation of a frambœsia tubercle. After an interval varying from a month to a year the skin completely resumes its normal condition. In a word, it may be said that in frambœsia there occurs a chronic dermatitis, originating in the papillary layer, and extending deeply into the corium by a series of consecutive changes.

The origin of the pathological process is unknown, and I have

not been able to discover it in the course of extended microscopic investigations.

Contagiousness.

All authors who have written about frambœsia agree in thinking that the disease is very contagious; but in the course of my researches I began to doubt the contagiousness of this skin affection, because it appeared to me so remarkable that a child should suffer from the disease upon the lip without infecting its brothers and sisters who eat and drink out of the same vessels, and sleep with the patient in the same room, and that often a small one. Yet I have only very seldom seen two children of the same family afflicted with yaws. In order to definitely settle this point I resolved to undertake both hetero- and auto-inoculation experiments.

In the fort of Segli in Atteh there was living for a considerable time the son, aged twelve years, of a native workman employed in the place. The father was perfectly healthy, but the child, who was very well developed, had exhibited for more than a year an eruption of frambœsia distributed over his whole body.

The efflorescences varied from the size of a pin's head to that of a nut. In some places the tubercles had become confluent, and in others they had undergone ulceration as the result of mechanical irritation. The uninjured papules and tubercles were covered with honey-coloured crusts and were surrounded by dark areolæ. When the crusts were removed, the fungous character of all the tubercles became apparent.

On the alæ nasi, and even within the nostrils, tubercles were present which caused the alæ to feel very rigid. In some parts of the body dark patches were noticed, each of which indicated the position in which a tubercle had formerly been situated. Whilst the patient was under my observation and during its further course, the eruption had an indolent character, and there was a general enlargement of the lymphatic glands. I had this patient under observation from May 5th, 1879, until August of that year, without administering any drug, and during this period the course of the disease was such that as some tubercles healed, new ones constantly formed. The nasal tubercles developed in a peculiar manner, growing

outwards, whilst the nostrils gradually became free. On the upper lip a raised and curved ridge was developed with its concavity towards the nose, which extended in a serpiginous manner, without leaving behind it any scar as it spread. On June 3rd, I inoculated the patient himself on the right side of the chest with a portion of a crust dissolved in glycerine, and on the left side with blood obtained from a tubercle in the stage of active growth.

Signs of reaction very soon made their appearance at both seats of inoculation, and within ten days a pustule developed on the right side, whereas a similar pustule only appeared on the left chest after sixteen days. Both pustules became covered with crusts of considerable size, and when these were removed a distinctly fungating basis was exposed. New crusts very quickly formed and a fungous tumour gradually developed.

After August 1st the patient was treated externally with mercurial plasters, as large as the palms of two hands, applied to the calves, and internally with iodide of potassium in increasing doses. After two months' treatment the patient was completely cured and had gained a considerable amount of flesh. From the same patient I took both blood and crusts wherewith to inoculate two native soldiers lying in hospital with fever. Both soldiers were well nourished, and were aged 20 and 25 years respectively. Both were treated on June 30th with blisters, six centimeters in diameter, upon the right side of the chest. After removal of the blisters and cleansing of the eroded surfaces there was applied and bandaged over each a portion of softened crust, and at a distance of four centimeters a small pad of lint soaked in blood from a frambœsia tubercle. Nevertheless the results were completely negative, and the areas, which gradually became covered with epidermis, did not exhibit the slightest deviation from the normal. These two soldiers were under my observation for fully four months, but I was never able to detect in them the slightest manifestation of frambœsia.

In the same Fort Segli a native soldier, named Gnojo, aged 26, came under my care on May 28th, 1879. He appeared well nourished, was strongly built, and was suffering from two raised tumours upon the dorsum of the right foot. The smaller of these tumours had a rounded, hemispherical appearance,

was about three centimeters in diameter, was movable with the skin, and felt very hard to the touch. Its surface was fungoid, and by the aid of a lens the enlarged papillæ could be clearly seen. The other tumour which had been formed by the confluence of three smaller tubercles, was also very hard, and moved with the skin. In the midst of this efflorescence was a crateriform ulcer of irregular shape, covered with an offensive, blood-stained, purulent liquid. The margins of the ulcer, as well as the entire surface of the tumour, presented a fungating appearance. The patient stated that he had struck the tumour against a chair, and that this was the cause of the ulcer. The lesions were indolent. A year previously the patient had suffered from similar tumours on both lower extremities. These gradually disappeared, whilst fresh ones developed in turn. The affected areas were indicated by circumscribed dark patches, and in a few instances by scars. During the previous four months, however, he had only suffered from the two tumours already mentioned on the dorsum of foot. There was not the slightest indication of any glandular affection.

I made inoculations in the following manner with the crusts from this patient, after softening them with glycerine, and also with blood from the tubercles. I cleansed with warm water a spot on the middle of the anterior surface of the thigh, carefully extracted a hair from its follicle, enlarged the opening with a blunt instrument, without causing any bleeding, and then introduced the material into the hair-sac. The part was then rubbed with a hard substance, in order to produce hyperæmia around the follicle, and so to favour the absorption of the virus.

The patient himself was first so treated. In a fortnight two pustules of the size of peas had formed in the seats of inoculation, which however gradually dried up, and a month after the inoculation they had only left two small white spots.

At the same time as Gnojo himself a strumous Atchinese boy, a healthy Javan, and a Javan afflicted with serpiginous syphilitic ulcers were inoculated. In the case of the two last-mentioned individuals, I also introduced, into the corresponding part of the opposite limb to that inoculated with frambœsia, pus from an acne-pustule on a healthy individual.

My endeavour was to ascertain what difference there might be between the results obtained by inoculation with ordinary

products of suppuration and those obtained from a frambœsia tubercle. In all these cases nothing resulted beyond pustules, which slowly dried up, and had nothing in common with frambœsia; and the results obtained with the frambœsia secretion differed in no respect from those obtained with ordinary pus. Change of residence on my part, or the departure of the patients, made it impossible to extend the observations over a longer period than 2½ months, and, consequently, I cannot say whether they may have developed frambœsia later.

After my appointment to the military hospital at Pantek Perak in Atjeh, I frequently had opportunities of pursuing my experiments on the inoculation of frambœsia.

On December 27th, 1879, a native stoker of the Royal Navy, Salman by name, was sent to me by the naval doctor there. The patient, who was 25 years of age, and well-nourished, had been ill for two months. His illness began with high fever and gastric disturbance, and directly after the febrile attack the skin eruption appeared. On examination of the patient I found frambœsia tubercles all over his body, varying from the size of a pin's head to that of a bean. Around his neck the tubercles, which were situated about five centimeters apart, were arranged like a necklace. The tubercles were covered for the most part with dirty yellow crusts—and only a few of them were devoid of crusts—felt dry to the touch, and had a fungous appearance. They were hard and moved with the skin. The patient had for some time felt no discomfort from his complaint. After I had obtained from him a supply of inoculation material he recovered in forty days, under treatment by the external application of mercurial ointment to the tubercles, and by the internal administration of iodide of potassium in increasing doses.

On January 12th, 1880, I saw a native orderly affected with frambœsia. The patient had already suffered from the disease for a considerable time without paying much attention to it, since it had lately been unattended by any pain. I took the patient, whose name was Djimier, under my care. This man, who was 23 years of age, was well nourished. There were confluent tubercles in the left nostril, on the septum, ala, and floor, which formed an irregular protuberance. This raised

area afterwards extended as far as the edge of the upper lip. In the angle between the scrotum and penis there were five fungous tubercles, each half a centimeter in diameter, and arranged in a semi-circle. In the concavity of the perineum there was a tubercle of similar size. All were alike infiltrated, surrounded by dark areolæ, much elevated, and covered with thin, honey-coloured crusts. The glands in the groin were swollen and some presented fluctuation.

This case shows very plainly how resistant long-standing frambœsia tubercles are. Being situated in the nose they frequently caused the patient to insert his finger, as he himself stated, but no ulceration or injury of the tubercles resulted. This patient also was utilized for the supply of material for inoculations, and was afterwards treated externally with mercurial ointment applied to the tubercles, and internally with iodide of potassium in increasing doses. He recovered completely within two months.

I inoculated these two patients respectively with softened crust and blood from each other's tubercles. Marked redness in the seat of injection followed in both cases. In Salman's case there was present a fortnight later a large pustule in the spot inoculated with pus. A fortnight after removal of the rupial crust I found an ulcer, 3 centimeters in depth, with a mottled floor, and raised and undermined edges. The ulcer was not infiltrated but was very painful, and secreted a sticky purulent fluid. The parts around the ulcer were red and slightly œdematous. The ulcer quickly acquired a swollen and fungating floor, and the removal of the crust was always followed by the formation of a fresh one, resembling an oyster shell in form and of a honey-yellow colour. Ultimately there developed on the site of inoculation, a definite fungating tumour presenting the appearance of a frambœsia tubercle. No special effects were observed in the spot inoculated with blood.

Djimier developed, a week after the inoculation, two pustules of the size of peas, which slowly dried up however, so that in three weeks there remained only small pale indurations, as large as pins' heads.

With the frambœsia products from Salman there were further inoculated:—

1. A native soldier, named Singopermono, 30 years of age,

well nourished, and in good health. No reaction followed the inoculation.

2. A strongly-built native girl, aged 15, Frau Kasimin, and her daughter, aged 1 year, who also was well developed and healthy. The mother suffered from gonorrhœa, and had communicated gonorrhœal ophthalmia to the child. The ophthalmia was quickly cured, and after both patients had spent twenty six days in hospital, they were inoculated on January 13th, 1880; the mother on her very fully developed right breast. The result of the inoculation was that, on February 4th, she presented an infiltrated, deep, and painful ulcer with a mottled floor, three centimeters in diameter, which secreted much pus. The child was inoculated, a the same time as the mother, on both shoulders. Two insignificant pustules developed which quickly dried up. Both patients were discharged from the hospital, at the mother's request, and passed completely out of my observation.

3. A native hospital servant, aged 30. The result was that he developed two pustules of the size of peas. Whereas the pustule produced by inoculation with blood dried up rapidly, that produced by the softened crust increased more and more in size. Finally the rupial crust was removed, and there appeared beneath it an ulcer, two centimeters in diameter, with a fungating floor. From time to time there were rises of temperature towards evening, which, however, yielded to the administration of quinine. The ulcer, which was continuously painful, gradually healed under a water bandage.

There were also inoculated, with Salman's frambœsia secretion, three Javans, one Negro, and one Ambonesian child, all healthy, and of the respective ages of 1, 3, 4, 7, and 10 years. In all these children reaction followed, but as in case No. 3 further observations were prevented by my transference to Padang.

For the better explanation of the results of the inoculations with the frambœsia products obtained from Salman, I should mention that the products from tubercles in various stages were employed. Moreover, I purposely selected six children for this operation because I anticipated that the period of childhood would prove most favourable to the success of the inoculations. In my new sphere of work as chief physician to

the hospital for prisoners undergoing penal servitude at Padang, I could not refrain from making a fresh series of experiments bearing upon the question of the contagiousness of frambœsia, especially as the former series had yielded negative results. Here I was in a better position to investigate the subject, since I was able to retain the convicts in the hospital as long as I thought fit.

As a rule, the patients inoculated were convalescents from beri-beri, but some were quite healthy.

By means of rewards and promises to abstain from any operative procedures, I was able to get some sixty patients from the surrounding villages to come to me at the hospital each morning for observation.

At first I gave the patients nothing but sacch. alb., being desirous of studying thoroughly the course of the disease, and at the same time of satisfying them. Ultimately, after the necessary inoculations had been carried out, I had abundant opportunities of trying the effects of various lines of treatment.

From the large number of patients available I selected four admirable examples of frambœsia, in order to transfer their products to healthy individuals and convalescents. I append short histories of these four individuals:—

No. 1.—A well-nourished man (Kauwno), aged 29, had suffered for four years from frambœsia, and had not previously submitted to treatment because no ulceration had taken place, and he had not, as a rule, the slightest difficulty in following his occupation on account of the disease. He had been married thirteen years, and his wife continued healthy. There were no children of the marriage. The patient exhibited on all parts of his body a scattered eruption of frambœsia in different stages. On the neck and face he presented tubercles both in the stages of development and of recession. There was general enlargement of lymphatic glands; the glands, which were as large as pigeons' eggs, readily yielded fluctuation in their centres, and were indolent.

No. 2.—A well-nourished and well-developed native boy (Dvela), aged 5 years. The child had fallen ill three months previously with fever, gastric disturbance, and pains in the extremities. Between the right thigh and the scrotum were

two fungating tumours 2½ cm. in diameter, which were oval, raised, indolent, hard, and surrounded by dark red areolæ. Around both ankles and knee-joints, as well as on the backs of both hands, there were a number of papules as large as pins' heads, with yellow summits, and arranged fairly symmetrically.

Around the anus were fungous growths as large as peas, covered with yellow crusts. There was very marked affection of the lymphatic glands, which had at first been painful, but were now indolent. The patient felt quite well, and paid little attention to his frambœsia.

No. 3.—A young Malay, Lehman, 5 years of age and well-built, who had six quite healthy brothers and sisters who slept in the same bed with him. (These beds are constructed of bamboo, and are 1½ meter broad by 2½ meters in length.) His parents were dead. For four months the patient had exhibited a frambœsia eruption on the nape of the neck, hairy scalp and at the right-hand corner of the mouth (partly within the mouth and partly on the skin). On the backs of both hands there were small pins'-head papules with the characteristic yellow crusts upon their summits. On the left elbow was a raised hard tubercle, one centimeter in diameter, with other small ones around it. Upon the inner aspect of the right thigh and on the scrotum were several large raised tubercles of oval shape, with hard bases and dark areolæ. Upon the ankles and knees were a number of frambœsia tubercles. Around the anus the tubercles formed a circle. The fungous form of all these tumours was easily recognizable. Here and there were some indolent enlarged glands.

No. 4.—A Malay, Gedang, aged 20, very tall and extremely spare. For seven months the man had suffered from an eruption of frambœsia over his whole body. Almost as fast as one tubercle healed a fresh one developed. Upon the upper and lower extremities the tubercles were very small, and they had their greatest development on the hairy scalp, on the face, and on the nates, where they were sparingly distributed. There was at the same time a general polyadenitis. In other respects Gedang felt well, and stated that only at the commencement of the disease had he experienced pains in all his bones, accompanied by high fever.

From these four patients I took the softened crusts and blood

from fungous tumours in various stages of development, and therewith inoculated :—

A. The persons themselves from whom the material was obtained.

B. Two of the four patients with each other's products.

C. Thirty-two convicts, free from frambœsia, all of Javan race, with the exception of a single Chinaman.

D. Ten Malays who had previously had frambœsia, and at the time merely exhibited pigmented areas and a few scars resulting from the antecedent attack.

The inoculation was performed as follows :—A sharp-pointed bistoury was introduced under the skin for a distance of one centimeter; the opening was somewhat enlarged, without removal of the blade. The instrument was then withdrawn a little way and turned so that the breadth of the knife stood at right angles to the skin. In this way an open sac was formed into the bottom of which the frambœsia product was introduced with a Hebra's inoculating needle. First the knife and afterwards the needle were then withdrawn. This operation seldom gave rise to bleeding and the inoculated material always remained beneath the epidermis. Reaction followed immediately after the operation, which showed itself as an extensive reddening in the neighbourhood of the wound, accompanied by a local rise of temperature.

I do not propose to describe each individual case, seeing that the results of the operation are alone of interest to us.

A. *Auto-inoculations.*

Of the four persons so inoculated, three yielded good results. The child Dvela had, apparently, destroyed the spots of inoculation on account of itching, and, consequently, the results were scanty in his case. The inoculations both with blood and with softened crusts gradually led to the formation first of papules and afterwards of pustules, which increased in size and acquired rupia crusts. On removal of the crusts I found deep painful ulcers with mottled floors and undermined, raised edges. Upon the floors of the ulcers were papillary excrescences, and fresh crusts were always formed. Finally, there developed from the ulcers large fungating tumours. These inoculation experi-

ments, which had almost all like results, served to prove that frambœsia is certainly auto-inoculable. Seeing that I had these patients under my treatment for more than four months, I can confidently assert that the inoculations had no special influence upon the further course of the frambœsia, from which the patients were already suffering before the inoculation.

The course of the disease was characterized, as usual, by the appearance of fresh tubercles, whilst others were disappearing.

B. *Inoculation of two of the above patients with each other's products.*

Of these the inoculation was only successful in Kauwno, and this was performed with blood. A definite fungating growth with the characteristic crust appeared. I undertook this experiment merely in order to ascertain whether, in case the auto-inoculations should prove abortive, frambœsia patients were susceptible to the products from other patients, although possessed of immunity against their own.

C. *Inoculations of convicts who had never had frambœsia.*

Of all these inoculations four only failed, among which was the case of the Chinaman. I saw the persons in question daily for five months and was able to make thorough investigations. Seeing that the results of the inoculations were almost the same in all the cases, I will merely present the principal points of my conclusions. After the lapse of fourteen days after the inoculation, small papules were always seen (except in four cases) at the seat of injection. These papules had red areolæ, and were very painful, but the temperature of the skin in their neighbourhood was only raised half a degree. Pustules gradually developed from the papules, and this change took place about twenty days from the inoculation. The pustules extended more widely and became so painful that the patient could no longer endure a shirt on account of the friction which it caused. The crusts of the pustules also increased in size, became irregular on the surface, and assumed more the appearance of oyster shells.

After the crusts had been formed for some time I removed some of them in order to see the underlying condition. Deep

ulcers with mottled floors and undermined and thickened edges were exposed. There was little purulent secretion. The appearance was that of an *ulcus molle*. The patients complained of painful glandular enlargement in the axilla of the corresponding side, and the whole region between the ulcer and the axilla was intensely tender..

Some of the ulcers gradually assumed a fungous character, whilst others again healed, leaving always a thick, hard, whitish scar. Those of the first kind on the other hand developed into raised tumours, which presented exactly the appearance of frambœsia tubercles. In the majority of patients the earliest appearances of frambœsia showed themselves after three months, but in some instances after four months, and before the initial phenomena had come to an end.

Of these initial phenomena fever commencing with rigors was the earliest. The temperature rose in the evening to 39° C., but the patients were for the most part free from fever in the daytime.

The fever began about a week before the eruption and lasted a fortnight altogether. At the same time the pains in the bones appeared, and were of such severity that the patient could scarcely move. The pains were increased by pressure, and were specially localized in the joints, which, however, did not exhibit the slightest swelling. A slight local rise of temperature was in most cases observed. The pains, which never extended along the course of the bones, persisted day and night and lasted until a short time after the appearance of the eruption, but they soon disappeared under suitable treatment. The patients also suffered from gastric disturbances, and got but little sleep.

The eruption followed one of two courses ; the patients either developed small frambœsia tubercles around the tubercle at the seat of inoculation, or completely isolated tubercles were formed. These tubercles gave rise to much pain and acquired the characteristic yellow crusts, spotted with red.

For three weeks the severe pains and feeling of tension in the tubercles persisted, and afterwards new tubercles were formed in succession, which were quite painless. I am unable to explain why it is that the earliest tubercles are attended by pain whereas the latter are not. I did not observe that the frambœsia tended

to make its first appearance on any particular part, but the first tubercles appeared now on one part of the body, now on another. At the commencement of the eruption the patients also complained of tenderness and swelling of the glands. I noticed that, as is the case in syphilis, the lymphatic glands corresponding to the seat of inoculation were the first to swell and become painful and were much more swollen than those in other situations. On the basis of these observations, I have always sought in cases of frambœsia for some specially large gland, in order to obtain a clue to the manner and situation in which the frambœsia poison was originally introduced into the body. Unfortunately, I have obtained no satisfactory results because the majority of the patients coming under my treatment (with the exception of those inoculated) have been already affected with frambœsia for some time, so that at the time of observation the gland in question was no larger than the others. Either the swelling had somewhat diminished or the enlargement had not been sufficiently great to show any difference. From all the inoculations described up to now, it follows that inoculations with blood and also with the tubercle-secretion yielded satisfactory results, but, on the other hand, it is remarkable that inoculations with blood from a dry tubercle in the stage of retrogression (devoid of crust and secretion) always failed.

D. *Inoculations of ten Malays who had previously suffered from frambœsia.*

I was led to undertake these experiments by the statement of some authors, that the disease only attacks the same individual once; a statement which other authors contradict. The various inoculations which I carried out succeeded excellently, and only in three instances did I fail to observe anything resembling frambœsia after an adequate time had elapsed. Moreover, these inoculations yielded results similar to those performed on persons who had not previously suffered from the disease; but I must add that in one instance the general eruption only followed after the lapse of five months.

The above experiments lead, then, to the following conclusions:—

1. That frambœsia is a contagious disease.
2. That it is both auto- and hetero-inoculable.

3. That it may attack the same person more than once.

4. That patients with frambœsia, who are inoculated with material from themselves or others, develop, at the seat of inoculation, either an ulcer (resembling an ulcus molle) or a fungating tubercle; and that on the other hand such inoculations do not exert the slightest influence upon the pre-existent disease.

5. That both the secretion and blood from a tubercle are infectious, and the results of inoculation with both are identical.

6. That the virus is a fixed contagium and that infection can therefore only result from actual contact.

7. That the products obtained from tubercles in the stage of aggravation and of full development are infective; and as soon as they begin to dry up infection is no longer possible.

8. That the period of incubation may last from three to five months.

9. That fever, accompanied by gastric disturbance, and pain in the bones precedes the eruption, and may be concurrent with it for a time.

10. That if the frambœsia be not of long standing the spot by which the virus entered the body can usually be approximately determined, since the glands corresponding to this situation are specially enlarged.

A further question which now requires to be considered is this: Whether or no frambœsia is to be regarded, as the majority of those who have written about it have held, as a special variety of syphilis? Alibert was the first to put forward this view, and those who have followed him have almost all accepted his conclusions.

Undoubtedly frambœsia resembles syphilis in many respects:—

1. Both are contagious diseases.
2. Both are due to a fixed contagium.
3. In both the incubation lasts from three to six months.
4. Both diseases commence with fever and pains in bony structures.
5. Both manifest themselves by cutaneous infiltrations.
6. General glandular inflammation occurs in both diseases.
7. Both are cured by the same drugs.

There are, however, other facts which lead us to the conclusion that frambœsia and syphilis are two very distinct maladies, which require to be clearly differentiated from each other:—

1. The spot at which infection with frambœsia has taken place presents an ulcer which always runs the course of an *ulcus molle*, whereas in syphilis the induration of the ulcer, or sclerosis, is of the greatest importance for the diagnosis.

2. Frambœsia never begins in the form of blotches, as is usually the case with syphilis.

3. Frambœsia very seldom undergoes spontaneous cure in a few months, but its course covers a year, whereas the manifestations of syphilis, as a rule, disappear moderately quickly.

4. Frambœsia never goes on to ulceration, unless the tubercles have been submitted to severe irritation, whereas in syphilis we have to do with a more destructive process.

5. However long the disease persists, the constitution of the patients is never impaired by frambœsia, whereas persons attacked by syphilis are usually greatly affected by it.

6. Lastly, frambœsia always remains localized on the skin and mucous membrane, and only extends more deeply as the result of severe irritation, as, for example, when tubercles on the sole of the foot are struck against a stone. When this is the case an ulcer results, which runs the ordinary course, and the destruction of tissue is, therefore, not to be ascribed to the frambœsia, but simply to the injury inflicted.

In syphilis all organs and tissues of the body may be involved in the disease. Moreover, the successful results of auto-inoculation in frambœsia prove that this disease is not syphilis.

Although I was acquainted with these facts, I resolved, nevertheless, to carry out a few experiments, in order to directly establish the fact that frambœsia is not syphilis. I selected for this purpose only a single individual, since I was, naturally, unwilling to expose a larger number of persons to the risk of syphilis. Before the experiment I made clear to the patient the possible results of this inoculation, in order to leave to him complete freedom of choice in the matter. He thereupon submitted himself willingly to the proceeding. The person in question was the man Kauwno, already referred to. On May 3rd he was inoculated on the right side of the chest with the

secretion of a hard sore, and, at the beginning of June, a hard sore appeared at the spot. One of the glands in the right axilla was greatly swollen and very painful. After 3½ months, Kauwno developed over his whole body, first a macular, and shortly afterwards a papular syphilitic rash. During the whole of this period he had frambœsia tubercles, which were not modified in the slightest degree by the onset of the syphilis.

At about the same time there came under my treatment a well-nourished Malay, aged 26 years. This man had had for some time a widely disseminated frambœsia eruption all over his body; but it was not on this account that he sought for treatment, but on account of a hard sore recently developed in the *sulcus subglandularis*, after intercourse with a woman suffering from venereal disease. In order to make sure of its nature, I allowed the sore to run its course without interference. The ulcer left behind it for a long time an induration, which broke out afresh from time to time. After this patient had been for nine weeks under observation, a maculo-papular syphilide appeared over his whole body, and mucous tubercles developed about the mouth and anus.

It was by this case in particular that the question whether frambœsia and syphilis are identical diseases was decided in a negative sense.

Treatment.

Although the course of frambœsia has been differently described by different authors, these are for the most part agreed that the disease yields to mercury. Even Sauvages (who denies the syphilitic nature of frambœsia) and Plenk state that mercury is the best remedy for frambœsia. Neumann, Kaposi, and the majority of European dermatologists, who associate under the name of frambœsia a variety of morbid conditions, naturally suggest different drugs, according as the tumours are due to parasitic affections, syphilis, lupus, or other diseases. In the work of Tilbury Fox and Farquhar, Dr. Imray recommends sulphur and potassium bitartrate in the stage of development, and later gives mercury with decoction of sarsaparilla, sassafras or mezereum. For debilitated persons he recommends the administration of tonics as well as mercury, and he applies a solution of carbolic acid locally. Dr. Bowerbank,

on the other hand, is in favour of mercury at all stages. Here, in the East Indies, some employ copper-sulphate in substance, others vegetable decoctions, and others again alum. The natives use a mixture of copper-sulphate and arsenic, but appear to obtain but little result from these remedies, for they come to me, although they have already employed this treatment for a long period.

I have taken the trouble to try all these different methods, and the results of my observations are as follows:—

Sulphate of copper in powder or in solution has not the slightest effect upon the frambœsia tubercles, in whatever stage they may be, but finely powdered copper-sulphate is useful for the ulcers which are produced by injury to the tubercles. In some instances I have employed copper-sulphate in such a way as to produce a dynamic effect, that is to say, I scratched the tubercles with the crystals. Rapid healing certainly followed, but a scar always remained as the result of the loss of substance, so that on this account this method is to be avoided. Sulphate of copper in combination with arsenical powder has no more effect than the sulphate alone.

Alum has not the slightest effect except in the case of the ulcers which sometimes form on the soles of the feet, and which yield to its use. The pain which its application causes is, however, so great that I must emphatically describe this treatment as a form of martyrdom; especially as so many other lines of treatment are open to us.

Vegetable decoctions have absolutely no effect, and only in the cases of patients who are greatly enfeebled some improvement of the general condition may follow their administration. The actual disease is not cured by these decoctions.

I have employed cod-liver oil both internally and externally on several occasions, but the natives have such an intense antipathy to this drug that I was compelled to abandon its use.

Mercury, in the form of a mercurial ointment applied to the tubercles, has a very satisfactory as well as a very rapid effect, but nevertheless patients treated in this way soon returned with a few fresh tubercles. In such cases I inferred that the patients were not completely cured at the time of their discharge, although they no longer had any tubercles.

Having met with several such relapses I resolved to administer mercury internally in the form of the proto-iodide, but I could not continue this treatment as salivation always rapidly occurred. I attribute the rapid occurrence of this symptom, on the internal administration of mercury, principally to the abnormal condition of the mucous membrane of the mouth which is always present in the natives.

These people are accustomed to introduce into the mouth highly irritant substances, such as the so-called "sirie." Sirie consists of tobacco, lime, an acrid fluid derived from a nut, and certain kinds of bitter leaves. The whole is chewed and retained in the mouth.

It is easily seen, then, that under such conditions the mucous membrane of the mouth can never be in a normal condition, and that salivation must follow the internal use of even small quantities of mercury. Moreover, I entirely agree with Sigmund, that want of cleanliness of the mouth, and not draughts or chills, is the usual cause of salivation.

The best treatment consists in the combined use of mercury and iodide of potassium.

Mercurial ointment is applied to the tubercles and the patient takes iodide of potassium internally, beginning with two grammes a day, and increasing the dose by a gramme after two days. Such treatment cures the disease within one or two months (seldom longer) and, moreover, the natives bear the iodide very well and increase in weight while taking it. In cases in which the patients are covered all over with frambœsia tubercles I prescribe an inunction course with iodide of potassium internally.

Iodide of potassium alone has no effect on the tubercles, and only the bone pains are relieved by it. I can further recommend, as the best remedy for these bone pains, iodoform in pills of sixty-five milligrammes, five pills being given three times in the day.

If tubercles are present between the toes and fingers, or speaking generally between two opposed surfaces, especially where there is an active excretion of sweat, such parts should be separated by lint spread with mercurial ointment.

The fever which precedes and follows the eruption is treated by quinine. When the fever disappears the digestive disturbances also cease.

Little need be said regarding diet. As has been already mentioned the sufferers from frambœsia are for the most part vigorous persons who eat and sleep well. Generally speaking the disease causes them no suffering, and the affected individuals are, with the exception of the skin disease, quite healthy and lead the same life as ordinary persons. It is not known that the natives acquire frambœsia from the use of any particular article of diet, or that the disease is intensified by any such influences.

ON THE

VISCERAL COMPLICATIONS OF ERYTHEMA EXUDATIVUM MULTIFORME.

BY

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ON THE VISCERAL COMPLICATIONS OF ERYTHEMA EXUDATIVUM MULTIFORME.

By William Osler, M.D.

By exudative erythema is understood a disease of unknown etiology with polymorphic skin lesions—hyperæmia, œdema, and hemorrhage—arthritis occasionally, and a variable number of visceral manifestations, of which the most important are gastro-intestinal crises, endocarditis, pericarditis, acute nephritis, and hemorrhage from the mucous surfaces. Recurrence is a special feature of the disease, and attacks may come on month after month, or even throughout a long period of years. Variability in the skin lesions is the rule, and a case may present in one attack the features of an angio-neurotic œdema, in a second of a multiform or nodose erythema, and in a third those of peliosis rheumatica. The attacks may not be characterized by skin manifestations; the visceral symptoms alone may be present, and to the outward view the patient may have no indications whatever of erythema exudativum. Of the eleven cases here reported the visceral manifestations were as follows: In all gastro-intestinal crises—colic, usually with vomiting and diarrhœa—five had acute nephritis, which in two cases was followed by general anasarca and death; hæmaturia was present in three cases; hemorrhage occurred from the bowels in three cases, from the stomach in two cases, from the lungs in two cases, from the nose in three cases; one patient had spongy and bleeding gums; two cases presented enlargement of the spleen; in one case there were recurring attacks of cough and bronchitis without fever; in one case there was a heart murmur. Five of the cases had swelling about and pain in the joints.

The skin lesions were polymorphic, ranging from simple purpura to extensive local œdema, and from urticaria in all

grades and forms to large infiltrating hemorrhages of the skin and subcutaneous tissues. In individual cases the cutaneous eruptions were often of the most varied character.

The remarkable tendency to recur is a feature of all forms of exudative erythema. It will be noted that of the cases here reported in only one was the attack single. In the others there were multiple outbreaks distributed over periods ranging from two months to eight years.

A majority of the cases would be described under the heading of purpura or peliosis, since hemorrhage was the most constant lesion, but the variable character of the eruption, and its interchangeable nature in individual cases, make a wider definition of exudative erythema the more acceptable. A remarkable circumstance, which I have not seen mentioned in the literature (though it is not likely to have been overlooked), is the recurrence of severe attacks without cutaneous manifestations. In the first two cases—which are at present under observation—one would not for a moment suspect the true nature of the disease from the existing manifestations, which are entirely visceral.

I will first give a detailed report of the cases which have come under my observation.

Case I.—*For six years recurring gastro-intestinal crises—colic, vomiting, and diarrhœa—with fever, delirium, and erythema multiforme; for two years no skin lesions with the attacks; enlargement of the spleen.*—Benjamin L., aged twenty-seven years, Norfolk, Va., consulted me October 14th, complaining of attacks of gripes and cold feet, which have recurred very frequently during the past eight years. For a time the attacks were thought to be severe indigestion with colic. They recurred at first every two or three months: he once passed six months without an attack, but for nearly three years he does not think that he has ever been free for so long as two months. He gives an account (corroborated by that which his wife has written) of a very remarkable series of events. He is always, for a day or two, warned of the attack by the occurrence of

Cold feet, an unerring premonitory feature. They are also cold to the touch, sometimes for as long as forty-eight hours. Frequently, too, he has had at this period uneasiness in the

stomach. Independent of food or of the time of the day, he then begins to feel pain in the abdomen, and has severe

Gripes, as he calls them; sharp recurring attacks of colicky pains in the central portion of the abdomen. Formerly the pain was severe enough to double him up, but of late years it has not been so intense, and he gets more relief by straightening himself out to the full extent. He often vomits, and in the early attacks always did so. Of late years he has had more belching, which seems to relieve the pain. In some attacks he has had diarrhœa, but of late he has been constipated during and after them. With the abdominal symptoms, sometimes preceding them, there is

Fever.—He gets burning hot everywhere but in his feet. Within a few hours he becomes delirious; as his wife expresses it, he talks "out of his head." He himself says that he talks much nonsense, just as in a fever, and imagines all sorts of things. One of his favourite fancies is that in an attack, during the colic, he has twenty-six throats and twenty-six stomachs, which are all in a row, and he cannot pick out the one which belongs to him, and which is causing the pain.

I had obtained this much of the history from him, and was beginning to be very interested, as it seemed an unusual sort of affection, when he voluntarily expressed the information that in the attacks "great big liver spots came out all over him." In several of the first attacks he thought he had been poisoned by eating something that had disagreed with him. The spots came out on the trunk and arms, not so often on the legs, and they were sometimes so large that they took days to disappear. Some have been as large as the palm of his hand. They are always red, sometimes raised, but never itch. During the first few years almost every attack was characterized by them. For nearly two years he has not had any of the blotches on the skin. The entire duration of the attack is from six to ten hours. After them he feels very sore in the abdomen, particularly the right side. He is irritable and has lack of energy. He has never had pain or swelling in the joints. The urine is sometimes high coloured, but not more, he thinks, than is common in fever.

There is no similar disorder in his family. He has always been a healthy, strong man, and is actively engaged in business.

This disease has always been a great trouble to him, as he never knows at what time it may attack him.

The patient is a medium-sized man; looks healthy, though a little pale; the tongue is clean; the gums are not swollen; the pulse is quiet; the examination of heart and lungs is negative.

The abdomen looks natural; is not swollen. On deep inspiration the edge of the spleen is distinctly palpable; area of vertical dulness five fingers' breadth. The stomach is not enlarged; liver normal, no increase in size. The urine is not albuminous. There are no spots now on the skin; no swelling of the legs; no swelling of the joints. The retinæ are normal.

Case II.—*Attacks of colic for a year, with bleeding at the nose, anæmia, and one outbreak of urticaria; recurring attacks of cough. Subsequently attacks with arthritis and lesions of erythema exudativum; enlargement of the spleen.*—The following case is of great interest because of the persistence of the abdominal symptoms with ill-health and anæmia for such a long period before the appearance of arthritis and erythema exudativum.

W. E. B., aged eleven years, was first seen March 10th, 1894. Family history excellent. He is a well-grown boy, very active and intelligent. About a year ago he began to have attacks of severe pain in the abdomen, coming on very abruptly, not associated with any errors in diet, and often of such severity that he would roll upon the floor in great pain. After the attack passed off he would be quite comfortable. At this time he had several attacks of bleeding at the nose and got pale. His appetite kept good and he has never had any vomiting. During the latter part of the summer he had a very "brazen" cough, which was suspected to be pertussis. Once during last summer he had an attack of hives below the knee. He has never had any rheumatism; never complained of any pain about the joints, but he has had pains low down under the left ribs.

The appetite for the past year has not been very good, and he has been very particular about his food. The bowels have been regular, and the attacks of colic have never been followed by diarrhœa.

During the winter he remained pale and had occasional attacks of colic, and the cough recurred at intervals. He has

been able, however, to go to school, but has not been at all strong.

Present condition.—A fairly well-nourished boy, a little pale in the face, but the lips and tongue are of good colour. The muscles are feebly developed; the skin is clear; there is no purpura, no staining.

The abdomen looks a little large, is soft, nowhere painful on deep pressure. The edge of the liver can be readily felt at the costal margin. The spleen is enlarged and extends in the parasternal line nearly to the level of the navel; the edge and its notch are to be felt very plainly. The upper limit of dulness is at the lower margin of the seventh rib.

The heart-sounds are clear, and there is no enlargement of the organ. The lungs are everywhere clear on percussion, but at the right apex and right upper axillary region there are a few medium-sized moist râles.

The blood presented no special changes; the leucocytes were not increased. There was a moderate grade of anæmia, about 80 per cent. of red blood-corpuscles, and about the same of hæmoglobin. The urine was clear, and contained neither albumin nor tube-casts.

I confess to have been quite puzzled by the case. The history of protracted colic with cough and the moderate anæmia with enlargement of the spleen formed a symptom-group which did not seem to come into the category of any recognized affection. There had been no articular troubles, and the occurrence of the urticarial rash last summer seemed to be an accident.

On April 9th his mother said that he had complained several times of pain in the left shoulder, but there was nothing to be seen on inspection.

Under the free administration of arsenic and iron he improved a great deal, and the spleen reduced considerably in size. In the middle of April he had an attack in which the cough was much aggravated, and he had slight fever, the temperature reaching nearly to 102°. There was no dulness, but at the apex of the left lung there were many moist râles before and behind. It was with great difficulty that any expectoration could be obtained; it was bronchial and contained large numbers of alveolar cells. He improved very much towards the end of the month.

Friday, May 18*th.*—He has been doing very well. The spleen is only just palpable beneath the edge of the ribs. He has complained since last Sunday of pains about the legs and knees. I noticed to-day one or two bluish stains, as if there had been purpura.

22*nd.*—The patient came again to-day. Last Friday evening when he went home the ankles were swollen and red, and blotches of urticaria and purpura came out over the instep and first phalanges of the toes. They extended along the outer surface of the left leg and there were a few on the right, but there was not so much swelling in the feet. This is the first occasion on which he has had an outbreak of purpura; with it he had an attack of severe colic, the first for several weeks. The legs and feet to-day present the fading stains of the purpura. There is no swelling and no soreness, and he feels quite well. The trouble in the lung seems to have almost disappeared, and he has very little cough.

June 6*th.*—Since the last note the boy has been very well, with the exception of an attack of œdematous swelling on the back of the left hand. To-day he has had a good deal of itching and an acute attack in both ankles. The condition is as follows: On the back of the left hand there are three or four scattered patches of erythema with exudation. Over the knuckle of the little finger there is considerable swelling, but no ecchymosis. The right ankle is swollen, and the swelling extends over the dorsum of the foot and about half-way up the ankle. There is some heat, and extending for about two inches above the malleoli on either side there are mottled ecchymoses. The same extend half-way down the dorsum of the foot. The left ankle is a little puffy, and the entire leg is covered with the remnants of purpuric urticaria. Though the ankles are swollen and look very sore, yet he was able to walk to the house, and could take off his shoes and stockings alone. Temperature 99·2°.

27*th.*—Patient has been at Atlantic City and has not been materially benefited. He looks thin and pale; the spleen is still palpable, and the edge can be felt two fingers' breadth below the costal margin. He has had no skin trouble since the last note.

October 30*th.*—He has been much better until to-day, when he had an attack of colic. He looks pretty well, and has no

blotches; no purpura since spring. The spleen is decidedly smaller, the edge only just palpable. The liver is not enlarged. The piping and moist râles have all disappeared. He took the Fowler's solution in full doses at intervals to the 15th of August.

December 7th.—He has had no arthritis since May, and no spots, but there have been many attacks of pain in the abdomen, which last only five or ten minutes. The edge of the spleen can still be felt. The liver is not enlarged. His colour is good; his tongue is clean. I ordered the syrup of the iodide of iron. He has been taking the Fowler's solution at intervals since last May, and cod-liver oil since the 15th of August.

March 9th, 1895.—He has kept very well through the winter and has been at school. Yesterday his father allowed him to play hockey. Last night he had very severe attacks of colic. He has had them also at intervals through this morning. I saw him at five o'clock; he seemed better. There was no arthritis; no skin eruption. He had had one tender point on his right shoulder. He had had some cough, and there were numerous piping râles, chiefly at the right apex. Examination of the abdomen was negative; the spleen was smaller than it had been on any previous occasion. The liver was not enlarged; no tenderness anywhere on palpation.

June 5th.—He has been much better; no attacks of colic; no spots. He began to cough about three weeks ago, and now coughs "terribly" at night. The spleen is a full hand breadth below costal margin. There is a remarkable condition of right apex again; the note is higher in pitch than normal as low as the fourth rib and behind to the spine of scapula. There are many large moist râles over whole infra-clavicular, mammary, and upper axillary regions. The breathing is not tubular, but is a little harsh.

19th.—The cough has been better. The spleen is not so large as at last examination, only just two fingers' breadth below the costal margin. The resonance is still a little high pitched at the right apex; numerous crackling râles from the clavicle, extending through the mammary region into the axilla.

October 21st.—He has had a good summer. The spleen is only just palpable; no colic; no spots. Recently the cough has returned, and there are now crackling râles at the left lower

mammary region and right lower axilla; a few, too, at the apex.

CASE III.—*Joint pains; colic with diarrhœa; urticaria; purpura urticans, appearing in crops; melæna; acute nephritis; death.* (Abstract.*)—A boy, aged six years, seen with Drs. Dunton and Agnew. There was a rheumatic history in the family, and the child of an aunt on the father's side died of purpura hemorrhagica. The onset was with pains in the ankles, followed by colic and an urticaria-like eruption. Hemorrhage from the bowels followed in about ten days. The recurring attacks of colic were most distressing. About the fifth week after the onset the urine became scanty and albuminous, and showed a few blood-corpuscles and numerous tube casts. After the development of the dropsy the attacks of purpura ceased, and he died of the acute nephritis within three months of the onset of the illness.

CASE IV.—*Second attack; arthritis; cutaneous hemorrhages and urticaria; colic; vomiting; albuminuria; recovery.* (Abstract.†) The patient, a man aged forty-six years, was admitted to the Philadelphia Hospital, under my care, with diarrhœa and extensive purpuric rash and polyarthritis. About eighteen months before he had had a similar very severe attack, which had lasted three weeks. In the present one he had recurring colic, swelling, and tenderness of both elbows, of the right knee, and of the right ankle. There were numerous purpuric spots on arms and legs. The vomiting was a very distressing feature. Three days after admission a fresh eruption occurred of urticaria and purpura. The gums were not spongy. The urine contained much albumin and many hyaline and epithelial casts. The patient improved rapidly, and within a month from the time of admission seemed quite well, though on his discharge there was still albumin in the urine.

CASE V.—*Gonorrhœa; acute arthritis and synovitis, with purpura; severe colic and vomiting, with successive outbreaks of purpura, urticaria, and larger extravasations; hæmaturia.*

* Reported in full in *New York Medical Journal*, December 22nd, 1888.

† Ibid.

Recovery after an illness of two months' duration.—Jas. McD., aged eighteen years, was admitted to the Johns Hopkins Hospital, March 16th, 1890, complaining of pain and swelling in the wrist-joints and fever. The patient knows very little of his family history, other than that his father died of pneumonia.

He has always been healthy, and can only recall having measles when seven years old. He has never had rheumatism. He contracted gonorrhœa a month ago and still has a slight discharge.

Present illness began March 9th with fever, pain, and swelling in the knees and in the calves of the legs. He did not go to bed, but attended a dispensary in the city, and was ordered an ointment. On March 12th the wrists became swollen and the fever increased, and he had much pain in the back. Two or three red spots came out on the skin.

Present condition.—The patient is a well-nourished young man. The temperature is 99·5°. The face is flushed; lips red; tongue coated on the dorsum, red at the edges. There is now no swelling of the knees. Both wrists and the backs of the hands and of the fingers are swollen and tender, and are reddened and pit on pressure. The swelling over the wrists is chiefly subcutaneous. Movement of the joint is not painful. On both legs, on the ankles, and on the feet there are numerous ecchymoses, varying in size from a half to five or six millimetres. They are also present on the inner surface of the thighs, and a few are scattered on the back and buttocks. About the ankles there are some larger, confluent ones, which are capped with vesicles. The heart's action was regular and there were no murmurs. The urine was yellowish in colour, a little smoky, acid, sp. gr. 1025, and microscopically it presented many blood-corpuscles, with some hyaline and a few epithelial casts. The meatus of the penis is red and moist, but no discharge can be squeezed out. A bacteriological examination was made of the material from the vesicles on the legs. Esmarch's tubes were made, but nothing grew. At first we regarded the case as one of gonorrhœal synovitis with purpura, but the subsequent history of the case shows that it must be grouped as erythema exudativum.

March 17th.—A large swollen, hemorrhagic wheal developed on the inner malleolus of the right leg. In the evening the

patient complained of much deep-seated pain in the abdomen, and vomited.

18*th.*—The temperature has ranged from 99° to 101°. He vomited again this morning and complains a good deal of pain in the back.

20*th.*—The urine contains much less blood, but hyaline and epithelial casts are still present. For the first time a murmur was noticed to-day in the pulmonary area.

22*nd.*—The hands are very much better. The left biceps to-day about its middle is swollen and tender, and it pains him to move it.

23*rd.*—The patient complains of a great deal of pain in the abdomen below the navel. He has had no further vomiting. Fresh purpuric spots are present to-day over the clavicles. The swelling of the left biceps has increased; extension of the arm is particularly painful. There is no discharge to-day from the urethra.

24*th.*—A group of ecchymoses has extended about the neck. The biceps to-day is very tender. He complains much of pain in the abdomen, and for this in the evening he had to be given a hypodermic of morphine. The urine still contains a moderate amount of albumin, red blood-corpuscles, and numerous hyaline casts. It has a distinct cherry colour.

25*th.*—A small, raised erythematous area has appeared over the right instep, capped with a distinct bleb. Cultures from this were made, which subsequently showed the presence of the ordinary pus organisms.

26*th.*—Albumin and casts persist.

27*th.*—Urine is lighter in colour; no blood noted to-day. Patient has improved somewhat; the biceps is better.

29*th.*—Within the past twenty-four hours a large patch of purpuric spots has developed on the outer side of the left forearm, and on the right buttocks there has come out a crop of ordinary urticaria with somewhat injected margins.

31*st.*—No casts noted in the urine. Patient has had no abdominal pain for some time.

April 1*st.*—New crop of purpura on the dorsum of the right foot. No fresh articular trouble. The temperature has ranged from 99° to 100° and 100·5°. The heart-sounds at the apex are clear. Daily notes were made on the urine, and albumin and

hyaline casts were present. He improved a good deal, though at times he had sweats. On the 15th he had a recurrence of vomiting and of the abdominal pain, and a fresh crop of petechiæ came out on the right side of the neck and chest. Pain in the abdomen was so severe that he required morphine hypodermically. Blood did not appear in the urine. On the 16th he was better. On the 17th the vomiting was very severe and the abdominal pain most intense in the region of the stomach. The tongue was clean and moist; he has no fever, and he slept well after the morphine. There were a few ecchymoses also on the right elbow.

18*th*.—The pain in the abdomen is better. The tongue is to-day coated; the urine is turbid, smoky, and dense, an unusually large number of tube casts, some of which are pale; others made up of leucocytes and a few blood-corpuscles.

19*th*.—The blood persists in the urine; the casts are not so numerous.

From the 20th to the 22nd he was better; no fever. On the 23rd a fresh crop of purpura came out on the right instep. He has no fever, and has been better; appetite good; he has gained in weight. He improved quite rapidly early in May, and left the hospital on the 12th. At the time of discharge the urine had a specific gravity of 1013; contained a trace of albumin and a few hyaline casts.

Case VI.—*Third attack. Purpura, colic, and melæna; vomiting; recurring attacks; albuminuria; death from pneumonia.*—Wm. L., aged nine years, admitted to the Johns Hopkins Hospital, October 18th, 1892, complaining of spots on the arms and legs. The family history is good; the father and mother, two brothers, and one sister are living and healthy. The mother had rheumatism in right hand fourteen years ago.

The patient has always been a delicate child. He had pneumonia when three years old, and measles when six. No other illness. Sixteen months ago he had the first attack of the affection with which he suffers at present, namely, spots on the skin, which recurred frequently with pain in the bowels and blood in the stools. The present illness began about two months ago. The spots first appeared. He lost his appetite and got pale. Five weeks ago he had the first attack of pain in the

abdomen, with nausea and vomiting. It lasted all day and he had several bloody movements, and there was a little blood in the vomitus. In a week or ten days he improved and remained better until two weeks ago, when an attack began in the same way, with little pain in the abdomen, nausea and vomiting, and bloody stools. On several occasions his knees have been a little stiff in the evening, but there has been no swelling and no pain. In one of the attacks his mother states that he coughed up a little blood, and one day his nose bled. With each attack a fresh crop of spots appeared on the skin.

Present condition.—He is a healthy-looking boy; the lips and mucous membrane are perhaps a little pale; the pulse is of good volume, 104; the temperature is 100°. When asked what is the matter with him he places his hand on the abdomen and says he has pain and soreness. Over the arms and legs there is a copious purpuric rash. The spots on the legs are fading; those on the arms are fresh. On the afternoon and evening of the 19th he vomited a great deal, and was unable to retain anything, and had a good deal of pain in the shoulders. No blood appeared in the vomitus or in the stools. On the morning of the 20th a fresh crop of spots was noticed, particularly over the shoulders and back. The joints were neither enlarged nor tender. The apex beat was inside the nipple line; the sounds were loud and clear. The abdomen looked natural; the spleen could not be palpated; the area of dulness was not increased; the liver was not enlarged. The urine was turbid, yellow, sp. gr. 1020, and presented a trace of albumin. On the 22nd, after the attacks of vomiting and pain and the fresh crop, the specific gravity was 1020, the amount of albumin had increased, and a few finely granular tube casts were found and a few red blood-corpuscles.

The patient improved very much on the 21st and 22nd, the vomiting ceased, and on October 23rd his mother removed him.

At home he got somewhat better, and the purpura did not develop so long as he stayed in bed. There was no return of the pains in the stomach or of the vomiting. He remained pretty well until about the 16th of November, when he had a chill, which was followed by pneumonia, of which he died on the 28th of November. During the illness the temperature was high; no purpura developed.

CASE VII.—*Hip disease; subcutaneous hemorrhages; purpura urticans; colic; vomiting; arthritis; great œdema of forehead; albuminuria; recovery.*—Mary R., aged four years, seen November 15th, 1890, with Dr. Finney. The child had always been healthy and strong until June of this year, when she began to have symptoms of hip disease. She was seen by Dr. Halsted and Dr. Finney toward the end of October, and two injections of iodoform into the joint were made.

On Thursday, November 6th, she had been restless all day, and in the evening the mother noticed that her hands were swollen and covered with bluish spots. Dr. Finney saw her that evening, when she had slight fever, temperature about 101°, and the hands presented a swollen appearance, due to subcutaneous localized infiltrations with blood, giving a curious patchy blueness. These were seen on the palmar as well as the dorsal surfaces. The following day there was a very extensive purpuric urticaria about the elbows, ankles and knees, and irregularly scattered over the limbs. There was no special swelling or soreness of any of the joints.

On the 8th she began to have pains in the abdomen of a cramp-like character, coming on at intervals with vomiting. The urine was clear and free from albumin; the bowels were not loose. From the 8th to the 15th, when I saw her, she had in brief the following symptoms: 1. Successive crops of most extensive cutaneous hemorrhages, chiefly in the form of urticaria, but many were deep, subcutaneous, and presented through the skin only a bluish diffuse colour. There were also many smaller purpuric spots not raised above the surface of the skin. 2. The feet were swollen and the ankle-joints enlarged and tender. The other joints did not seem to be affected. 3. On the 12th the forehead became greatly œdematous, and the swelling extended to the eyelids, closing them completely. This swelling was not associated with hemorrhage. There were several spots on the face and ears. 4. Extreme general sensitiveness, so that the slightest touch seemed painful. 5. Abdominal symptoms, consisting of paroxysmal attacks of colic of great severity and of obstinate vomiting. At the time of my visit the child was better than she had been for four days. She was sitting up in bed, and the face looked bright. The left cheek was swollen, tender, and presented on the mucous surface a patchy, whitish

appearance. The arms were covered with fading ecchymoses. Those about the elbow were still raised from infiltration of the skin, and on the hand on both sides there were bluish subcutaneous infiltrations. The spots were not numerous on the thorax, but were tolerably abundant upon the abdomen and very numerous over the buttocks, where they presented the appearance of ordinary urticaria. The patches almost covered the skin of the face and about the extensor surfaces of the knees. The ankles looked large, rather, it seemed, from subcutaneous infiltration than from involvment of the joints themselves. They were, however, painful on pressure. The feet were swollen, the skin tense, due largely to a diffuse subcutaneous infiltration with blood. The abdomen was not tender; there was no enlargement of the liver or spleen; the heart-sounds were normal. The blood was examined by Dr. Thayer, and showed nothing special, except a slight increase in the number of leucocytes. The bowels were constipated. The urine seemed normal in quantity and contained a trace of albumin, but no blood.

Dr. Finney had given various remedies without special influence. Ergot was employed without success. The solution of morphine seemed to be most effectual, allaying the pain and giving the child sleep. The child recovered completely.

Case VIII.—*Slight trauma; crops of purpura; no arthritis; severe colic with diarrhœa; acute nephritis; general anasarca; uræmia; death.*—Olive L., aged five years, referred to me by Dr. Goldsborough, of Cambridge, Md., July 14th, 1891, with general anasarca.

The father has suffered much at times with rheumatism; the mother and three other children are well.

This was the first child; she had always been strong and robust.

On June 14th, just a month ago, while playing under a cherry-tree, she struck her foot against a chair, and complained very much to her mother that it hurt her. Very soon she could not move the leg, and by nightfall, it is stated that she could not move either leg. A small congested spot was seen on one ankle, and it was thought possible that something had bitten her. The next day a rash came out on the skin of the legs, irregular patches of a bright red colour, which within twelve

hours turned to a dark purple. For two weeks they came out in crops, and as they disappeared œdema of the feet was noticed, and the urine became scanty. There was no hæmaturia. The bowels were regular; her appetite was poor, but she had at times severe pains in the abdomen.

Present condition.—The child presents general anasarca and is very anæmic. The tongue is moist; pulse 100; no increase in tension; the temperature is normal. Upon the skin of the legs to the middle of the thighs, and upon the arms to the elbows, there are irregular brownish stains from 5 to 30 millimetres in diameter. The examination of the heart and lungs is negative; apex beat is in normal position. The abdomen is large, and there is dulness at the flanks, but the chief distention seems to be due to tympany. The spleen is not palpable, and the liver is not enlarged. The anasarca extends to the back, and is, of course, most marked on the legs and thighs. The urine was not examined at the hospital, but Dr. Goldsborough, who had made frequent tests, stated that it presented both albumin and tube casts, but no blood.

Dr. Goldsborough wrote subsequently that the condition of the patient did not improve in any way. No further attacks of purpura occurred, but she had frequently colicky pains and diarrhœa. The anasarca continued in spite of all measures, and she died with uræmic coma and convulsions.

Case IX.—*Arthritis; purpura urticans; colic and vomiting; recovery.*—Lewis J., aged twelve years, admitted January 2nd, 1895, with œdema of the legs, pain, and purpura.

The family is healthy; there is no history of hæmophilia. One brother has been treated in the hospital for rheumatism.

The patient has had measles, varicella, and mumps.

Present illness began December 16th, 1894, with pains in the legs. The left ankle was swollen on the 21st and remained swollen up to the date of his visit on the 26th. It was painful only on motion. Red blotches came out on the 20th and 21st. He had no other swelling and no abdominal pain at this attack.

I saw him on the 26th in the dispensary, and noted that he was a healthy-looking boy; gums not spongy; tongue clean. Both legs are swollen and are œdematous, and the skin shows remnants of a copious rash of purpura urticans. The tissues

about the left ankle are much swollen and œdematous and the joint is stiff. He is not able to walk on it. The purpuric rash extends up the trunk as far as the chest. The heart-sounds are clear. This day when we saw him the rash was fading. On the same day after returning home he had a very severe attack, which began with vomiting, and was associated with great pain in the abdomen. This persisted on and off for three days. The pain was griping, recurring in spells, getting very much worse at intervals, and caused him to twist and squirm about in bed. A fresh crop of purpura came out with this attack. He has been getting better, but his legs have remained swollen.

On admission he had a fairly good colour. The gums are a little swollen, but not spongy. The legs show numbers of small, fading purpuric spots. There is a little puffiness, but the ankles are no longer swollen. The edge of the spleen could not be felt.

The boy did very well, the swelling disappeared from the legs, and he has been up and about.

On the 15th he had a fresh eruption on the legs and thighs, most of them cutaneous and purpuric in character; others deep in the subcutaneous tissues, looking like *tache bleuâtre*. The legs became somewhat swollen. He had no colic. There was no albumin in the urine.

Case X.—*Repeated attacks of epistaxis and bleeding from the gums, with purpura. Subsequently attacks characterized by chills, colic, and purpura urticans; recovery.*—B. W., about thirty years, Alexandria; seen February 1st, 1892, complaining of swelling of the gums and a tendency to bleed.

The patient comes of a perfectly healthy family, in which there is no special tendency to bleeding.

In October, 1889, he had his first attack of bleeding from the nose and gums. It began on Monday and continued until Friday. Dr. Hamilton, then of Washington, plugged the nostrils. He was in bed at this time for two weeks.

A second attack began two weeks subsequently, with nose-bleeding, swelling of the gums, and numerous purple blotches appeared on his skin. In this attack the bleeding stopped spontaneously. He was well then until December, 1890, when he had severe bleeding from the gums, and three weeks sub-

sequently another attack, in which he bled also from the nose. He was ill for two days, and at this time he went to New York to consult Dr. Jacobi. He then remained well for some months. In a recurrence he went to Germany and consulted Professor Baümler, who very kindly referred him to me.

During the past year the attacks have changed entirely in character; there have been at least half a dozen, the last one four weeks ago. They now invariably begin with severe pains in the abdomen and vomiting. This is followed by or associated with a chill. On one occasion it lasted an hour; then within the day bleeding begins from the gums, and within from twenty-four to thirty-six hours the skin of the legs and arms (and once of the face) become covered with raised bluish spots. The chill comes first, as a rule, and is not always very severe. Lately he has had no epistaxis, only the bleeding from the gums. The pains in the abdomen are of great intensity and are like ordinary colic. They rarely last more than half an hour to an hour. The vomiting has sometimes been severe; he never brought up any blood; never passed blood in the stools or with the urine. He has never had any pains in the joints.

The patient looks pale, but he is not profoundly anæmic; the pulse is good, a little jerky; the gums are swollen, spongy, but are not bleeding. The skin of the arms and legs is covered with remnants of the attack of four weeks ago; some of the stains are large, as if the rash had been purpura urticans.

The heart-sounds were clear. The spleen was not enlarged.

Patient sought direction with reference to the possible prevention of the attacks. He was ordered Fowler's solution and the juice of half a lemon twice daily.

I heard of this patient on the 13th of February, 1895. Dr. O'Brien tells me that, with the exception of one slight attack shortly after he saw me, he has had no outbreak. He took the Fowler's solution at intervals for a long time, and attributes his recovery to it.

Case XI.—*For four years recurring attacks of colic with hæmatemesis, melæna, purpura, and arthritis.*—Annie R., aged eighteen years, seen at the Dermatological Dispensary with Dr. Gilchrist, June 29th, 1895, complaining of an extensive hemorrhagic eruption on the arms and legs.

In July, 1891, when she was fourteen years old, she had the first attack, which began with vomiting and cramps in the abdomen. From her mother's description it must have been of great severity, as the stomach symptoms persisted for five or six weeks. The cramps were of such severity that she went off into spasms. At first the vomitus was not coloured; subsequently she vomited blood, and she passed blood from the bowels and in the urine, and once coughed up blood. About eight weeks after her illness began, before she had recovered her strength, blotches appeared on the arms and legs, and she had pain and swelling in the knees, elbows, and fingers. In this attack she was in bed very ill, and crops of purpura recurred on and off until January. Then she got better and remained well until the following August, when she had a second attack, which was not so severe, as she had not to go to bed, but it had the same characters of cramp in the abdomen, much vomiting, and the skin eruption. She has had no arthritis since, and no bleeding from the mucous membranes. During the past two years the attacks have recurred with great frequency, and she no sooner recovers from one attack than another begins to develop. She has not, however, had cramps for two years.

Present condition.—She is a healthy-looking, well-nourished girl; colour is good; tongue is clean. The gums are not spongy (her mother says they never have been swollen); the tonsils are not enlarged. None of the joints are swollen. There is an extensive hemorrhagic eruption on the arms and legs, chiefly on the extensor surfaces of the arms and about the elbows. The rash does not extend to the chest and back and there are no spots on the hands or on the face. The skin of the lower extremities is extensively involved; the ankles are a little swollen and puffy and the skin over them shows many fading spots. The eruption is very abundant about the knees, where the hemorrhages in places are confluent. Some of the patches are a little raised. The eruption is somewhat symmetrically distributed on the knees. It is also very abundant on the thighs.

Patient seen again October 7th, 1895. She has been taking Fowler's solution, and has been in many ways much better. Through the summer she has had four attacks, one with vomiting and colic. The vomiting began in the evening about six

o'clock and lasted until 1 a.m. The spots came out with great rapidity and were very extensive over the arms and legs. In one of the attacks the knees and ankles were swollen and tender. In one of the attacks Dr. Gilchrist removed a small spot of the purpura and found, as his sections show beautifully, that the hemorrhage was chiefly about the hair follicles.

At the time of the present visit the skin is almost entirely clear.

The visceral lesions of the various types of erythema have been carefully studied by many observers. In erythema nodosum, endocarditis and pericarditis have been frequently described. Lewin* in fifty-eight cases met with heart complication six times, and Stephen Mackenzie† found ten instances of heart affection in 108 cases of erythema nodosum. In the type of erythema characterized by hemorrhages and œdema with pains in the joints—the affection known as purpura, or peliosis, rheumatica—the visceral complications are, as Kaposi remarks, much more frequent than in erythema nodosum. They are chiefly albuminuria with nephritis and acute endocarditis.

Ever since Willan (1808) described a case of purpura associated with violent vomiting, excruciating pains in the bowels, and anasarcous swelling of the legs, thighs, and hands, cases have been reported with this remarkable symptom-complex. One of the earliest cases by Ollivier‡ is of especial interest, inasmuch as with the ecchymoses there was also simple œdema of the eyelids and of the hands.

Henoch§ in 1874, and also in the various editions of his *Vorlesungen ueber Kinderkrankheiten*, called attention to this combination of symptoms.

Couty‖ described the condition as a special form of purpura of nervous origin.

Of late years an attempt has been made to separate these cases as examples of an independent disease, which has been called *Henoch's Purpura*. V. Dusch and Hoche, in *Henoch's Festschrift* for 1890, have given an exhaustive description of the cases, and a tabulated list of seventeen cases in children, and

* *Charite Annalen*, Bd. iii.
† *Clinical Society's Transactions*, vol. xix.
‡ *Berliner klin. Wochenschrift*, 1874.
§ *Archives de Méd.*, 1827.
‖ *Gazette Hebdomadaire*, 1876.

twenty-two in adults. They conclude that the clinical picture presents differences from the forms of purpura heretofore recognized, which are sufficient to establish an independent and well-defined type of disease.

Though Willan gave a graphic description of a case, this symptom-group has not attracted special attention from English and American writers. Among the fifty-four references in the article by v. Dusch and Hoche there were only three English and no American cases. Of the recent text-books, that of McCall Anderson* makes, as far as I can see, no mention of it. Crocker † refers to two cases with gastro-intestinal symptoms. Malcolm Morris‡ is silent on the subject, with the exception of a brief reference to cardiac complications in peliosis rheumatica. Kaposi§ lays much stress on the internal complications, among which, under erythema multiforme, he mentions hemorrhage into and gangrene of the pharyngeal mucosa, hemorrhage from the kidneys, severe arthritis, endo- and pericarditis, and pneumonia; in erythema nodosum, besides the colic, acute nephritis; and in purpura or peliosis rheumatica, hæmaturia, and endocarditis. In the works on skin diseases by American authors the special symptom-group to which I refer is scarcely mentioned.

In addition to those collected by v. Dusch and Hoche there are cases reported by Russell,‖ McKay,¶ Dutt,** Collie,†† Monillot,‡‡ Prentiss,§§ and two cases by Musser.‖‖ Other cases are reported by Silbermann.¶¶

When one considers how benign, as a rule, in all its types, is the course of exudative erythema, the mortality of the cases with severe visceral complications is remarkable. Of sixty-one cases (including those in v. Dusch and Hoche's table, the additional ones which I have collected, the eleven cases here reported), there were thirteen deaths, a percentage of 21·3.

* *Diseases of the Skin.*
† *Diseases of the Skin*, 2nd edition, p. 115.
‡ *Diseases of the Skin*, 1894.
§ *Pathologie und Therapie der Hautkrankheiten, Vierte Auflage*, 1893.
‖ *British Medical Journal*, 1883, ii.
¶ Ibid., 1886, ii.
** Ibid., 1888, ii.
†† *Lancet*, 1891, i.
‡‡ *Transactions of the Academy of Medicine, Ireland*, vol. v.
§§ *Transactions of the Association of American Physicians*, vol. v.
‖‖ Ibid., vol. vi.
¶¶ *Henoch's Festschrift.*

Of the visceral manifestations by far the most common are the *Gastro-intestinal crises*, which are claimed as the distinguishing characteristic of Henoch's purpura. The features are very varied. They may be simple colic of all grades of intensity, from a transient, readily borne belly-ache to an attack of such agony and duration that repeated hypodermics of morphine have to be given. Vomiting and diarrhœa are frequent, but not necessary, accompaniments of the attack. In some cases the vomiting occurs without the colic, or a severe attack of vomiting and diarrhœa may accompany the outbreak of the purpura. The attack bears no relation whatever to food, and may come on abruptly in a person in excellent health; and in Case II. (in which the colic occurred alone so frequently) the boy's mother could never notice any circumstances which increased the liability to the trouble. An identical form of colic is described in the so-called angio-neurotic œdema, many cases of which should doubtless be reckoned with this type of erythema exudativum. In fact, in one of the attacks in Case II. œdematous swellings occurred without purpura. In the remarkable family which I described a few years ago,* in which acute circumscribed œdema had occurred in five generations, the gastro-intestinal crises formed a special feature of the attacks. Of great interest in this connection is the patient whose history is given under Case I., in whom for more than two years the attacks have been characterized by fever, delirium, and gastro-intestinal crises of great intensity, but without skin lesions.

It is possible that among the cases of recurring gastro-intestinal crises of unknown etiology, such as have been reported by Leyden, some belong in this category.

Nephritis, the most serious complication, was present in five of my cases. In the total number (61) already referred to there were fourteen cases, of which four died. In the mildest grade there is only a trace of albumin, with a few tube casts, as in Case VII.; while the more aggravated cases present all the symptoms of an acute hemorrhagic nephritis. Recurring hemorrhages may take place from the kidneys, as in Case XI., without causing nephritis. In other instances, as in Case VIII., the nephritis dominates the scene almost from the outset, and may prove fatal within a few months. The amount of albumin present varies

* *American Journal of Medical Sciences*, April, 1888.

from a well-marked trace, as in Case VII., to large quantities, as in Cases III., IV., and VIII. The tube casts were hyaline and epithelial, and often contained blood-corpuscles. Dropsy was present in two of my cases. In a majority of the cases the recovery is complete, but in rare instances the nephritis becomes chronic. The only case, so far as I know, in the literature has been reported by Dr. Prentiss, of Washington. At the Association of American Physicians in May, 1890, he showed a patient aged thirteen years, who in March, 1889, had his first attack, with pain in the abdomen, vomiting, arthritis, and purpura. A second attack followed in September and a third attack in November of the same year, in which, in addition to the pain in the abdomen, there were hemorrhages from the bowels and bladder. In this attack he was delirious, and had dyspnœa and swelling of the forehead. On December 17th, 1889, and on February 27th, 1890, he had relapses. After this, to the date of reporting, he had recurring attacks at intervals of a month or six weeks. The urine contained blood, and on one occasion it was diminished in amount and had much albumin. A point of particular interest in this case was the fact that he had large hemorrhages into the skin, which became gangrenous and sloughed. At our meeting this year—May, 1895—Dr. Prentiss brought the patient before us again. The boy has now chronic nephritis, with dropsy, albuminuric retinitis, increased tension, and stiff arteries. In this instance the acute nephritis of 1889, associated with the extensive erythema exudativum, laid the foundation of the present chronic nephritis.

Next in order of serious import is the hemorrhage from the various mucous membranes, which were present in five of my cases. There was bleeding from the nose in three, in one of which the nostrils had to be plugged on several occasions. Case XI. had hemorrhages from the stomach and bowels and coughed up blood. Slight hæmoptysis occurred in another case. In three there were hemorrhages from the kidneys. In Case X. the gums were swollen and spongy and bled profusely in many of the attacks. Hemorrhage from the bowels is the most common, and occurred in thirty of the thirty-nine in v. Dusch and Hoche's tables, and in thirty-nine of the total sixty-one cases. In one case only of their list did the gums bleed, and in three the sputa were bloody; in no instance, I believe, did death

occur directly as a result of hemorrhage from the mucous membranes.

Cardiac complications were not present in my cases; the murmur in one case quickly disappeared. Endocarditis is rare, having occurred in only two cases in the total series. Pericarditis occurred in three cases. This is a much smaller percentage of heart complications than in the cases of erythema nodosum collected by Stephen Mackenzie. I have only once seen cardiac complications in peliosis rheumatica. The case has been reported by Dr. Musser,* who very kindly took me one day to see the case. The patient had extensive peliosis rheumatica with pericarditis and a gangrenous slough on the uvula.

The respiratory organs are less frequently involved. In Case II. the recurring attacks of cough with bronchitis are, I believe, part of the affection. The sputa always indicated bronchitis, and at times the cells of the alveolar epithelium have been unusually abundant. The cough was often dry, very annoying and persistent, and there was once or twice sneezing. In v. Dusch and Hoche's list of thirty-nine cases pleurisy is mentioned twice, bronchitis once, and pneumonia twice, both fatal cases. In Case IX. of my series pneumonia followed the disease and proved fatal. In this connection it is interesting to note the statement of Lewin, who found among seventy cases of erythema nodosum in the literature four deaths from pneumonia.

The onset of the attack may be with a chill, as in Case X.; more frequently the skin lesions are preceded by feelings of indisposition and slight gastric disturbance. The curious prodrome, which has recurred during so many years in Case I., great coldness of the feet, I have not seen mentioned. Fever is a frequent accompaniment of the attack. In cases which have the type of peliosis rheumatica the temperature may range from 101° to 103°, or even higher, for several days; there may, however, be the most extensive skin lesion without pyrexia. At the height of the attack delirium may occur.

Perhaps the most extraordinary and distressing feature of the disease is the tendency to recur, which is so noticeable in all types of exudative erythema. In Case XI., in which the disease has persisted for four years, during the first two years the girl

* *Transactions of the Association of American Physicians*, vol. vi., p. 284.

no sooner recovered from one attack than another began. In Case I. the patient's life is, as he says, a burden, owing to the recurrence every month or two of the severe colic.

Arthritis was present in five cases of my series, and in thirty-two of the collected cases. The peri-articular more often than the intra-articular tissues are affected, and the chief part of the swelling is often due to effusion in the tendon sheaths about the joints, and, as in Case II., the patient may be able to walk quite well with the ankles much swollen.

The anatomical conditions associated with the visceral symptoms are not well understood, but the changes in the gastro-intestinal canal, at least, are probably the counterpart of those which occur in the skin, namely, exudation of serum, swelling, hemorrhages, and in rare instances necrosis. At autopsy hemorrhages have been found in the internal organs. A remarkable case is given by Silbermann in *Henoch's Festschrift* for 1890. A child, aged ten years, was attacked on December 15th, 1887, with fever and pains in the knees. On the 16th there was an outbreak of purpura, with colic, hæmatemesis, and melæna. After persisting for three days the symptoms disappeared. The attack recurred in January with great severity, and on the 20th, 21st, and 22nd there were signs of an acute peritonitis. The autopsy showed an acute purulent peritonitis, which had resulted from a perforation at the fundus of the stomach. There was no ulceration in the bowels, but the mucosa was swollen and congested. There were necrotic foci in the stomach and intestines, and thrombi were found in some of the blood-vessels. In a few instances necrosis and gangrene have occurred on the skin, as mentioned in connection with Dr. Prentiss's case.

The outbreak of this type of erythema multiforme during gonorrhœa, as in Case V. of my series, is interesting in connection with the etiology, since this is one of the infections with which a severe type of true purpura hemorrhagica occurs, and of which a fatal instance has been recorded by Patterson.*

I purposely refrain from discussing the relation of these conditions to rheumatism, and the question of the infective character of some forms of erythema exudativum. I have nothing to say which would help to clear the existing confusion

* *British Medical Journal*, 1886, i.

or which is not already better said in journals and monographs easy of access. My purpose in this paper has been to call attention to the importance of the visceral manifestations of the disease.

In Cases II. and X. arsenic appears to have been beneficial; in other instances it did not seem to do good.

SLEEP IN ITS RELATIONS TO DISEASES OF THE SKIN.

BY

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SLEEP IN ITS RELATIONS TO DISEASES OF THE SKIN.

By L. Duncan Bulkley, A.M., M.D.

To those who look upon affections of the skin as wholly or largely local affairs, dependent upon extraneous influences, whether parasitic or other, the discussion of the topic here proposed will probably seem unnecessary, and some of the statements unsound. But to those who take the broadest view of dermatology, and regard the aggregation of symptoms to which are given the names of different diseases as only the expression of various forms of disordered tissue-action, influenced by every element which conduces to perfect or imperfect nutrition and innervation, the subject is fraught with the greatest interest, and is one of a most practical character.

Sleep is undoubtedly one of nature's sweet restorers, and yet in the literature of dermatology, both in text-books, monographs, and journal articles, I can find hardly any allusion to the subject, and I do not know of its having been referred to in any society discussions on dermatological subjects, except in the briefest and most superficial manner.

On the other hand, with me it is one of the most important elements to consider in connection with many diseases of the skin, and for 25 years I have made notes in regard to this element in large numbers of my patients; so important do I consider it that on my printed paper for recording cases the word "sleep" appears twice, once in connection with the "previous history of the patient," and again in recording the condition of the patient at the time of first observation; record in regard to sleep also is commonly made, in very many patients at each subsequent visit.

It is not necessary at the present time, even if I were able,

to discuss the nature of sleep or the causes that produce it in the healthy individual. Every one recognizes "that natural condition of restful unconsciousness into which the system falls normally with more or less regularity daily." * Every one also recognizes the difference between this restful and perfectly refreshing sleep and that which is disturbed in varying degrees; the disturbance may vary from a slight insomnia to a more or less well-marked vigil or wakefulness, and there may be also various degrees of deranged sleep, from a not unpleasant dream to the agonizing distress seen in children or others starting up with "night terrors," also the varying degrees of sleep-talking, sleep-walking, &c.

Normal, healthy sleep is certainly one of the elements of health of the body and all its tissues, whereas disturbed or deranged sleep is a contributing factor to many diseased conditions of various structures of the body. As already remarked, the relations between sleep and diseases of the skin have not hitherto received the attention of dermatologists, but is it not quite reasonable that the state or condition in which more than one-third of the human life is spent must have something to do with the nutrition and innervation of the skin as well as of other organs? We all know how readily the expression of the face and the tone of the tissues will show the results of continued loss of sleep, while the fresh, vigorous tone of the skin of the person in perfect health, with perfect sleep, is equally well recognized by everyone.

But it is largely in the direction of the symptomatic character of disturbed sleep that this feature is of practical importance in dermatology. Normal sleep depends upon the perfect functionating of all the parts of the system, so that the periodical rest occurs in a natural manner; conversely, disturbance in the performance of the function of various portions of the body may lead to an imperfect sleep.

Illustrations of this are, of course, familiar to all; such are the restlessness in sleep with vivid dreams, and unrefreshing sleep dependent upon digestive disorders; the insomnia accompanying diseases of the heart and blood-vessels, that due to excessive use or abuse of tea, coffee, and tobacco; the wakefulness following excessive brain-work, grief, emotion, &c.,

* Foster, *Illus. Encyclop. Medical Dict.*

and that due to cutaneous influences, as itching, pain, burning, &c.

For convenience of consideration we may arrange the causes of disturbance of sleep under six main classes, as follows:—

1, Digestive; 2, Toxic; 3, Circulatory; 4, Nervous (direct or reflex); 5, Psychic; and 6, Cutaneous.

Time and space forbid my entering here fully into the subject, or elaborating in detail the features belonging to these six classes of causes, which exhibit themselves more or less frequently in disturbed sleep in many patients with diseases of the skin; some of them will appear later in our consideration of the matter in hand.

We may now study our subject somewhat more in detail and will consider: 1, Disturbances of sleep preceding or causing diseases of the skin; 2, Disturbances of sleep accompanying or caused by diseases of the skin; and 3, Means of removing disturbances of sleep in connection with diseases of the skin.

1. Disturbances of Sleep Preceding or Causing Diseases of the Skin.

In speaking of disturbances of sleep preceding or causing diseases of the skin I do not wish to be misunderstood. It is not claimed that the disturbances of sleep which shall be spoken of are often the direct causative agents which induce diseases in the skin, nor that their removal will necessarily be followed by recovery from the skin trouble. I only assert that for many years I have so constantly observed the concurrence of, and relations between the two, in very many patients, that, to my mind, the former should be observed, regarded, studied, and more or less treated from their basic standpoint, in order to obtain the very best results in the treatment of the latter.

In endeavouring to learn the exact character of the sleep of patients some considerable care will often be necessary. In questioning in regard to sleep the common and hasty answer will frequently be that the sleep is "all right," or "very good," or even "too good," when a careful cross-questioning will very often elicit the fact that this is far from being the case. Many are forgetful; many become so accustomed to the character of

sleep which they have had, that they do not appreciate that it can be otherwise; and I have found large numbers of persons who, for many years at least, have not had at the right times and under the right conditions that "natural condition of restful unconsciousness" which constitutes perfectly normal, healthy sleep. Many will have drowsiness during the day or evening, and insomnia or unrefreshing sleep at night. Many will have long periods of vigil or wakefulness on retiring, or will awaken frequently, or very early in the morning, with inability to further sleep. In some the sleep will be heavy, "like a log," and troubled or not with vivid and annoying dreams; in others the sleep may seem fairly good, but is wholly unrefreshing in character, and the patient will be as tired in the morning as on retiring, or even more so; and patient inquiry will often discover many other aberrations from healthy, restful sleep. These may depend upon any one or more of the six principal causes already mentioned, or perhaps others.

Now, while these conditions exist, and they could be amplified very much more, perfect nutrition and innervation do not and cannot exist, and the skin tissues, even if restored to a comparatively normal state, by either external or internal measures, will readily yield again and become diseased. It is the failure to properly recognize and treat these and other derangements of the system which has led in some measure to the recognized obstinacy of skin diseases; and the dermatologist can never practise his branch in the highest and best manner unless he is thoroughly competent in general medicine, and skilled to recognize and treat the functional and other disturbances of the system which have so much to do with the vigour and health of the individual and all the tissues.

In a not inconsiderable number of cases of eczema I have known the eruption to first appear after a period of sleeplessness, which in different cases had occurred from quite different causes; and time and again I have known fresh attacks of eruption to come on, apparently from the same cause. How far this element of imperfect sleep has to do with the causation of other skin diseases I cannot tell positively at the present time. It is hoped that others will observe the matter closely and report their experience.

2. Disturbances of Sleep Accompanying or Caused by Diseases of the Skin.

The first disturbance, which will occur to every one, is that arising from itching. As all know, this is often a most distressing feature in many cases. From earliest infant life to extreme old age one afflicted with eczema may have sleep largely interrupted by itching; indeed the nocturnal sufferings of these patients will often far exceed those of the day, and after a night of real agony, with only snatches of broken sleep, the patient enters on the day wholly unrefreshed.

The reasons for the greater distress from itching during the night, in many skin disorders, seem to be numerous: 1. The exhaustion of the nervous system by the activity of the day renders it more liable to disturbances, until the loss of nervous energy has been restored by sleep. 2. During sleep there is a certain withdrawal of the general nervous control of the system, which allows special irritations to assert themselves; this is observed also in relation to other disorders of the system, as in asthma, in certain neuralgias, in urinary and bladder affections, &c. 3. During the condition of somnolence there is also an absence of self-control, which leads the patient, perhaps unconsciously at first, to scratch and rub, even for a slight pruritus, and thus to excite an already irritated skin to an increased erethism and to the development of new lesions, requiring fresh scratching. 4. Just as the brain is especially excited at night by the products of faulty metabolism, resulting from digestive disorders, and even the nerve elements of the healthy skin suffer a like irritation during the period of sleep (manifested by restlessness and even burning and moderate itching), in like manner patches of diseased skin are especially irritated at night by the circulation of imperfectly elaborated blood. 5. Finally, the warmth of the bed favours a congestion of the skin, which congestion, pressing upon nerve elements already in a state of irritation, excites them to renewed activity.

I have known cases where complete nervous exhaustion has thus occurred, and remember vividly a lady who, having tried an infinity of remedies to get relief, had finally been given chloroform repeatedly by her husband for this purpose, with disastrously prostrating effects.

Other diseases—urticaria, pruritus, dermatitis herpetiformis, &c.—will often act in the same manner, and the resources of the physician will frequently be taxed to the uttermost in meeting this element of the case. In some instances, as in zoster, dermatalgia, and syphilis, the sleep will be broken by pain, which, indeed, may be also a formidable obstacle to overcome; various ulcerative affections and also bullous eruptions, as pemphigus, may in like manner interfere with sleep.

But, as mentioned in the preceding section, it is necessary to recognize certain other less-marked disturbances of sleep, which will not infrequently be found accompanying some diseases of the skin, if indeed they are not caused by the conditions which lead up to the latter; for, as already mentioned, we should not, in a study like the present, consider these diseases of the skin as entities, but only as expressions of a disordered physical state, the changes in the skin taking various forms, which we for convenience designate by different names of diseases.

In a not inconsiderable proportion of my cases of acne, in private practice, I find, on close questioning, that disorders of the sleep are very common; and continually, as the case progresses to a cure, I find the character of the sleep change for the better. Many a patient has told me, during treatment, that for the first time in years the sleep had been of the natural refreshing character of health. The same is true, though to a somewhat lesser extent, in psoriasis and in other diseases, and also in eczema, even when the disturbance has not been from the itching, but only from the general systemic derangement.

The form of the sleep disorder in these cases has varied greatly. At times it has been vigil on retiring, in others an early wakefulness, perhaps even toward morning, say after 3 o'clock; in many patients it has been only a disturbed character of sleep, with frequent dreams of a pleasant or terrifying nature; or again, simply a restlessness at night, with a total want of refreshment in the morning, &c.

As I said before, I do not claim that all these sleep derangements are directly causative of or caused by the particular skin disorder present, but do believe that they are elements which go to make up the complex state finally exhibited by an eruption on the surface, and that unless they are more or less rectified, permanent good cannot be done.

In closing this section of our discussion mention should be made of the restlessness in sleep belonging to the eruptive fevers, and also of that accompanying some other conditions, as jaundice, glycosuria, and chronic kidney disease, where a dry and itchy skin prevents sleep.

3. Means of Removing Disturbances of Sleep in Connection with Diseases of the Skin.

To rightly understand and apply the correct principles and measures of treatment with success, that is, in the generality of cases, it is necessary, first, to keep well in mind the nature of physiological sleep, and the causes which disturb it, as already alluded to; and second, to study the individual case, in reference to the existing conditions antagonistic to sleep. Routine prescribing may occasionally give relief, but far oftener does harm. A vast weight of responsibility rests on those who in times past and present have vaunted this or that new soporific, which has too often been employed with but little thought, except to heed the enticing claims put forth by those who manufacture and push it for commercial purposes.

Sleep is, always has been, and probably always will be, a great mystery. While we undoubtedly know considerable in regard to the conditions of the brain during sleep, and the experiments and observations of many prove very conclusively that the brain is in a condition of anæmia during sleep, it is not known whether that anæmia is a primary condition, or whether it is secondary to changes in the brain cells, induced by a "periodic exhaustion of intra-ganglionic energy."

Fortunately, however, it is not necessary practically to fully understand the exact order of precedence of the causative elements of sleep; for we do know positively that agencies can cause insomnia which operate in either of two directions, namely, by furnishing stimulus to the nerve cells, reflex or otherwise, or by causing excitement to the cerebral circulation.

A most interesting experiment by Chapin, cited by Long Fox,* demonstrates the latter perfectly. He applied amyl nitrite, which promotes the circulation of the brain, very carefully to the nostrils of a number of patients who were

* Long Fox, *The Influence of the Sympathetic on Disease*, p. 217. London, 1885.

sound asleep, and in every case they awoke promptly; this was repeated on several evenings on different patients with a uniform result. As a counter-experiment he applied bisulphide of carbon and oil of peppermint to other patients, not a third of whom were roused; showing that the results were from the action of the amyl nitrite on the circulation, and not simply from the odour, or from his presence near the bed, &c. All recognize, of course, that stimulus to the brain cells, as by light, sound, severe pain, or itching, brings consciousness, and also that intense mental activity prevents sleep.

The disturbance of sleep by reflex action from other parts of the system, and by the irritating effects of the products of imperfect assimilation and disassimilation are more or less commonly recognized, even by the laity. The child who tosses in sleep will often be rightly thought to have intestinal worms, or will be suffering from undigested substances; and all degrees of restlessness and deranged sleep will be noticed from the latter cause, even up to violent manifestations of "nightmare" and "night horrors."

All recognize the perturbed sleep after partaking of heavy or indigestible substances, especially late at night, and also that associated with many forms of chronic indigestion. Now it is just these conditions which so frequently exist in those suffering from many diseases of the skin, and which often play an important part in the ill-health which leads up to them; and it is these which it is often of the greatest importance to consider and treat, if the best results would be obtained in the skin lesions.

I am convinced that often when itching exists, and seems to be the cause which prevents or disturbs sleep, the real cause, in part at least, will be found elsewhere, and that the patient will sleep well if that is removed, even in spite of some itching. I will therefore consider this last section of our subject under the six main classes of the causes of disturbance of sleep already mentioned, namely: 1, Digestive; 2, Toxic; 3, Circulatory; 4, Nervous (direct or reflex); 5, Psychic; and 6, Cutaneous.

1. *Digestive.*—The subject of the disturbances of sleep by digestive derangements is so great that it can be hardly more than touched upon at the present time. But, on the other hand, it is one of the most important points to consider in

connection with many diseases of the skin, and mus not be passed by with a single question. Not only should remedies be given to correct the digestive disorders, but accurate directions should be given as to diet; for, with modern life, the temptations to error in eating and drinking are so great that few escape some digestive disorder, and with many this affects sleep; indeed, sometimes sleep disturbance will be about its only marked symptom. Late eating at night, and that generally of indigestible substances, is a fertile cause of sleep disorder; on the other hand, long abstinence from food will also frequently interfere with sleep. In this latter case, if patients are awake four or five hours after finishing supper, say until midnight, a warm drink, such as pure milk alone, or a very weak broth of meat extract, or a thin gruel, will commonly secure perfect sleep.

It will often, however, be quite difficult to determine exactly the dietary error at the bottom of the sleeplessness, but it can be accomplished by patient investigation. Sometimes constipation will be the cause of deranged sleep, and all must have noticed how much better and more refreshing sleep is apt to be after a free purgation, when this has been needed.

2. *Toxic.*—Toxic disturbances of the sleep are much more common than is supposed. These include not only the effects of the excessive use of coffee, tea, and tobacco, but also other disturbing elements, such as quinine and some other drugs. The toxic character of many of the products of gout will also prevent or derange sleep and should always be taken into consideration. This is, of course, closely connected with the preceding section, and much care should be given in these cases in securing the most perfect metabolism possible; this is to be accomplished by various means, including diet, hygiene, exercise, and remedies affecting the chylo-poietic viscera. Hypnotics should be rarely resorted to.

3. *Circulatory.*—Not only in marked disease of the heart, in aneurism, and in atheroma may there be derangement of sleep, but this is apt to happen frequently where no gross lesions of the heart or blood-vessels exist, but where there is only heart-weakness and functional disturbance of the circulation. This may manifest itself in many ways. With an excited circulation, often evidenced by throbbing in the head, the warm bath, or

even a foot-bath on retiring, will so withdraw the blood current from the brain that the symptom will no longer cause annoyance. Recently a patient of mine with lichen planus, who was very actively engaged as a lawyer, under great and prolonged excitement connected with some recent public trials, obtained sweet and refreshing sleep in this way for many nights in succession. In some cases one of the bromides, with a trace of aconite, will give entire relief. In some cases, on the other hand, where there is heart weakness and a general weak tonicity of the blood-vessels, digitalin, given before meals, and at bed-time, will act better than anything else, as I have repeatedly witnessed.

Another form of deranged circulation will be manifested in cold and clammy hands and feet, which are continually observed in skin patients, and which often prevent sleep long after retiring. Digitalin will often remove this, as will also the appropriate treatment for the anæmia causing it; relief is obtained, likewise, by plunging the members alternately into basins of hot and cold water, and by other measures which readily suggest themselves.

4. *Nervous.*—Nervous (direct or reflex) causes of the derangement of sleep in patients with diseases of the skin are numerous, and will often require some care in their discovery and removal. In many a case the skin lesion will be but one of the signs of a general breakdown which has come from excessive or injudicious use of the brain, and the insomnia which has resulted has in turn contributed much to the further debility of tissue; in some instances it has come from overwork, or from social or other dissipation, with restricted hours of sleep. These cases often require very delicate handling, by all means tending to restore exhausted brain cells; it is worse than useless to give the so-called sedative remedies, and even bromide of potassium will sooner or later increase instead of diminish the trouble we seek to remove. Good and proper feeding, with nerve tonics, and friction of the surface, such as a thorough rubbing of the body and limbs with a Turkish towel at night, after a brisk sponge with tepid water, or even a cold pack, &c., will often restore the nervous vitality and permit of sleep. In some cases digitalis, by restoring tone to the overstrained and relaxed capillaries of the brain will be of much service, as may also ergot.

If the sleep disturbance is caused by reflex nervous irritation, whether it be by intestinal worms, uterine, bladder, throat, or other disease, these will require attention before the sleep can be of the refreshing character which leads to a perfect restoration to health.

When the sleep of patients with diseases of the skin is disturbed by extraneous influences, as noise, light, heat, cold, &c., these matters should be looked into and rectified, if possible; and pain from any cause, disturbing sleep, should also be relieved, if practicable, for the reasons already mentioned.

5. *Psychic.*—Psychic disturbances of sleep are not at all uncommon, and will often have to be met in treating diseases of the skin. Mental cares, whether of business, domestic, or social character, may all at times act as powerful depressants, and by interfering with perfect sleep hinder the cure of skin lesions. In addition to general rules, and the endeavour to free the mind from the disturbing load, these cases will often receive the greatest benefit from the judicious use of proper hypnotic remedies for a short period. I well remember the case of a young lady, much afflicted with acne, who had been utterly sleepless for some little time, owing to an unfortunate love affair. A few full doses of a mild hypnotic insured prolonged and refreshing sleep, after which the preceding troubles vanished under the appropriate treatment.

6. *Cutaneous.*—Before speaking of the relief of sleep disturbed by pain, itching, and burning in the skin, I wish to make a single cautionary remark, namely: It is an error to suppose in every instance where the patient complains that the sleep is disturbed by these causes that this is wholly the case. In many many instances, some of the other elements which we have considered are really at the bottom of the sleep disturbance, and when the patient is thus deprived of sleep the pain or itching asserts itself, and then forms an additional cause of wakefulness. A single illustration will suffice to recall others. How often do we find that those who are called upon to empty the bladder at night are, when thus aroused, distressed and then kept awake by the itching which is induced by the exposure of the surface to the air after warmth in bed? The same occurs when some are awakened by troublesome dreams, by palpitation, by indigestion, or

perhaps by a laryngeal cough, of gouty origin, it may be. Now the careful and proper attention given to these, and their removal by appropriate measures, will often be of the very greatest importance in securing rest in sleep for those afflicted with diseases of the skin. And if this refreshing sleep is obtained, then with the resulting gain to the nervous system the very pain or itching will be less annoying, and so will be more easily controlled.

We may dismiss very briefly the subject of pain as a disturber of sleep in connection with diseases of the skin. This should always be attended to, and special methods will suggest themselves to all. The pain from syphilitic lesions will generally yield more or less promptly to very actively pushed specific medication suitable to the special stage of the disease or character of the lesion present; but opium or morphia may occasionally be needed. I have also repeatedly found the very greatest, indeed perfect, relief to osteocopic and neuralgic pains in syphilis from antifebrin, in about five-grain doses, given every hour or two, with hot water, and a little whisky if there seems to be any depression.

In the distressing pain often accompanying or following herpes zoster, especially in elderly persons, galvanism will prove very valuable, and I recall a patient who, having previously had distressing nights from ophthalmic zoster, would drop off to sleep while galvanism was being applied. Antifebrin is also extremely serviceable, and will secure sleep even when the pain has previously produced great wakefulness; it must be used freely, however, to be of great service, and needs to be watched.

Itching as a cause of sleep disturbance is unfortunately too well known to everyone, and all are familiar with the difficulties often attending its relief. Proper internal and local treatment, of course, play the most important part in securing sleep under these conditions; but I will not attempt to develop this subject, which could alone occupy our entire time. A few words, however, may not be out of place in regard to some of the details connected with the latter, which are sometimes overlooked.

Patients generally understand very little in regard to modes of making applications to the skin, and very explicit directions

are often necessary to secure the desired result. The same application used in a right and a wrong way may produce very different results. This is strikingly illustrated in connection with eczema of the scrotum. With the exactly proper application of hot water, followed immediately by the perfect adjustment of an ointment of tar and zinc, spread on lint, closely applied and kept firmly in position, we may often get perfect rest at night, when a previous application, wrongly made, has been followed by great insomnia. I have frequently seen sound sleep secured in infants, with the most severe and general eczema, by a proper dressing, firmly bound on only to the parts which were most liable to be scratched, when a former dressing, quite proper in itself, but loosely and wrongly applied, had given no results.

In some instances the exposure of the body to the cool air, on undressing at night, will excite so much pruritus that sleep is prevented; much of this can be prevented by avoiding this exposure, the patient going to bed with the underclothing on, making an application beneath the clothing; in the morning a general dressing of the affected parts can be made, if desired, and fresh underclothing put on. Also in regard to taking baths, whether medicated or not, errors may occur which will result in the sleep being disturbed or altogether prevented. Sometimes baths will be taken so hot as to excite the circulation and prevent sleep; in the process of drying the skin after them, patients may also so stimulate the surface with towels that subsequent applications do not suffice to allay the irritation, which then prevents sleep. In a word, regard must always be had for sleep in giving directions for treatment of skin patients, for, as stated before, a restless or sleepless night will often operate so disadvantageously to the patient that much of the good effect of treatment may be lost.

In the matter of the administration of internal remedies to secure sleep in patients disturbed by itching, there is need of the exercise of much discretion; they are often *needlessly* given, they not infrequently prove *useless*, and are sometimes *harmful*. From what has preceded, the needlessness of hypnotics in many cases has been abundantly shown. Their uselessness is seen where the irritation from the skin is very great, for they rarely serve to secure sleep until the irritating is in a large

measure removed. Their harmfulness frequently appears in the attempt to substitute them for the proper measures of relief, general or local, or to press stronger and stronger remedies, even to the great depression of the nervous system.

But, on the other hand, by the judicious use of these we can occasionally accomplish very much both for the comfort of the patient and for the cure of the disease. The first point to remember, which is often forgotten by the profession, is the utter futility of prescribing preparations of opium to secure sleep, when it is disturbed by itching; the skin irritation is commonly so aggravated thereby that the narcotic effect of the drug is largely nullified, and if sleep or stupor is secured by a large dosage, it is of the most unrefreshing nature, and the scratching during sleep, which commonly occurs, will often greatly aggravate the disease.

There are, however, remedies which often aid in quieting the pruritus, and which may be given with advantage. When not otherwise contra-indicated, bromide of soda in good dose, with a fair amount of tincture of aconite, will often produce a quiescent effect which is most happy. Tincture of gelsemium, in increasing doses, given every half hour, for three doses, has acted excellently in my hands; cannabis indica, employed in the same way, is also very often efficient.

I may remark that the method of preparing three increasing doses of a remedy, and placing them under the patient's control by the bed before retiring, will also aid in the action desired; the expectancy of the result augments its efficiency. I direct that one dose shall be taken on getting into bed, the second half an hour later, if needed, and the third, still half an hour or an hour later. Repeatedly I have found that the third dose was left untouched, and rarely do the three doses fail of action. The patient should be instructed to have the doses ready, properly diluted, in separate glasses, so that they can be drank in bed, with as little rousing as possible, and certainly without rising to prepare or take them.

Phenacetin often proves a most valuable hypnotic in pruritic cases; three doses may be arranged in the manner above described. Antifebrin is also serviceable, but requires greater caution in its use. Sulphonal is frequently given to secure sleep under these circumstances, but in my experience it is not

a very satisfactory remedy. When used thus there seems to be a later depression of the nervous system, which in the end aggravates the skin complaint. I have used trional in some, but have not yet been very well satisfied with the results. Chloral has also a secondary nervous reaction which is often harmful, although in certain cases its use for a night or two will seem to so induce the sleep habit that patients can afterward do without any aid; it can often be advantageously combined with bromides. Paraldehyde will also occasionally act very favourably, and is a relatively safe remedy. Chloramide I have seldom used. Urethran has sometimes proved of very great service where the itching was not severe, but when the latter is excessive it has little, if any, effect on the sleep.

In many cases, even where there has been considerable sleeplessness from itching, which local or general treatment fails to relieve sufficiently to allow of sleep, an excellent effect may be produced by a large warm drink on retiring, without the aid of any hypnotic drug. For this purpose I have made use of warm milk (not boiled), if sufficient time (at least four hours) has elapsed after eating, to allow of the stomach being perfectly empty; the milk, even to the amount of a pint, being drank pure and alone, without other food or medicament. Gruels made of wheat preparations also serve admirably well, and in many cases one of the meat extracts, such as bovox, a tablespoonful in a large tumbler of hot water, acts as a perfect hypnotic. In some instances the best addition to the hot water is a half teaspoonful of Horsford's acid phosphate.

In all these instances the action is much the same, namely, diverting blood to the stomach, and so aiding in producing the brain ischæmia necessary to sleep.

In bringing this memoir to a close I must again emphasize some of the points already mentioned:—

1. Sleep is an exceedingly important factor to consider in connection with many diseases of the skin, disorders in sleep occurring both as a contributing cause and as an effect of the same.

2. The disorders of sleep occurring in patients with diseases of the skin may arise from many different conditions; the six principal causes may be classed as, *a*, Digestive; *b*, Toxic; *c*, Circulatory; *d*, Nervous (direct or reflex); *e*, Psychic; and *f*, Cutaneous.

3. These causes of disturbances of sleep should be searched for and relieved, because of the injury resulting from imperfect sleep in producing or aggravating many diseases of the skin.

4. In cases where the sleep disturbance is caused by the disease of the skin, the effort should be made to get relief to the insomnia by the proper internal and external treatment of the skin affection, before resorting to hypnotics; attention to details is often very necessary to secure this end.

5. Preparations of opium may be resorted to when the disturbance of sleep is caused by pain connected with the skin disease, but these are useless or harmful when the wakefulness results from itching. Chloroform or ether are also not to be advised for this purpose.

6. Some of the newer so-called anti-neuralgic and hypnotic remedies are often of great service in quieting the general irritation and inducing sleep, and gelsemium and cannabis indica are also valuable. It is often desirable to give repeated doses, at half-hour intervals, until the desired effect is produced.

A

REMARKABLE CASE OF PURPURIC ERUPTION ENDING IN GANGRENE, APPARENTLY CAUSED BY SODIUM SALICYLATE.

BY

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A REMARKABLE CASE OF PURPURIC ERUPTION ENDING IN GANGRENE, APPARENTLY CAUSED BY SODIUM SALICYLATE.*

By Francis J. Shepherd, M.D.

Having had under my care during the past summer a very unusual case of skin eruption, supposed to be caused by the ingestion of sodium salicylate, I thought a report of it would interest the members of this association. I am indebted to my house surgeon, Dr. Byers, for the careful notes taken of this case.

William B., hotel porter, aged thirty-two, was admitted into the Montreal General Hospital, May 8, 1895, complaining of pain and swelling in the left knee-joint. Patient is a well-made man of medium stature, somewhat addicted to alcohol. Had typhoid fever 6 years ago, and a year later several severe attacks of renal colic, for which nephrotomy was performed. He never had syphilis, gout, or rheumatism. Two days before entrance into hospital, had received a severe blow on the knee, which was followed almost immediately by swelling, pain, and heat in the joint.

On examination the left knee exhibited all the characteristics of an acute synovitis. As there was no history of gonorrhœa or any other condition tending to a synovitis, the diagnosis of traumatic synovitis was made and appropriate treatment adopted. With the exception of the knee-joint lesion the patient was perfectly healthy.

The next day after admission the patient's temperature, which had previously been normal, rose to 100° F., but there was no aggravation of the knee symptoms.

Three days after entrance the heat, swelling, and pain disappeared from the left knee, but now the right knee was

* Read before the nineteenth annual meeting of the American Dermatological Association, September 18, 1895.

becoming affected. It was slightly swollen, red, and very painful. Thinking the case was one of acute rheumatism, and waiting his transference to the medical wards, the house surgeon ordered twenty-grain doses of sodium salicylate to be taken three times a day. After three doses had been taken (one drachm), an eruption appeared on the body and extremities looking very much like urticaria. Distinct wheals were seen, but there was not much itchiness. Successive crops of these urticarial spots coming out, the administration of the drug was discontinued. The spots now became petechial, and were raised above the surface and considerably indurated. The spots went through the usual chromatic changes following extravasation of blood, and coincidently the induration altogether disappeared. At a few points the hæmorrhagic extravasation was so great that the vitality of the skin was destroyed, and a deep slough resulted, which on separating left a well-marked ulcer which was very slow to heal. The eruption affected all superficial parts of the body except the palms of the hands and soles of the feet. In addition to this the mouth, soft palate, tongue, pharynx, and larynx were all the seat of the eruption, which caused a great deal of œdematous swelling and led to alarming symptoms of impending suffocation, and for some days the patient was unable to swallow anything but liquid food, and that in only very small quantities. Myalgic and arthralgic pains accompanied the eruption. The heart was normal throughout the course of the case, and once only was a trace of albumen found in the urine. There was never any blood or pus in the urine, nor was there any disturbance of the bowels. The whole period occupied by the disease from the onset to the disappearance of the eruption was thirty-three days.

Such is the general account of the case, as to the distribution of the eruption and its appearance.

As was noted, almost every part of the surface of the body except the palms of the hands and the soles of the feet was affected at some time or other during the course of the disease. The eyelids were so swollen that the patient could not see out of his eyes, and the prepuce was much enlarged, discoloured, and œdematous. The tongue, mouth, and pharynx were similarly affected, large extravasations occurred in the soft tissues of

the palate and pharynx, and many sloughy spots were seen as the result of the severe hæmorrhage. This gave rise to difficulty and severe pain in swallowing. The larynx, owing to the condition of the mouth, could not be examined with the laryngoscope, but the voice was much altered and severe dyspnœa occurred at times, showing that the conditions existing in the mouth were also present in the larynx.

The eruption first appeared on the right leg, thigh, left leg, and left elbow. Then the trunk became affected, and the backs of the arms, the face, and mouth. The shoulders next were the sites of the eruption, and here it was more severe than anywhere else. About the neck, shoulders, and upper arms the extravasation following the urticarial wheals was so great that large sloughs were formed. The eruption was much more extensive on the posterior than the anterior surface of the body. The scapular region and nape of the neck, backs of arms, back, buttocks, backs of thighs, and calves of legs were especially affected; indeed, in every part where there was much pressure the rash was thickly distributed. On the anterior surface the only parts affected were the face, upper part of thorax, shoulders, thighs, and dorsum of right foot, and in no place was the eruption very abundant. Over the shoulders and arms the eruption was most violent, the extravasations leading to necrosis of the skin. Several crops of eruption came out from time to time, but none was so severe as the first.

When the spots first came out they had exactly the appearance of urticaria, the wheals varying in size from a ten- to a fifty-cent piece and elevated above the surface of the skin. At times they were slightly itchy, and the patient complained of stinging sensations. Soon after their appearance the spots became markedly infiltrated, and the surrounding tissue was slightly œdematous. In some regions, the arms especially, the swelling was acute and associated with tenderness and pain, probably due to the tension. Within twelve hours the infiltrated spots showed blood extravasation. They had at first a pinkish colour, with here and there a central spot of a darker shade. In some instances the whole spots became dark from extravasated blood. In another forty-eight hours the infiltration had disappeared, and the colour changes in the spots had commenced. These were very striking, the body being covered

with brown, red, and coffee-coloured spots. In many places, where several wheals had run together, a large, irregular, sharply defined spot was seen. The extravasated blood in the greater proportion of the eruption was rapidly absorbed, and the spots gradually disappeared, going through the various colour stages of a bruise; but in certain places, instead of the extravasation being of moderate extent, it continued to increase and finally destroyed the part, forming deep sloughs, which slowly separated from the tissues below. This local gangrene, which occurred in the mouth and pharynx as well as on the surface, was most marked about the right and left shoulders and upper arms. In these latter spots the process was very rapid. First, large, irregular, and raised patches were seen, much indurated and very painful. These patches were in size from a fifty-cent piece to the palm of the hand, the larger patches being due to the fusion of several smaller ones. The central portion was of a dark purplish colour, fading gradually to bright crimson, pink, and pale pink. The tenderness and pain as well as the inflammatory areola were marked. Later, the central portions of the spots became quite black, and blebs appeared on the surface, and soon a line of demarcation formed, and the dead began to separate from the living. During the separation of the sloughs the patient had a rise of from two to three degrees of temperature and felt ill and miserable. As the sloughs separated, his condition improved, and he was discharged from the hospital about the middle of June, with healthy granulating ulcers, which were dressed from time to time, and did not completely heal until September last. The patient has had no pain in joints and limbs since leaving hospital. That salicylate of sodium is the cause of skin lesions is well known. After the administration of this drug the appearance of erythema or urticaria has been frequently noted; in some cases intense itching has been the chief symptom, and cases of œdema of the eyelids following its use have also been reported. Freudenberg (*Berlin. klin. Woch.*) reports a case in which a petechial eruption occurred after the taking of five grammes (seventy-five grains) of sodium salicylate. These petechiæ were intensely itchy, and some were the size of a fifty-cent piece. They occurred on the back at first, but afterward spread to the breast, shoulders, upper arms, hips, and thighs. After eight days the spots became

paler, and the epidermis desquamated in large scales. Of course, some might contend that my case was not one of drug eruption, but one of those rare forms of peliosis rheumatica known as erythema purpuricum. Hutchinson calls it purpura thrombotica. In some of these cases the hæmorrhage is severe enough to destroy the skin and cause a slough. It is said that the rash of this affection occurs chiefly in the legs, and is more often seen in women.

The pains in the limbs, the swellings in the joints, and the duration of the case would perhaps render this diagnosis probable, but still the fact remains that until the drug was administered no sign of any skin affection was seen, and the purpura was preceded by a well-marked urticarial rash. Again, the hæmorrhagic condition existed in the mucous membranes or under the skin. Still, there is no doubt much to be said in favour of the diagnosis of peliosis rheumatica, and since the case occurred I have been daily more inclined to come to the conclusion that the eruption was not due to the sodium salicylate alone.

SYPHILIS AND GENERAL PARALYSIS.

BY

PROFESSOR ALFRED FOURNIER.

(Read before the Académie de médecine.)

TRANSLATED

BY

GUTHRIE RANKIN, M.D.

SYPHILIS AND GENERAL PARALYSIS.

By Professor Alfred Fournier.

For a considerable time it has been an important question to know what are the general relationships between general paralysis and syphilis. In bringing the subject before the Academy, it is not with the intention of repeating before this tribunal what I have said or written about it otherwise, whether in former years or quite recently. My intention, as I will explain, is otherwise, and it is a double one.

I wish, on the one hand, to demonstrate that the problem in question, as it is usually stated, is badly formulated; that it is, in reality, much more complex than is generally supposed, and that, if we continue, as has been done heretofore, to discuss it *en bloc* upon a badly determined foundation, there is little chance, for a long time, of our arriving at a satisfactory conclusion.

On the other hand, I am anxious to show how a complete solution of the question cannot be the work of a single observer, because it cannot be achieved except by the union of diverse forces, or, if I may be pardoned the expression, by a syndicate of specially associated competent opinions.

These two points will, I hope, be made clear by the following considerations:—

I.

There is a proverb which says that a problem well stated is, from this fact alone, half solved. If this be so, let us endeavour to determine clearly the one before us.

Generally this problem is formulated in the following manner: "Is general paralysis a symptom, a result, a derivative of syphilis, or not?" Stated in these terms the question is not, I submit, to the point; it is incomplete and unsatisfactory, because it leaves aside several inherent details which form an

integral part of, and ought not to be separated from, it. And the proof of this is that these omitted or forgotten points never fail to spring up as soon as discussion begins and adverse opinions enter into conflict. Clearly, then, the problem of the connections of general paralysis with syphilis is more complex than the preceding formula would lead one to suppose; it is not entirely encompassed by that formula. In other words, it does not comprise one question but, at least, four, and four of different kinds, four which have each their individual autonomy, which do not in anything implicate one another, which are entirely independent, indeed, to such a degree that the same observer can make a statement affirmative upon this one and negative upon that.

But I hasten to pass from generalities and come to the point.

To my mind, the problem of the relation of general paralysis to syphilis will not be made completely clear until a precise and categorical answer shall have been given to the four questions which follow:—

1st. Does there exist, as a possible result of syphilis, a clinical entity which deserves the name of *general syphilitic pseudo-paralysis?*

2nd. Can *true* general paralysis, under any circumstances, be derived from syphilis? And, if so, with what degree of frequency does it happen?

3rd. Is the true general paralysis which is produced as a consequence of syphilis, syphilitic in *nature* or in *origin* only?

4th. Does the true general paralysis, which is directly the consequence of syphilis, differ in some characteristics, clinical, anatomical, or otherwise, from general paralyses of other origin?

These four precise and categorical questions comprise an approximately complete summary of what it is necessary to know in order to fix and determine the problem with which we are now engaged. For the solution of the said problem would be gained, and gained completely, if light could be thrown upon each of the four questions enunciated above. Such, then, I think, should be the programme of discussion to adopt and methodically follow in order to try to elucidate this complex and difficult subject.

For it will, perhaps, not be without advantage and interest to enquire, while limiting ourselves to the programme thus laid down, where we stand to-day concerning it; that is to say, to bring to a focus what we know, and what we do not know, on these several points; in short, to balance the account of our real knowledge on the subject. Perhaps, indeed, such a review will not be useless, particularly if, in indicating the lacunæ of contemporary science, it happens to call forth in that direction new and laborious efforts.

II.

The first of the four questions which I have specified is not meant to detain us long. It is, I am able to say, actually solved, as it would have been at first sight, but for an unfortunate misapprehension which cropped up concerning it. This you will understand as I proceed.

Yes, most certainly, yes, syphilis presents sometimes, as when it occurs on the brain, a clinical picture, which recalls near enough that of general paralysis, and which, fairly enough, can be classified under the name of general pseudo-paralysis. I appeal to the recollections of practitioners now present: Do we not, from time to time, encounter unfortunate syphilitics, in whom, the brain being touched by this diathesis, a certain number of symptoms, characteristic of general paralysis, are manifested, such as the following: Muscular tremors, specially in the hands and tongue, hesitation in speech, inequality of pupils, psychical troubles (weakness of intellect, loss of memory, alternating fits of mental depression and exaltation, &c.), sensory affections, transient unconsciousness, with a threatening of partial or hemiplegic paresis, &c.? Undoubtedly such patients closely resemble general paralytics, more or less according to circumstances, but, sometimes, to such an astonishing degree that, even in the hands of experts, the diagnosis wavers between simple cerebral syphilis and general paralysis. Then, to anticipate events, comes the post-mortem, which demonstrates cerebral syphilis and eliminates diffuse periencephalitis.

Struck by such cases, as I have many times observed, above all, struck by their resemblance to general paralysis, I have, for

upwards of fifteen years, had the desire to call attention to them under a special name, and I have christened them general pseudo-paralyses. Whether the idea was good or bad it is not for me to say, but this unfortunate word has always become a new element of discord thrown into the discussion. If it has been accepted by some, others have attacked it vigorously, and have reproached me with creating a factitious "morbid entity," which is justifiable neither clinically nor anatomically. All this dispute rests upon a misunderstanding, which ought now to be explained.

What I have written concerning general pseudo-paralysis of the syphilitic, and what has been accepted by certain of my colleagues, whom I thank in passing, is in no respect a separate morbid entity, differing at the same time from cerebral syphilis and general paralysis. It is simply a special modification of cerebral syphilis—a simple name given to one form of that disease. Just as, in common with others, I have called cerebral syphilis epileptic or aphasie in character, according as it presents, as predominant symptoms, epileptiform or aphasie crises, so I have proposed to qualify by the name of general pseudo-paralysis the cases where the specific encephalopathy bears a general clinical resemblance, which more or less recalls the picture of general paralysis. General pseudo-paralysis is nothing more than a word descriptive of a condition, a physiognomy, an *ensemble* of cerebral syphilis, and nothing else. And this word implies in no respect, as has been said, and as I have been accused of saying, any morbid entity whatever, still less a "modified general paralysis," and still less a "general paralysis peculiar to syphilis." Apart from further equivocations, an agreement on the subject can, and ought to be, come to on the following terms:—

1st. There exists a clinical modification of cerebral syphilis which recalls more or less the physiognomy of general paralysis. That is a fact which is certain, and clinically undeniable.

2nd. This modification is not unworthy of a special name by which attention may be called to it. Therefore, I again propose to call it general pseudo-paralysis, carefully specifying that this name shall not be understood in any other sense than the following:—A particular modification of cerebral

syphilis, recalling more or less the pathological physiognomy of general paralysis.*

III.

Second Question:—Is there any reason whatever for believing that true general paralysis ever arises from syphilis?

Needless to say, that is the climax—the main point of the problem; the point which has been, and which, without doubt, will continue to be, the most warmly discussed. Now, in regard to this special question, where do we find ourselves at the present day?

It is useless to deny that the question has produced a scientific movement of considerable intensity in the course of the last few years, and that an inquiry has been instituted on all sides upon the causes of general paralysis,† from which a great fact has been proclaimed, a fact subversive of ancient beliefs and almost revolutionary in nature, namely:—That general paralysis with certainty recognizes syphilis as one of its most common etiological factors, indeed, as the most preponderant and important of all. And, in short, many valid and authentic reasons authorize the admission, for a large number of cases, of a relation of cause and effect, a true and undeniable pathogenic connection, whatever it may be otherwise, between syphilis and general paralysis.

To reproduce these reasons here would be to do what I desire to avoid, namely, to raise a new pleading on the question before us. Yet, again, I do not discuss, I expose a situation, a condition of things as they exist. It will suffice, then, to

* It has been proposed to abandon this term of general pseudo-paralysis, and that not only as applying to syphilis but also to those affections known as alcoholic, saturnine, &c., general pseudo-paralysis. In an excellent recent article, contributed to the Traité de Médecine, Messrs. Gilbert and Paul Blocq express a contrary opinion:—"From the clinical and diagnostic point of view," they say, "we cannot agree to the abandonment of this word general pseudo-paralysis, for there exist, clinically, some cases whose behaviour resembles with such apparent precision all the symptoms characteristic of general paralysis that the diagnosis, during some time, is not really always possible. We will, therefore, preserve this designation because it appears to us practically useful to describe, if not certain true nosological entities, at least certain symptomatic features capable of imitating true general paralysis." (p. 149.)

† In connection with this enquiry the names of Messrs. Morel, Lavallée, and Bélières will remain prominent on account of their painstaking investigations. See their very interesting monograph under the title of "Syphilis and General Paralysis."

enumerate and, very briefly, to recall the principal arguments which have served as a basis for the new doctrine.

I. Of these arguments that which naturally is of first importance is gathered from the frequency with which syphilitic antecedents can be traced in general paralytics. Common sense indicates that as a fair criterion for judging of the discussion, because there are two alternatives: either syphilis is not found except in a small proportion of the antecedents of general paralysis, which would imply that it is not necessary to the genesis of that disease, or, it takes place as a precursor in a notable proportion of cases, on which hypothesis it is impossible to refuse it an etiological *rôle* more or less important.

But let us appeal to the statistics on this subject. Not, let it be understood, old statistics made at a period when syphilis, not being yet recognized as a possible cause of general paralysis, was unsought for in the patient's history, but contemporary statistics, where one has taken the trouble to obtain information on the subject. Last year I collected twenty-seven sets, to speak of them only, in which the proportionate frequency of syphilitic antecedents to general paralysis exceeded 50 per cent., that is to say, 51, 56, 60, 62, 62, 64, 65, 66, 66, 66, 72, 72, 73, 73, 73, 75, 75, 77, 77, 80, 80, 80, 81, 86, 86, 92 per cent. (indeed including cases "only probable" up to 93 and 94 per cent.).

What is to be thought of such figures? What can be said of such a large proportion of specific antecedents, especially in a disease such as general paralysis, which does not declare itself except at long intervals after exposure to infection; in a disease such as general paralysis where the investigation of morbid antecedents is surrounded with such obscurity and with so many difficulties; where the patient, living, perhaps, amnesic or unconscious, has no knowledge of his past history; where the facts can often only be obtained in an indirect manner, &c. ? To see in such figures only the result of simple coincidences, and to interpret them as the outcome of accidental concurrences, would be to arrive at a conclusion of non-acceptance, equally impossible and absurd. This, gentlemen, is not a matter of clinical insight, but of simple common sense, and, that being so, I venture to declare that common sense rebels against any such explanation, and that, on the contrary, it finds, in the preceding statistics,

evidence of a most intimate causal union between syphilis and general paralysis, whatever otherwise may be the nature of their interdependence. And, in short, if syphilis has been found as an antecedent of general paralysis in the proportion of from 50 to 92 per cent., the evidence is overwhelming that syphilis constitutes an etiological factor of general paralysis and one which is powerful, extensive, and of very first importance.

II. After the evidence approved by statistics comes, in the second place, an argument which I will call, for reasons you will understand later on, the argument of syphilographers. Syphilographers are not, like alienists, so situated that they can collect a certain number of cases of general paralysis and separate from among them the number which present a syphilitic history. But they can do otherwise, that is to say, they can inquire into what becomes of their patients and ascertain whether there be few or many who end in general paralysis. As for myself, I am free to admit that what first made me suspect, then inquire into, and finally determine, that there must be an etiological bond between syphilis and general paralysis was the relatively large number of my clients whom I observed gravitate into general paralysis. Upon this point I appeal to the testimony of my colleagues, confrères or friends, Messrs. Mesnet, Magnen, Motet Luys, Fabret, Debone, Joffroy, Semilaigne, Meuriot, Gonjou, &c. (and may I not also recall to mind our regretted colleagues Blanche and Charcot!). How many times have I not had to examine, with them, old patients of my own, or old patients of my distinguished master, Ricord, who had become general paralytic! Such has become the number that, without being a partisan (far from that, since from the beginning I compelled myself, out of respect for tradition, to recognize in them only cases of general pseudo-paralysis), my conviction has become established, or, to speak more correctly, has become rectified, and, to-day, I am led, by the force of these facts, to look upon the following proposition as absolutely certain :—A number of syphilitics gravitate into general paralytics.

III. The two preceding arguments decide with certainty the question of a necessary affinity—the question of whatever there may be beyond this being reserved—between syphilis and general paralysis. Let us not, however, forget a certain number of papers and considerations of various kinds, which lend their aid

to strengthen this proposition. I will not do more than recall them shortly. Thus :—

1st. General paralysis is, as we all know, rare in women. But, where it does occur among them, in what class of women is it found? Almost always, by common consent, among those of irregular habit of life, among those of the *demi-monde* or of the class known as "fast," among prostitutes, that is to say, entirely in the midst of surroundings where syphilis conspicuously abounds.

2nd. In like manner it is universally admitted that general paralysis is relatively rare in the country, in agricultural districts, amongst clergymen, religious people, quakers, &c., because such are precisely the communities where, comparatively, syphilis is least likely to prevail.

3rd. Some very interesting statistics have been compiled by various authors (notably by Obersteiner, Oeheke, Spillmann, and Dengler) upon the comparative frequency of various factors capable of contributing, whether individually or in association, to the production of general paralysis. Now what do we see there? Always syphilis in the front rank marching at the head, and preceding by a long distance all other etiological excitants. To quote only one example, the statistics of Messrs. Spillmann and Dengler show us syphilis in the first line with a proportion of 93 per cent., leaving far behind nervous heredity (20 per cent.), congestive heredity (20 per cent.), and even alcoholism (17 per cent.).

4th. Another argument, no less valuable, and, to my mind, one of the most instructive, is furnished by the relative frequency of syphilitic antecedents in general paralysis as compared with other forms of insanity.

Taking together nine sets of statistics referable to this subject, Dr. Régis has arrived at the following figures.

Proportion of syphilitic antecedents :—

I. In all forms of insanity, other than general paralysis, 10 per cent.

II. In general paralysis, 65 per cent.

And five other sets of statistics are further forthcoming to confirm these results.*

That is equivalent to saying, in ordinary language, that

* See my book upon "*Les Affections parasyphilitiques*," p. 177.

rarely, indeed very rarely, syphilis declares itself in the past history of common insanities, whereas it is very common in that of general paralysis. Would it lie thus, could it possibly lie thus, if syphilis were of no account in the genesis of general paralysis?

5th. From an entirely different point of view, what can be thought of the association, which is so common, of general paralysis with tabes, a disease whose etiological connections with syphilis are no longer, at the present day, a matter of dispute? Does an association of this kind not logically bear witness to a community of origin between the two diseases?

6th. Finally comes—and I will end there—the forcible argument of juvenile general paralysis.

Dr. Régis has collected fourteen cases of general paralysis occurring in patients from 13 to 19 years of age, and he has discovered in the family histories of these young people certain evidence of syphilis in seven cases, and probable evidence in one. (It may be a question whether in all these cases the family history had been deeply enough probed, because it is admitted that the antecedents of hereditary syphilis are more difficult to elicit than those of the acquired form of the disease.)

Seven or eight times, therefore, in fourteen, or, with two other more recent additional cases, nine or ten times in sixteen, syphilis has figured in the antecedents of children or adolescents suffering from general paralysis. Is this proportion not significant, is it not convincing as concerning the subject we have under consideration? So much so, I think, that it is scarcely necessary to take into account those causes behind which the adversaries of the specific origin of general paralysis continually find refuge. Why invoke, in the case of patients of such an age, or of children, the influence of passion, of the wear and tear of life, of moral pre-occupation, of alcoholism, &c.? Manifestly, none of these causes come into play at such a time of life; and, in fact, we reach a finality in presence of these two facts which it is impossible not to correlate the one to the other as effect and cause, on the one hand, general paralysis, and, on the other, a powerful infective heredity, eminently pathogenic, and as characteristically so as other forms of nervous disturbance. Why, I repeat, refuse a similar origin to facts which, taken together, constitute a piece of powerful etiological evidence?

But let us resume (for, I think, I have said enough to establish my contention), and let us agree that the preceding statistics and diverse considerations combine to form a mass of testimony strong enough to establish a pathogenic connection—whatever there may be in addition or otherwise being points held in reserve—between syphilis as cause, and general paralysis as result.

IV.

The blind part of the problem before us, presents some very different difficulties. It deals with a question of pathology, and is easily stated.

The question, in short, is this: What is this general paralysis which is thus produced by syphilis? How, by what mechanism, by what pathological process, does syphilis terminate in general paralysis? What is the pathogenic bond which binds the one to the other?

On such a point, theory has had ample scope to run riot, and it has not failed to take advantage of its opportunity. Let us, however, refer only to the leading opinions expressed on the subject.

According to some, syphilis would not produce general paralysis, except upon a prepared soil, prepared by various causes, such as nervous heredity, congestive heredity, alcoholism, nervous debility caused by excesses, by excitement, by worries, by overstrain, physical, intellectual, or moral, &c. On this hypothesis, it would constitute only the drop of water by which the vase was made to run over, or at least, not to minimise its rôle too much, it would be the last weight which, placed in the balance, would serve to light up the mischief.

According to others, on the contrary, syphilis would prepare the ground, confining itself thus—if I may be excused the expression—to "making the game" for other causes capable of precipitating the catastrophe. Incorporating its rôle under a more energetic formula, it has even been said that syphilis would not produce general paralysis except after the manner of a "manure" of a fertilizing dunghill; in short, by a process the result of which would be to render the brain more susceptible to psychical deviations. But then, it may be asked, incidentally, why does it not render the brain equally susceptible

to the other psychoses, which, as we have already seen, it does not?

According to others, again, the general paralysis of syphilitics would be a kind of legacy, a species of degeneration, the result of certain symptoms or of certain lesions which had, in the course of infection, first of all implicated the nervous system.

Yet, again, according to others, it would be the result of an infectious cachexia which would react upon the encephalon, either "in the form of vaso-motor troubles common to syphilis," or "in the form of feebleness, exhaustion, functional debility of the brain," causing a lessened capacity of resistance against morbific influences.

Finally, we come to the already famous theory of syphilitic toxines, specially advocated by Strümpell. According to this theory, general paralysis, like tabes and other similar disorders, would be the result of a septic infection, the product of a microbe which is still unknown in syphilis. What would happen, in two words, would be this: The specific microbe would begin by developing in the economy a certain number of morbid phenomena, the result of its own specific and direct activity; phenomena constituting syphilitic manifestations properly so called, that is to say, ordinary syphilis running its usual course, and amenable to treatment by mercury and iodine. Then, later on, this same microbe would elaborate a special toxic substance, a toxine which, infecting the organism in its turn, would determine another succession of symptoms very different from the preceding ones in many respects (especially in their resistance to specific treatment), symptoms of which the prototypes would *par excellence* be tabes and general paralysis.

To enter upon a formal discussion of these various theories, and of many others, which I leave unmentioned, would be, for many reasons, a superfluous labour. I will not, therefore, spend more time over them, but will confine myself to one question of a more general nature which I believe to be of special interest. This question may be put as follows:—

Ought general paralysis occurring in syphilitic subjects to be considered an affection syphilitic in nature, or only an emanation of syphilitic origin?

Some observers, much more courageous than me, regard general paralysis as a direct consequence—a direct effect of

syphilis. According to this idea, general paralysis occurring in the syphilitic would be the analogue, the equivalent of any other entirely specific symptom, as, for example, a mucous plaque, or a gumma.

So far as I am concerned, it is impossible for me to agree with this theory. Most assuredly I have a firm conviction that general paralysis comes from syphilis in a very great number of cases, and that an equally definite number of general paralytics would never have become such if they had not contracted venereal disease. But I would not like to go so far as to say that a general paralysis, the result of syphilis, is a syphilitic general paralysis. I am not prepared to look upon this general paralysis as an equivalent manifestation to a mucous plaque, to a syphilide, or to a gumma. I do not know what medical instinct within me rebels against such an appropriation. I wish, sincerely, and, indeed, I wish with all my heart, that this paralysis may be found to have its origin, its original cause, predominant in syphilis; but it is wrong, I repeat, to stamp it syphilitic, and so classify it with a chancre, or a gummatous ulcer. And why? For many reasons, of which it will suffice to quote the following as being the most important:—General paralysis is not influenced in the least degree by specific treatment, as are the true manifestations of the syphilitic diathesis. Give me mercury and iodide of potassium, and I will promise to cure ninety-eight times out of a hundred a syphilide, an exostosis or a gumma; whereas were you to give me some thousands of mercurial pilules and pounds of iodine, I would do no good, in the same numerical proportion, against an affection, which you and I, of common consent, I suppose, would have diagnosed general paralysis.

To sum up, then, I believe that if general paralysis is the result of syphilis, it is a result which is produced after a different method than a chancre, a mucous plaque, or a gumma.

It may perhaps be asked, "But what then do you believe to be the relationship?" That I know nothing about, and will continue to know nothing about as long as the microbe of syphilis remains undiscovered, and its various possible reactions upon the organic tissues are unrecognized. But the want of explanation of a fact does not imply the non-existence of that fact, and I am presuming such to exist, that is to say, I am

formulating that of which the why and wherefore is still undiscovered.

At the present moment, nevertheless, an explanation presents itself to my mind which is suggestive. There is, in the domain of syphilis, a certain succession of occurrences, which, although undoubtedly specific in origin, are not really specific at bottom, and which, now-a-days, we begin to group under the name of para-syphilitic incidents. May not general paralysis be classified under this group? I will explain.

Experience has shown that syphilis is not responsible only for the numerous and complex series of manifestations, which, by common consent, are attributed to it under the name of specific symptoms. Undoubtedly it does more than that in many other ways. Independently of these specific symptoms, specific both in origin and nature, it is further accountable for developments, which, though not syphilitic in nature, remain none the less syphilitic in origin, in the sense that they are the progeny of syphilis, that they are the result of its occurrence, that, according to all evidence, they would not be produced without it.

Two leading characteristics establish beyond all else a well-defined line of demarcation between the symptoms here referred to and those manifestations which are undeniably syphilitic. For instance, firstly, on the one hand, para-syphilitic affections do not arise exclusively and necessarily from syphilis as a cause, whereas syphilitic casualties, properly so called, never arise but from syphilis, and always recognize syphilis as their inevitable factor of origin. There can be no mucous plaque or gumma without pre-existing syphilis, either acquired or hereditary. In contra-distinction to this, tabes neurasthenia, hysteria, rickets, imbecility, hydrocephalus, congenital malformations, arrests of development, &c., which syphilis so often appropriates to itself under the title of para-syphilitic manifestations, may equally be produced apart from any syphilitic antecedent, and independently of any syphilitic taint.

Secondly, on the other hand, para-syphilitic affections are not influenced by mercury and iodine, as are those of the true disease; that is to say, mercury and iodine do not exert upon them, as they do upon the other common results of syphilis, that abortive and curative action, which is so striking, so

intense, and so speedy, that we have come to look upon it as a reliable criterion of syphilitic specificity.

From every point of view, general paralysis comes into close relationship with these para-syphilitic disorders, and properly belongs to their class. In short, like them, it does not absolutely require syphilis for its production, but occurs apart from it, under the influence of other etiological exciting causes. Like them, again, it proves itself rebellious to specific treatment, even when it is manifestly derived from a specific cause. For those two reasons, then, not less than on account of its frequent connection with tabes, it may fairly be classified among the same family of ailments, and ought to be included in the group of para-syphilitic affections.

V.

IV. I come now to the last part of the problem, which may be thus stated: Does true general paralysis, which is produced as the result of syphilis, differ in any respect, clinical, anatomical, or otherwise, from general paralyses of other origin?

Gentlemen, I opened this discourse by saying that the complete solution of the question with which it deals could not be achieved except by the union of diverse forces, and as the outcome of specially associated competent opinions. The truth of this statement becomes more and more apparent. We, who are syphilographers, can only claim or covet, as our personal share in the solution of the whole problem, the single rôle of inquirers or etiological delineators. We are, or we ought to be, good at two things: Firstly, at assuring a fact which comes within our special province, namely, the frequency with which general paralysis occurs among our patients: Secondly, at recognizing syphilis as an antecedent in many cases where others might be mistaken concerning it or might allow it to escape unperceived. In short, to understand syphilis as regards its morbid antecedents or its heredity is a specialty, like many others, at which no man becomes expert except by thorough training. *Fit fubricando fabed.* Some will excel, for instance, in discovering an almost imperceptible cardiac murmur, who will fail to recognize syphilitic manifestations, such as are readily appreciated by the syphilographer, and *vice versâ*. It is entirely a question of professional specialization. But if we

are skilled on this one point we are not of much use otherwise, and, as you will see immediately, for a sufficient reason.

Pathological anatomy has, most naturally, a word to say on the subject. It would be more than curious, it would be important to know if the general paralysis of our patients (allow me thus to qualify it) differs or not, anatomically, from the general paralyses of other origin. Pathological anatomy almost invariably makes us out to be at fault, but that entirely from the force of circumstances. Why? Because our general paralytics are not under our observation except as temporary patients. We look after them for some months; then, at a given time, we lose sight of them because they have become unmanageable, noisy, irresponsible, dangerous to themselves and to others, &c. In short, as a general rule, these patients end their unfortunate lives elsewhere than at home, and in consequence, later observation of them, and particularly post-mortem results, necessarily escape us except on very rare occasions.

And in like manner as regards clinical evidence. Does there exist between the general paralysis of our patients and the general paralyses of other origin any symptomatological differences? In order to appreciate the clinical refinements upon which such a diagnosis could be founded, we would require to possess what we have not got, viz.: 1st. Elements of comparison which we naturally fail to obtain because without syphilis there is no personal discomfort which compels the patient to seek our advice. 2nd. A special education which is not ours. We are only alienists on occasion, I was about to say alienists because of occasion. *Ne sutor ultra crepidum.*

Thus, I will allow myself to confess, I have my ideas, inconsiderable notions which are peculiarly my own, in regard to certain symptomatological differences which separate general paralysis, as found among our patients, from these other forms of the disease which own a different origin. For instance, to mention only one example, I have been frequently surprised to find the general paralysis of our patients either initiated by the ordinary phenomena of tabes, or in some way or other so associated with tabes as to constitute with it a sort of hybrid combination, which I have qualified by the name of cerebro-

spinal tabes. Very frequently, I repeat, I have seen, among our patients, tabes end in general paralysis; and *vice versâ*, though more rarely I have seen general paralysis terminate in tabes. On other occasions I have seen tabes and general paralysis develop simultaneously and manifest themselves as it were hand in hand. But do the general paralyses of non-syphilitic origin display as often as ours a like combination of symptoms? I think not, but I am not competent to dogmatize on the point, and I therefore express a guarded opinion. In order not to expose myself to the hostile criticism of our alienist colleagues who, with good reason, might recall me to order by suggesting that I should not wander from the points which properly belong to my specialty, let us, if you please, agree that I say nothing further on the subject.

And in a similar way let us deal with many other subjects referable to morbid evolution, to possible remissions, to apparent cures, to duration, &c., &c. On all these questions we, who are syphilographers, are not competent to pass judgment, for they demand nothing less, if they are to be appreciated at their true and distinctive value, than the special experience so highly valued of certain of our colleagues, such as Messrs. Mesnet, Magnen, Luys, Joffroy, Motet, &c.

Finally, it is to the alienists, and to the alienists alone, that it pertains to determine in the future the question of percentages of syphilitic general paralyses as compared with percentages of general paralyses arising from other sources.

Upon all these points, I can assuredly do nothing better than "pass the hand," if I may be pardoned the expression, to those who are more skilled in mental aberration, in pathological anatomy, in nosology, and to recommend it to their serious consideration. Because, gentlemen, be under no misapprehension; and with this assertion I will finish. The question of the relationship between general paralysis and syphilis will not come to be completely studied, elucidated aud finally disentangled from the many complex and difficult problems by which it is beset, except by the union, the collaboration, the syndicate, if I dare thus speak, of alienists, anatomo-pathologists, and syphilographers.

PARASYPHILITIC EPILEPSY.

BY

PROFESSOR ALFRED FOURNIER.

TRANSLATED

BY

GUTHRIE RANKIN, M.D.

PARASYPHILITIC EPILEPSY.

By Professor A. Fournier.

We occasionally see in the course of syphilis an epilepsy of a truly singular type, an epilepsy very different, in many respects, from what has been called syphilitic epilepsy, or, more correctly, the epileptic form of cerebral syphilis. This epilepsy, to proceed at once to its leading characteristics, is specially differentiated by the following features:—

1st. It is produced as an isolated symptom, that is to say, without the accompaniment of other phenomena, and, particularly, let it be understood, without cerebral phenomena.

2nd. It is continued and perpetuated in this form, and thus proceeds, like epilepsy, pure and simple, without the association of other morbid symptoms.

3rd. It is persistent and tedious in its duration.

4th. It does not yield to antisyphilitic remedies any response, either curative or even temporarily palliative.

5th. It is not, or at least up till now has not appeared to be, influenced by medication, except by bromides, which do not cure, but only control it.

The simple narrative of these characteristics shows you at once that in many of its leading symptoms this epilepsy is essentially different from syphilitic epilepsy properly so-called, which, in contradistinction, is usually found to possess these attributes:—

1st. It is associated, even at an early period of its history, with cerebral phenomena.

2nd. It rapidly loses its individuality in a complex symptomatological group which is that of the specific encephalopathies.

3rd. It develops, more or less prematurely, either in the direction of cure or of fatal termination.

4th. It is amenable, if not always, more or less frequently, to specific treatment, which sometimes even produces a most striking repressive effect upon it.

But an example taken from nature will demonstrate to you, better than any description, the morbid type to which I desire to call your attention.

A young man of 25 years of age contracts syphilis. He is under treatment for nine months, and the disease rapidly ceases to manifest itself by symptoms. Twenty years go by without recurrence. Then, suddenly, without the slightest warning, without any provocation, and in the midst of perfect health, this man, who has now reached the age of 45 (note in passing the age), is seized with a sudden epileptic attack, presenting all the classical symptoms of *grand mal*. Sudden fall, loss of consciousness, general convulsions, first tonic and afterwards clonic, cyanosis, foaming at the mouth, stertor, and subsequent sleep, &c.

Dating from that time for a period of at least eleven years, beyond which my observation does not extend, the patient has never ceased to be the victim of epileptic seizures of some kind, either *grand mal* or *petit mal*, and more commonly the latter.

During the first two years there occurred three severe convulsive attacks together with many attacks of simple vertigo. Later on, severe attacks of *petit mal* alone declared the continuance of the disease, but these were of frequent occurrence. They were carefully recorded. In 1882 and 1883, fifteen occurred each year; in 1884, twenty; in 1885, twenty-two; in 1886, eighteen; in 1887, nineteen, &c.* Almost without exception, the attacks presented the following sequence of symptoms:—Sudden stupor with pallor of face; sensation of annihilation; preservation of consciousness of a far-away and misty character; impossibility of articulation except for a few simple words such as "yes" or "no"; sounds of bells in the ears; a kind of ecstasy or dream followed by sudden cessation of all the phenomena after a duration varying from some minutes to quarter of an hour, and, finally, complete return to a normal condition.

* These figures are rigidly correct, the patient having taken care to note down each attack, as it occurred, in a book kept for the purpose, which was handed over to me.

Undoubtedly this was an epilepsy similar either to ordinary epilepsy or to that form of the disease which we so frequently meet with in those patients who are the victims of serious specific encephalopathies. But observe carefully, gentlemen, what followed. In the first place, this epilepsy remained during eleven years exactly as it was when it first began, without the least complication. The picture was that of simple epilepsy at the beginning and so it continued, without change, for eleven consecutive years, and without the occurrence of any additional morbid phenomenon. From the beginning the general health remained satisfactory and free from the slightest symptom of cerebral disturbance. Intelligence continued absolutely intact; memory unimpaired; there was no interference with the motor or sensory paths, nor with any of the nerves of spinal sense, &c., &c. In short, epilepsy, and nothing but epilepsy, comprised the entire history of the patient for these eleven years and probably for many more.

In the second place, specific treatment was of no avail. During those eleven years, as you may suppose, many and various methods of treatment were, one after another, resorted to; everything, indeed, which could be thought of, rationally or empirically, was tried, but, with the exception of one remedy, nothing produced the least satisfactory result.

Again and again I resorted to specific treatment, under different forms and often in large doses, but without producing any modification of the symptoms. The seizures recurred with the same frequency whether the treatment was in full force or in abeyance. No modification, not even any intermission in the attacks resulted from the free exhibition of mercury and iodine, and, at last, completely discouraged, I was compelled to relinquish the use of these drugs.

One medicine only has yielded certain and unmistakable, though imperfect, results, viz., bromide of potassium, administered in large doses. It has frequently produced intermissions of two or three months, but it has never succeeded in permanently putting a stop to the seizures. "It is the only remedy," said the patient, "which has produced the slightest effect upon me."

Such is the history, apart from certain unimportant variations in detail, of many patients whose cases I might mention, a

history which is always built on the following outlines: epileptic attacks of *grand* or *petit mal*, occurring without appreciable cause and without premonitory symptoms; of long duration and persistently manifesting itself under its original form, not complicated by any other trouble, and obstinately rebellious to specific treatment.

It follows therefore that the description of this combination of definite symptoms is a very simple matter. You already are in possession of the leading facts, but beyond these there are certain details which I now desire to bring under your notice.

1st. The morbid invasion is no less sudden than unexpected and apparently spontaneous. It occurs, *ex abrupto*, in full health, without the slightest premonition or cause (such as morbid incidence, excess, fatigue, emotion, &c.) to account for it. Generally it begins with an alarming attack of *grand mal*, but not uncommonly the disease is ushered in by a succession of attacks of *petit mal*, which are succeeded by a true convulsive seizure. Beyond that, the disease is constituted by a mixture, in very unequal proportions as regards number, of attacks of *grand* and *petit mal*.

2nd. Relatively, the attacks of *grand mal* are infrequent and at long intervals of time. They occur, that is to say, two, three, or four times in the course of a year, rarely more often, and they are specially liable to overtake the patient in the course of the first year.

These seizures, which it is needless to describe in detail, reproduce, symptom for symptom, the features of a classical epileptic fit (sudden onset, with or without a cry, fall, loss of consciousness, convulsions, first tonic in character and afterwards clonic; biting of the tongue, foaming at the mouth, stertor, and subsequent deep sleep, &c.). They are usually severe, and of long duration.

After a certain interval of time, often one or two years, they stop almost entirely, and do not reappear except at long intervals of time.

3rd. The attacks of *petit mal* are, on the other hand, very remarkable on account of their frequency, not only at the beginning of the disease, but also at a later period, when the more serious convulsive seizures having abated, they constitute by themselves almost the whole disease. They recur at least (due

allowance being made for the therapeutic influence of the treatment adopted) from ten to fifteen or twenty times in the course of the year, as in the patient whose history I have just related. Another of my clients has suffered from them to the extent of 13, 8, 11, 10, 8, 14, 10, &c., fits every month. Occasionally they are found to happen even more frequently than this. My last patient of this kind, for instance, affords such an example because he admits, at his worst, to having had as many as eleven in twenty days. Much more rarely they succeed one another so rapidly, as to really be produced "*en bouquet*," the same subject being the victim of as many as six in one day. In other cases, however, they occur distinctly more seldom, at intervals often of some weeks.

As regards symptoms, attacks of this kind recall precisely, apart from differences in detail, the usual type of ordinary *petit mal*. They comprise, as a rule, the following: A sudden instantaneous sensation of unconsciousness with stupor; a kind of absence, or eclipse, or ecstasy, or dream with open eyes; preservation of consciousness, but with a certain degree of mental confusion; suspension of the faculty of speech; impossibility of making oneself understood except by signs or by certain monosyllables ("yes," "no"); pallor of countenance; then disappearance of all symptoms, and a speedy return to normal conditions. You have heard how the first patient, whom I mentioned to you, described his attacks. With him an attack was inaugurated by a sudden intellectual dream, by a condition of rapture, and always accompanied by a "loud noise as of bells in the head." Throughout the attack he preserved his consciousness, but could only afterwards give an imperfect account of what had taken place around him. It was impossible for him at the time in spite of his most strenuous efforts to articulate more than one or two of the simplest words. He could rise, come and go, but wandered about aimlessly, without definite intention, like, according to his own comparison, captive animals, who mechanically pace from one end of their cage to the other. "Had anyone," said he, "seen me during an attack, he would have believed me to be drunk. On one occasion a fit took me while I was driving my trap. I did not drop the reins but it was impossible for me to stop or to guide the horse."

Another of my patients, a most observant man, and of an

unusual degree of intelligence, thus described his attacks : "Suddenly I am overcome by an ill-defined vague sensation, which completely drives away whatever the occupation of the moment may be, and, like a tyrannical mistress, takes entire possession of my brain; an almost painful sensation of constriction attacks my temples; my face becomes ashen; finally the whole discomfort suddenly terminates, and the attack has hardly passed off before I find it absolutely impossible to recall the curious sensation, indefinite, but always of the same nature, which has dominated my brain throughout the course of the seizure."

As regards intensity and duration, these fits present themselves under every imaginable variety. I have seen them exceedingly long in the case of one of my patients, who estimated their duration at 10, 15, or 20 minutes, occasionally even at an hour. This however is, I believe, an exceptional case, because, as a rule, the attacks do not last longer than a few minutes. Often, indeed, they are so fugitive that they do not seem to occupy more than a mere fraction of a minute. For example, one of my patients was in the act of selling certain articles, which he was counting over when his fit attacked him. He became very pale, remained motionless a few seconds, his eyes, said his wife, fixed as though he were in an ecstasy; but almost immediately he recovered and resumed the work he was doing as though nothing had happened. It is a curious fact that throughout this attack he continued, though steadfastly motionless, mechanically to continue counting his goods, and in a loud voice to enumerate them, 86, 87, 88 . . . Another told me this story : "My attacks are sometimes so short that my assistant may never be aware of their occurrence, or become so only by the sudden pallor which, I am told, overspreads my face. If the attack seizes me when I am in the act of speaking, I stop short for a moment, and it passes off. One day, when travelling in an omnibus, I felt that an attack was imminent. Stupidly I got down, and scarcely had I reached the pavement, when my thoughts became fixed and my vision dim; happily it was the affair of half a second only, and I was able to pursue my way as if nothing had happened."

As I have said, these two varieties of attack, *grand* and *petit mal*, constitute by themselves the whole disease; so much

so that there is nothing I need add to complete the clinical picture.

The patient who is affected in the way I have described is then purely and simply an epileptic, an epileptic subject to fits of varying kind and intensity during a certain period, and at a later stage of his history an epileptic whose fits are almost exclusively those of *petit mal*, and nothing more. But along with this, I repeat, the patient is in good general health; he is moreover free from any other form of cerebral disorder; he is master of his intelligence, his will, his memory, and his movements; his sensibility is unaffected, and his special senses retain their normal acuity.

4th. Finally, what is the duration and what the termination of this epilepsy?

At present, I have to confess myself unable, for a certain reason, to answer these two questions, the reason being that the patients I have treated for this class of disorder, having become dissatisfied with their rate of improvement, have rarely remained loyal. They have gone to seek better fortune elsewhere, and I have never seen them again.

None the less I am able to assert that the epilepsy in question is an epilepsy pronouncedly persistent and of long duration. During the whole time such patients have been under my observation they have continued subject to their attacks throughout long periods of time, extending over three, five, six, eight, ten, and eleven years. Further, all through this long continuance these attacks have undergone no modification whatever, and it would seem not unlikely that they have persisted far beyond the periods of my observation. But what in the end has been their termination? I know not; a most regrettable desideratum, so far as the history of this morbid entity is concerned. Two points in conclusion: At what stage of syphilis, and at what approximate age, does this epilepsy declare itself?

It most certainly belongs to the tertiary stage of syphilis, of which it seems to constitute, *par excellence*, a late manifestation. That is at least the conclusion to which my present experience leads me. In all the cases of which I have knowledge, the first indications of the disease have presented themselves at a period long removed from the date of acquisition of the diathesis, say

from the tenth to the twenty-first year after exposure to infection.

As a consequence of this the onset of the disease is almost invariably met with at a more or less advanced period of life, and generally between the ages of 37 and 48 years. Note that, gentlemen, in passing, as an argumentative answer to those of our colleagues who would erroneously wish to classify this form of epilepsy with the common and ordinary variety, is it at such an age that common epilepsy enters upon the scene for the first time?

Such is a short epitome of the variety of epilepsy which is sometimes met with among our syphilitic patients. There does not seem to me to be the least shadow of doubt that this epilepsy is derived from syphilis in the cases which I have narrated to you, and which I have chosen from among many others as being striking instances of the type which I have described. In all of them the relationship of epileptic attacks to the diathesis is legitimately proved throughout by the following facts:—1st. By undoubted syphilitic antecedents. 2nd. By the age at which the comitial symptoms first manifested themselves. 3rd. By the absence of every other cause to which, apart from syphilis, the said attacks could be imputed. 4th. Sometimes, in addition, by such or such other allied consideration. Thus, in one of my patients, a child was begotten at a period corresponding to that in which, for the first time, epileptic attacks occurred to him, with the result that when born it was a typical example of these emaciated, degenerate, badly-developed children which we so constantly associate with hereditary syphilis.

If, however, this first question does not raise insuperable difficulties, the same cannot be said for a second doubtful point which is of greater intricacy. I quite understand how it may be well asked of me: "This epilepsy of which you are now speaking, and which you desire to separate as a special variety, a particular morbid entity, is nothing more nor less than the 'epileptic form' of cerebral syphilis which you have yourself described, by what right do you dissociate the two? Why isolate this from the other, and by specializing it raise it to the rank of an individuality peculiar to itself?"

To this I return a negative reply. The epilepsy to which this

paper refers, and which, for the convenience of discussion in regard to what is about to follow, I request permission to designate from now on as parasyphilitic epilepsy, is not comparable to the morbid condition which we all nowadays recognize under the name of syphilitic epilepsy, or of epilepsy symptomatic of cerebral syphilis. Quite to the contrary, it differs from it entirely, to such a degree as to constitute a species of its own, a well-defined individuality which it is of importance to differentiate and to reserve from the obscurity in which it has been hidden until the present time. That is the result which I sincerely hope may be attained by a consideration of the following evidence. Parasyphilitic epilepsy in reality differs from the epilepsy which is symptomatic of cerebral syphilis by a whole series of important features. For instance :—

1st. From the symptomatological point of view, in the first place, it differs in respect that it never assumes (at least so far as I have seen) the circumscribed and partially convulsive type. It is never Jacksonian, to use present-day phraseology. It always, in its convulsive type, presents itself in the form of generalized convulsions. Jacksonian epilepsy, on the contrary (which, parenthetically, perhaps deserves to be more fairly called the epilepsy of Bravais *), is especially common in cerebral syphilis. It is met with very frequently among patients who suffer from that form of disease.

2nd. In the second place, and this has a very different bearing, epilepsy which is by birth parasyphilitic develops and continues in the form of epilepsy pure and simple, without mixture or association with other cerebral phenomena. Here, gentlemen, we have an essential and fundamental point, a special characteristic, I believe. Let us enquire further concerning it. With patients such as we have in view the affection is, on the one hand, born and developed with all the features of an ordinary and simple epilepsy characterized by attacks of *grand* and *petit mal*, but without any addition of special symptoms of a cerebral kind ; and, on the other hand, it persists in this form always without other associated symptoms and always without the intervention of cerebral complications. We have known the disease to continue without any such modification for consider-

* See the remarkable thesis of Bravais ("Recherches sur les Symptômes et le traitement de l'Epilepsie hémiplégique"). Thesis of Paris, 1827.

able periods of time; for as long, to be precise, as three, six, eight, ten, and eleven years. In the case of the patient whose history I was able to follow for the longest time, this epilepsy was eleven years after its commencement exactly what it was during the first years of its occurrence, having undergone no complication and having developed no symptom of cerebral origin. Well then, is that how symptomatic epilepsy, the epilepsy of cerebral syphilis, behaves? Most certainly and most unfortunately not! Its peculiarity, on the contrary, is that after a time it loses itself in a complex conglomeration of cerebral symptoms.

It is possible that at its commencement, and even during a certain time subsequently, for some months at least, it may bear the appearance of a pure and simple epilepsy. But, for one thing, that is not constant, and for another—and this is important—it is always provisional. Upon this I insist. I have said that it is not constant. The truth is that nothing is more common than to see symptomatic epilepsy accompanied at its onset, or even preceded, by certain cerebral phenomena, such as cephalalgia, discomfort in the head, frontal fulness, tendency to sleep, lessened aptitude for mental work, general lassitude, muscular fatigue, various derangements of the general health, &c.*

But I have also stated that it is only provisional, for it is an absolute rule that symptomatic syphilis, after having preserved for a certain time an exclusively comitial progress, sooner or later changes its physiognomy. In what respect does it thus change? By the addition to the comitial symptoms of an indefinite number of others of quite a different description. So much so that eventually instead of being the exclusive expression of a pathological condition, it no longer figures except as an item of a more complex combination, and indeed as an entirely secondary item. It becomes lost, if I may so express it, in a more comprehensive picture which is no less than that of a general encephalopathy. In short the patient of yesterday whom we looked upon as an ordinary epileptic is to-day transformed, according to our present method of expression, into a "cerebral."

But let us be precise, because I am desirous of leaving no

* See Fournier, "La Syphilis du Cerveau," p. 158.

room for doubt in your minds. What are the symptoms which, at any given time, may become in some way associated with symptomatic epilepsy? All cerebral symptoms, that is to say every symptom which is a precursor of, or which bears witness to, a progressive cerebral disorganization. For example:—

I. *Congestive symptoms.*—Heaviness of head, cephalalgia, vertigo, mental confusion, numbness and tingling of the limbs, sensory troubles (amblyopia, scotomata, buzzing in the ears, impairment of hearing), &c.

II. *Intellectual symptoms.*—Diminished aptitude for mental work; amnesia, which may be either progressive or only occur temporarily at intervals; changes in the moral nature which declare themselves by indifference, apathy, or melancholy; finally, progressive intellectual enfeeblement which may even become hebetude.

III. *Motor symptoms.*—Partial and incomplete paralysis; threatenings of hemiplegia followed by true paralysis, ocular palsies, monoplegias, and hemiplegia which is both the most frequent and the most serious termination. Nothing similar, I again repeat, is to be found in parasyphilitic epilepsy. Note carefully the difference between them.

3rd. In the third place parasyphilitic epilepsy is of long duration, and may persist in its original form for many years. I mentioned a short time ago that I had once seen it persist in one of my clients for eleven years, who moreover left me when his disease was in full activity, and therefore when it was far from giving any indication of abatement. How very different is symptomatic epilepsy! it pursues another course altogether and manifests a much more rapid evolution. It tends to speedily terminate in one or other of the three following ways:—either in cure, when energetic treatment is adopted early enough; or in death, under opposite conditions of management; or in infirmity and decrepitude, characterized by incurable hemiplegia, hebetude, dementia, and death. And the fact must not be lost sight of that sometimes it shows itself remarkably expeditious in its work, if I may be allowed to so express myself, for a few months may in this way suffice for the completion of its evolution.

4th. In the fourth place symptomatic epilepsy is amenable to treatment by mercury and iodine. It is capable of cure, and

often is cured, as innumerable examples could be produced to prove. Moreover, even in less satisfactory cases where the disease threatens to be complicated by serious cerebral symptoms, we know perfectly that in the course of treatment, in spite of temporary conditions of improvement, there is a battle being waged between the disease and the remedy, that the remedy has attacked the disease with every chance of success, that it would have acted more efficiently under more favourable conditions, &c.

With parasyphilitic epilepsy on the other hand there is absolutely nothing of this kind. Even when treatment is undertaken at the very beginning, when energetic medication with powerful doses either of mercury or of iodine or of the two combined is carried out perseveringly, no therapeutic effect is produced. I have seen among my patients attacks of *grand* or *petit mal* happen in the midst of treatment, and even at the end of a long course energetically carried out. I have frequently been stubborn, and have again and again renewed the attack in different ways, but my efforts have been futile and almost entirely thrown away. It is certain that this form of epilepsy remains absolutely refractory to the action of antisyphilitic remedies.

One drug only exerts any influence over the disease, but is not able to cure it, and that is bromide of potassium. With this bromide, or a combination of bromides, a decided therapeutic effect is obtained. It is true that the disease cannot be cured in this manner, at least I have never succeeded in attaining such a result, but it is improved, kept within bounds, and manifest remissions are produced. By the use of bromide, associated or not with hydropathic treatment, I have succeeded in controlling the fits to such an extent that several weeks elapsed between the occurrence of one and another, occasionally even some months, and exceptionally more prolonged remissions than this have resulted.* But as to a complete and permanent

* Thus, thanks to an almost uninterrupted administration of bromide, one of my city clients, who was afflicted with this form of epilepsy, and who suffered to an unusual degree from attacks of *petit mal*, entirely escaped any kind of fit for six months, at the end of which time he experienced one very slight seizure, which was of such short duration that its occurrence could be vouched for and no more. This is the most successful result which I have achieved with bromide up to the present time.

cure, I repeat that I have not yet succeeded in establishing one.

I have said enough, I think, gentlemen, to make clear to you the pronounced differences by which parasyphilitic is separated from symptomatic epilepsy. It will be impossible, henceforth, that two such dissimilar morbid types can remain mixed up and be confounded with one another. The types are so distinct one from the other, that whereas the one is never long in evidence without a speedy succession of cerebral manifestations, the other persists indefinitely in its original condition of epilepsy pure and simple; the one passes sentence upon itself in a very short time by some kind of termination, whether favourable or the reverse, whereas the other is pre-eminently tedious and persists in its original form; the one is amenable to specific treatment, whereas the other invariably proves itself refractory. It is clearly necessary to break such a factitious union, and in accordance with logic, no less than with observation, to restore to each of these types its individual independence and autonomy. For after all, we must admit what really exists as we see it in practice, viz., that, in the production of epilepsy, syphilis gives expression to more than one pathological change after the following fashion:

At one time by epileptic symptoms, such as cephalalgia, apoplectiform attacks, monoplegias, hemiplegia, mental disorders, &c., which are symptomatic of a progressive cerebral syphilis; at another, by a kind of epileptic neurosis, which like other such neuroses continues as it originally began, without subsequent development of other cerebral manifestations.—There is the fact!

Now this latter variety of epilepsy is precisely the morbid condition, which, from want of a better appellation, and because of our ignorance of its true nature, we have named parasyphilitic epilepsy.

The preceding remarks, gentlemen, are all gathered from clinical experience, and are brought home to us as the result of actual observation. But what the precise nature of the underlying morbid condition is, our knowledge is not yet sufficiently accurate to portray. What might be said further on the subject would be entirely hypothetical. It would indeed be curious, in the present state of our knowledge, to introduce now

another discussion to try and find out what this parasyphilitic epilepsy may be, after having established what it is not. Upon what foundation could a discussion of this kind be built up? For one thing we are short of post-mortem evidence, and for another the clinical history of this morbid condition is still only—I do not disguise the fact even from myself—in a state of outline. I have told you what I know concerning it as the result of a certain number of personal experiences, but will not subsequent investigations come to add to the clinical history of the disease new and unexpected characteristics, and also, perhaps, correct our present estimate of its manifestations?

Enlightenment, for instance, on the following point is most essential: Is this particular form of epilepsy the result of actual lesions, or is it only the product of a dynamic change, initiated in the brain by syphilis? For, I repeat, we have no present evidence to throw light upon this question. All we are able to infer on the subject by simple induction is that probably parasyphilitic epilepsy is not the result of lesions or their products, identical with those which constitute cerebral syphilis, and for the following reasons:—

1st. Because if it was the expression of lesions of this kind, it ought to more closely resemble the complex symptomatological *ensemble* which necessarily and invariably proclaims a lesion of some kind in the brain, but this is precisely what it does not do, on the contrary it persists as an epilepsy pure and simple without additional cerebral phenomena.

2nd. Because, according to this hypothesis, it would not be of long duration, particularly of such a degree of duration as characterizes it, but would have, like every other cerebral lesion, a much earlier and otherwise more precipitate evolution.

3rd. Because if it resulted from a syphilitic lesion it ought not so invariably to prove itself refractory to antisyphilitic medication, &c.

For these reasons, and others besides, it is therefore not likely that the disease is derived from a syphilitic lesion of the encephalon. What then after all is it? That we do not know, I am again compelled to admit, and up till now all we can say on the subject reduces itself to this:—

From every point of view this disorder comes into close relationship with these curious affections to which we have

latterly applied the descriptive word parasyphilitic. It comes into touch with them from three different points of view:—1st. In that it proceeds etiologically, and in no doubtful manner, from a syphilitic origin. 2nd. In that as regards its symptoms —and probably we will some day find also as regards its anatomical basis—it presents no features that pertain properly to syphilis, none which can be solely and exclusively syphilitic. 3rd. In that it is not influenced by antisyphilitic treatment.

In short, it stands in the same relationship to syphilis as an ordinary pigmentary syphilide or tabes or neurasthenia or general paralysis, &c., that is to say it owes its origin to syphilis without possessing of itself the nature or essence of a syphilitic manifestation. Provisionally then, at least, we are led by the logic of things to consider it as a parasyphilitic affection.

THE RELATION BETWEEN

TREATMENT IN THE EARLY STAGE

AND

TERTIARY SYPHILIS.

BY

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THE RELATION BETWEEN TREATMENT IN THE EARLY STAGE AND TERTIARY SYPHILIS.

By Professor Neisser.

The whole subject of tertiary syphilis, interesting and attractive though it be, cannot be fully discussed in this paper on account of the number of controversial problems which arise in regard to the nature, development, and limitation of this stage of the disease.

I am therefore obliged to limit myself to one of the most important points, viz., the relation between and treatment in the early stages of the disease and the development of tertiary forms.

This subject has recently been under discussion by German dermatologists, and Fournier's method of intermittent treatment of prolonged duration was strenuously advocated by me in opposition to the older method of expectant and symptomatic treatment upheld by Caspari, Pick, Jarisch, Kaposi, Glück, Havas, Petersen, Mraçek, and others. The general consensus of opinion opposed Fournier's method, which a small minority supported (Welander and Haslund). It is not a question, however, of majorities, whether one or the other side wins, but one of humanity, on which it is most important to arrive at as correct a decision as possible.

Personally, so convinced am I of the correctness of Fournier's method that I am most desirous of promulgating it, and my conviction becomes all the stronger the less I hear of really adverse grounds which are supposed to militate against its adoption.

The first proposition I wish to place before you is the following:—

I.

The tertiary phenomena of syphilis, like the primary and secondary lesions, are the result of an organized poison (bacterial).—

The assumption that bacterial virulence has been modified in the case of tertiary syphilis is by no means necessary. Usually this stage is not regarded as infective, and the conclusion is drawn that the micro-organism must be less virulent than in the secondary stage. Jadassohn has shown, however, that the peculiarity of tertiary syphilides and their slight infectiveness can be explained by the presence of micro-organisms in few numbers only. Such a difference between early and late syphilides may be paralleled by a similar condition that holds good in the case of acute forms of tuberculosis cutis and lupus. In both affections tubercle bacilli of equal virulence are present, the difference being one of quantity only.

This question cannot be treated at length now, although a number of points require further elucidation, *e.g.*, the relationship of the infectiveness of a syphilitic to the symptoms he shows; and the relationship of a patient with syphilis of three years' standing, showing tertiary syphilides and regarded as infective, to another who had syphilis ten years previously, and yet shows similar tertiary syphilides which are not usually regarded as infective, &c. In my opinion such observations, apparently so striking, are to be explained by the quantity as well as by the localization of the specific micro-organisms.

In order to account for the pathological changes in tertiary syphilides, Jonathan Hutchinson puts forward the hypothesis, which I agree with, that the tissues are so profoundly altered by the syphilitic virus that they no longer react in the same way to syphilis-bacilli as is the case with healthy tissues or those in the first stage of syphilis.

Such a theory seems to be more probable when we call to mind the tissue-changes that occur after the primary stage. For the contrast between the latter and the secondary stage is well-defined and can only be referred to tissue-change. Klotz's theory that tertiary processes are to be traced to the source of infection being tertiary does not commend itself to my judgment.

II.

In considering the ætiology of tertiary syphilides, two points must be kept apart:—

A. The causes that determine the localization of tertiary syphilides.

1. The residual virus in former sites of primary and secondary syphilides.

This circumstance indicates the importance of local treatment of early eruptions and its influence in preventing tertiary symptoms. Neumann believes that cell-infiltrates—the remains of former syphilides—form the starting point of tertiary eruptions. We must therefore assume that the syphilitic virus persists, and in consequence is capable of engendering proliferative activity of the tissues.

2. Traumatic or pathological irritation of the tissues. Such irritation induces neoplastic changes corresponding to the tertiary stage which undergo gummatous degeneration.

B. General conditions which favour the preservation of the virus in the body. Such are:—

1. All influences which interfere with the capability of the normal organism to destroy the virus: alcoholism, cachexia, marasmus, &c.

2. The absence, the insufficiency, and the late employment of mercurial treatment.

III.

Mercury as far as our present knowledge goes is the sole remedy which attacks the virus of syphilis, although we are still uncertain whether it acts directly or indirectly by raising the resistance of the tissues. In support of the former view, the hereditariness of syphilis is directly influenced by mercury; not only are the eruptions thus cured but the virus itself is annihilated.

IV.

All other remedies and methods are ancillary, *e.g.*, potassium iodide, baths, diaphoresis—and possess the property of removing cellular infiltrates.

It is an error to regard iodide of potassium as equally efficacious as mercury; on the contrary, I believe that the former drug, with the exception of a few special cases, is altogether superfluous in the early stages of syphilis. It is no doubt useful at times in allaying troublesome subjective symptoms due to slight periostitis or similar processes, but I have never seen such treatment exercise a direct influence in secondary syphilides, and

consequently I do not prescribe any form of iodide in papular eruptions of the early stage. Of course, it is possible that there are other preparations of iodine, not so rapidly eliminated from the body as iodide of potassium, which enter into combination with the tissues and exert a remedial effect.

Another point I wish to insist upon is, that it is now a matter of common experience that the frequency of tertiary syphilides is much greater during the first, second, and third years of the disease than was formerly thought. Iodide of potassium is of striking benefit in tertiary processes.

From these data we may lay down the rule that in all cases of syphilis affecting the internal organs during the first year both mercury and iodide of potassium should be given. For as it is impossible to determine in such cases whether the symptoms are purely secondary and therefore to be treated with mercury alone, or whether they are of a tertiary (gummata) nature and therefore to be treated with iodide of potassium, it is advisable to administer both drugs.

Experience has long ago guided us to this conclusion, and thus, in cases of cerebral and spinal syphilis both remedies are used with marked success. The addition of potassium iodide benefits those tertiary phenomena appearing early in the course of syphilis, even though an accurate diagnosis cannot be made; and mercury is absolutely necessary in those cerebral and visceral affections which bear the "papular" character of the early stage.

I have often pointed out the error that many physicians fall into, in regarding cerebral, spinal, and osteal syphilis when appearing early in the course of the disease as tertiary and administering only the iodide of potassium. Now, in these organs, just as in the skin, secondary lesions appear, and therefore they must be treated in the same way, and mercury must also be given. Quite recently, Fournier mentions "*tertiarismus præcox*" in syphilitics of one year's duration, suffering from cerebral symptoms. I cannot quite see my way to accept his view, although I admit that such early signs of cerebral mischief are graver than those appearing in later years. The difference is to be explained by the fact that such cerebral symptoms are not tertiary, appearing as they do in the course of the first year, but are "papular" lesions situated in the cerebral vessels; there-

fore they disappear less rapidly than the ordinary tertiary forms.

Lastly, in reference to the treatment of tertiary syphilis, there are certainly many tertiary forms which recover more rapidly under mercury than under iodide of potassium. In many of the later forms of syphilis, *e.g.*, palmar and plantar syphilides, I believe mercury is essential to their cure.

Serum therapy has, I believe, a great future before it, although it must be admitted that the results have not, thus far, been encouraging.

I now pass to the consideration of one of the most important propositions, viz., the connection between tertiary processes and previous mercurial treatment.

The most weighty ætiological factor in the appearance of tertiary syphilides is in my opinion deficient mercurial treatment in the early stages of the disease.

V.

Mercurial treatment is satisfactory (1) when the drug is given early, or at latest, with the first appearance of secondary symptoms. Theoretically considered, we should prescribe it as soon as syphilis is diagnosed with certainty. (2) When the initial treatment is thoroughly carried out; in many cases a single course of treatment is sufficient to annihilate all infection and power of transmission to offspring (for the space of ten years observed in one case), and ensures perfect freedom from relapse. (3) When treatment is continued in varying intensity for four years with appropriate periods of intermission. The mode of giving mercury is of more subordinate importance.

The choice of method depends upon whether the patient is to be rapidly or gradually brought under the influence of the drug, the surroundings of the patient, the properties of the different mercurial preparations (rate of absorption), and finally individual idiosyncrasy.

VI.

Mercurial treatment rationally conducted and suited to the requirements of the case is quite harmless. I have never seen any deleterious effects, mental or physical, following a prolonged course of intermittent treatment (Fournier's method).

VII.

It is an error to regard the frequency or nature of the early symptoms as the sole guide to the choice and number of mercurial courses. For, (1) mercurial treatment, in cases of recurring relapses, has been often continued too long, and without sufficient intermission; (2) we know that the absence of early symptoms in no way influences prognosis with respect to the later stages of the disease. We must therefore endeavour to submit every patient with what is a chronic affection, to a prolonged course of treatment.

VIII.

A proof of the causal relationship between insufficient mercurial treatment in the early stage and the manifestation of tertiary symptoms, is furnished by the enormous number of tertiary syphilides present in those cases left untreated. Such a condition has been described as occurring in syphilis epidemics of old time (Radesyge, Skerliewo, etc.), and more recently by Russian writers. To this category all cases of *syphilis hereditaria tarda* also belong.

IX.

In support of my argument I cite the large percentage of tertiary syphilitics who have either not been treated at all, or only in a very indifferent manner. Such statistics, I admit, are not free from objection as only those cases of tertiary syphilis properly treated on the one hand are compared with those insufficiently treated on the other hand, and at the same time our knowledge of the course of syphilis in well and badly treated cases is still imperfect. But in spite of this defect, the statistics, which moreover show a striking uniformity in different countries, are of great value.

We must exclude those cases in which (1) the syphilitic nature of the disease is doubtful, (2) the tertiary character of the affection is open to question. Under No. 1, all cases of tabes dorsalis, general paralysis would be omitted, for, even admitting that syphilis or its toxine is one of the most important factors in the production of these affections, they nevertheless cannot

be said to belong to the group of diseases comprehended under the term of tertiary syphilitic processes.

It would be interesting, though unfortunately beyond the scope of this paper, to determine whether the kind of early treatment exerts any influence or not over the manifestation of such affections, *e.g.*, tabes dorsalis, general paralysis, post- and para-syphilitic leucoplakia. Under No. 2, we must remember that just as in the skin or other organs, secondary and tertiary lesions are seen, so similarly, not every case of cerebral or hepatic syphilis, &c., is to be regarded as tertiary in nature. The correct appreciation of such cases is rendered all the more difficult, owing to absence of ocular demonstration, and variableness in the duration of the secondary, and in the appearance of the tertiary period. Again, we must not overlook the possibility that affections of a different nature altogether (sarcoma, &c.), have been diagnosed as syphilitic, *i.e.*, tertiary processes, and only been proved not to be so by post-mortem examination. Frequently the beneficial effects of potassium iodide clear up the diagnosis. Another difficulty for statistical purposes arises in how far we must consider the mercurial treatment to be satisfactory in those days when the drug was administered by inunction or in pill form.

X.

The local treatment of enlarged lymphatic glands which may harbour the specific virus must receive special attention.

XI.

Whether the early appearance of tertiary symptoms—*syphilis præcox*—signifies early cessation of infectivity and transmissibility is still undetermined.

XII.

Malignant syphilis must not be included under tertiary symptoms.

From the above remarks it will be seen that I am an ardent advocate of Fournier's intermittent treatment.

The opponents however urge the following considerations:—1. Fournier's method of treatment is not more beneficial than the usual symptomatic expectant treatment; 2. It is more harmful than beneficial.

Now I do not imagine that I have settled this question, which has been under discussion for the last twenty years; I cannot absolutely prove my statements to be correct, but at least I am constrained to dispute those made by the opponents of Fournier's method.

I maintain there are a number of grounds for holding that prolonged treatment is beneficial. I believe from what we know of the virus and course of syphilis that it is possible to deduce *à priori* that this treatment is necessary, and I deny the view that a prolonged course of mercurial treatment carried out according to Fournier's method under general medical principles can be at all injurious. I shall begin with the latter point, as this appears to be the most important. Again and again I have asked the question—Wherein lies the injuriousness which such prolonged administration is said to produce? Personally I have never observed such injuriousness, although it is just *we*, who carry out Fournier's treatment, who should see it. We, and not our opponents, have amassed observations of those who have undergone the treatment whilst the latter have been speaking of dangers based more on general considerations than on any specific grounds.

For instance, it has been urged that a greater irritability and even damage to the nervous system may be induced by such prolonged treatment. I deny this *in toto*, at any rate I find that there are just as many nervous persons among syphilitics who have been treated without as with Fournier's method. They have become nervous in spite of the gradual and moderate administration of mercury, and no one of us is able to say always what may be the cause of such nervousness. Of course, I do not dispute that excessive mercurial treatment may be pernicious to the nervous system. On the other hand, we do not estimate the value of any treatment because its results may happen to be deleterious owing to erroneous employment, and even then a transient disadvantage may be amply compensated for by permanent beneficial results. However, I can only repeat my conviction that no proof has been hitherto

forthcoming of the injurious effects of prolonged mercurial treatment.

In my experience such results are more likely to be experienced by those physicians who treat symptoms and consider that every recent or sluggishly disappearing eruption must be forthwith submitted anew to a course of energetic mercurial inunction. I have seen several such patients in a condition of extreme cachexia, with hæmorrhagic eruptions, emaciated and anæmic, with all the symptoms of mercurial poisoning, but not one of them had been treated according to Fournier's method; on the contrary, the physician has carried out "symptomatic" treatment with all the disastrous results of hydrargyrism.

Often however it is not so much the fault of the physician in such cases of over-treatment as that of the patient who goes from one medical man to another whenever a fresh symptom shows itself, demands energetic treatment because, as he states, he has not had enough mercury, and many of the opposite school to ourselves yield to his request with frequently disastrous results.

In urging the prolonged course of treatment we emphasize the importance of the *intermissions*. These intermissions must be strictly observed in order to prevent poisonous effects, and so as not to interfere with the efficacy of the drug. It is by no means seldom that I am obliged to prohibit its continuation where physician and patients would be anxious, because the case was grave, to carry out an energetic course of inunction.

The drawing up a uniform plan of treatment is an effective means of preventing abuse of the drug. I would remind those who dread the consequences of mercurial treatment and therefore dispense with the drug, that there are sins of omission as well as commission. The general public is silent as long as it is ignorant on these matters, but we condemn the medical man who treats insufficiently just as much as the one who does so excessively. Certain cases of *syphilis maligna* have been adduced as examples of the pernicious results of Fournier's method. But every experienced physician knows that "syphilis maligna" must be treated very sparingly with mercury owing to the intolerance of this form of syphilis to the drug; and how therefore can the untoward results after repeated mercurial

inunction be ascribed to Fournier's method instead of to the ignorance of the physician as to the nature of the affection and its intolerance of mercury?

Moreover, it has been pointed out that workers in quicksilver are not more resistant to syphilis virus, for were it so then the disease would run a mild course. Our knowledge of the course of syphilis in quicksilver workers dates from the time when mercurialism was common, and therefore whatever advantage might have accrued from this condition would have been observed.

But such cases have no bearing at all on the present question; as a matter of fact the patients are already debilitated and cachectic, and naturally we would expect at the outset that syphilis would more probably run a severe than a mild course. Moreover, such observations form no basis for criticism of Fournier's method, for the reason that one of the chief points is omitted, viz., the intermission in the exposure to mercurial influence. It is true that the experience of English physicians who keep their patients for years under the influence of small daily doses of mercury shows that such an uninterrupted method furnishes good results. But Fournier holds, and in my opinion correctly, that it is better with the object of maintaining the good effects of the drug to observe complete periods of intermission. Finally, prolonged mercurial treatment has been objected to on the ground that it has a deleterious influence over the mental state of the patient. Its repeated administration is said to depress them, make them syphilidophobes, and destroy all hopes of ever being cured.

Here again I am compelled to take the opposite view. Of course, there are nervous men who are everlastingly tormented with the thought whether they really are cured or may not be liable to serious relapses in spite of treatment. But would such be less anxious had they had less or no treatment at all? I am certain it is just with such neurotics that the conviction that they are cured increases and displaces gloomy forebodings when they perceive that the disease is not being left to itself or to the expectancy of the physician, but being a chronic affection is being treated chronically. The laity is already sufficiently alive to the fact that syphilis is a disease that lasts longer than a year; many patients are aware that it frequently happens after years

of health, symptoms have reappeared, and that they should not think of marriage until some years have passed since infection. The physician has frequent opportunities of seeing patients who, in spite of the absence of all symptoms, desire to undergo a mercurial course before marriage.

With such general knowledge before us, surely, even from a psychic standpoint, doing nothing is more out of place than a judicious course of treatment, and I can aver that no case has occurred in my practice in which I have not regarded such thorough chronic treatment as a boon.

The difficulty in carrying out such treatment, extending as it does over years, is not by any means so great. Patients apprehend the principles on which it is based, not only the better classes, but artisans, workmen, their wives, and even prostitutes visit of their own accord the policlinic, for the purpose of undergoing again treatment and receiving their "injections." Naturally, the physician must acquire at the very outset the patient's confidence and insist on the treatment being carried out; yielding to a patient's whims means weakness on the part of his medical adviser! I cannot admit the force of the objection that we are depreciating the value of mercury in the eyes of the public, because symptoms may appear after, when before treatment there were none. Who of you has not often experienced that during, or immediately after treatment for a symptom, fresh syphilides have actually appeared, in consequence of which doubts have been freely expressed about the efficacy of the drug? The anti-mercurialists among the public object *in toto* to mercury, and it is our duty in popular articles to impress and make it plain to them that the chronic method of treatment is the most suitable one for treating the disease.

Prof. Kaposi has expressed the fear that the popularization of Fournier's principles would tend to produce, in Breslau at least, "an endemic psychosis." His view is that chronic treatment is a mistake; patients lose hope of recovery, and regard their health to depend not so much on the permanent cure of the disease as on the influence of the mercury they are taking. I have no such fears, for if the patient is thoroughly impressed at the outset that syphilis is a chronic disorder, variable in duration, accompanied at times by many, few, or even no symptoms at all,

that he is neither healthier in the absence nor less so in the presence of symptoms, and that he should undergo treatment again before he marries—in short, if the patient is informed of the chronicity of syphilis, and without compromising ourselves, we emphasize its curability by efficient treatment, then I believe we have no reason to fear the so-called psychic distress of the public.

I would fain consider myself a physician ever ready to do the best for my patients, and to weigh carefully any objections they might urge against the treatment. But I must say I have had no experience of the fears Professor Kaposi has expressed. It may be urged, it is all very well for specialists and professors, but what about the general practitioner who follows out the plan of continuous treatment for years during apparent health of the patient. I can only repeat what I have already said, that the lay mind is more inclined to a prolonged course of treatment in syphilis. In fact, I believe we have rather to combat the tendency of over than that of under-doing it. Of course, it is possible that in a limited district as Breslau and the neighbouring provinces, uniformity of treatment is more readily achieved than in Austria, where the number of authorities and consultants is much greater, and their views are more divergent, with their consequent greater diffusion among medical as well as lay circles. In my own vicinity I can state that the numbers of physicians who carry out Fournier's method is considerable, and no question of psychosis has arisen.

Therefore, not only do I esteem his plan of treatment not harmful, but beneficial and even essential. This view is set forth in my fourth proposition: Mercury is a drug which combats directly the virus of syphilis, and, as a proof of this, we know its effect on the transmissibility of the disease. I do not intend to discuss the question how mercury acts on the micro-organism of syphilis, whether its destruction is brought about by chemical combination with the albumins of the body, or whether the cell activity called into play by its presence renders the virus harmless, or, finally, whether it only inhibits its further evolution. However this may be, mercury must be regarded as the antidote to the virus of syphilis. But this view is strenuously opposed by some, who explain the action of the drug by its resolving power over the products of the virus. On the

other hand, we must remember its influence over heredity, although at present we are profoundly ignorant as to whether syphilis in the ovum impregnated by an apparently healthy man is caused by the products of syphilis existing latent in the male generative apparatus. We are therefore obliged to assume, in the absence of evidence to the contrary, that it is the virus itself that is latent though active, and nothing is more certain than the beneficial influence of mercury over hereditary transmission of syphilis. This fact is, as you know, so fully recognized by Caspary, that he submits all his patients who contemplate marriage, even if they show no symptoms, to another course of mercury. He is convinced that the offspring is thus protected, at any rate on the paternal side, and, although he has not stated as much, believes that the husband is less liable to relapse, and the wife to infection. I cannot, indeed, see how any opponent of Fournier's treatment can agree with this recommendation of Caspari. Such therapeutic measures simply imply, "here is a patient in whom syphilis lurks, although I cannot demonstrate the presence of the virus, but I know of a certain remedy, mercury, which destroys it."

This admitted, I see no reason why I should not make the attempt, even though marriage be not contemplated, to annihilate the poison. That he may be free from symptoms is no argument against such procedure, for no one during the first years of syphilis regards the absence of symptoms as proof of cure. Therefore I am forced to admit the utility of prolonged treatment in all those whom I cannot conscientiously declare to be free from syphilis. I need not here dilate upon the impossibility of prognosing the course of syphilis from the nature of the primary and secondary lesions. Indeed, we all know that the absence of symptoms proves nothing as far as the course of the disease is concerned, continued health and grave relapses can follow years of latency; hence, the course of syphilis must not be allowed to guide us in our treatment. The accidental absence of symptoms in a syphilitic must not lead us into the error of supposing him to be healthy, and therefore not to require the treatment we would prescribe for one in whom the virus is manifested by typical lesions.

It is true that these are considerations more or less theoretical, but they derive support from the experience of physicians all

the world over, and although incapable of proof in every single case, compel us, in my opinion, logically to accept Fournier's plan. No doubt it would be an advantage if we could quote statistics in its favour, *e.g.*, that out of 1,000 cases of syphilis treated on Fournier's principles the number of cases running a grave course is far less than those in a similar number of cases with few symptoms, and correspondingly, less thoroughly treated. Have we, then, any statistics to warrant the correctness of Fournier's method? Kaposi has recorded his opinion that statistics are of very little value indeed, they always yield misleading results. I am quite ready to admit that statistics should be used with great care; on the other hand, we have learnt a great deal from them. Were we previously aware of the fact that the majority of tertiary syphilides already make their appearance in the course of the third year after infection? or, again, that 80 per cent. of lupus patients have, or acquire, tuberculosis in other organs? In fact, we cannot do without statistics even though there be a danger in over-estimating their value, and we may divide them into two kinds. The first reveals the enormous frequency of tertiary syphilides among those who have never been treated. We may contrast the 6-10 per cent. of tertiary cases in our country, where the large majority of syphilitics are treated with mercury, with the 70-90 per cent. in Norway (the often-cited epidemic, *Radesyge*), Croatia, Bosnia (*Skerlievo*), and more recently in Russia.

When the Russian lady-physician, Dina Sandberg, records that she found no less than 86 per cent. of tertiary cases in districts under her own observation as compared with 6-8-10 per cent. in Germany, such a striking disproportion can only be accounted for by the absence of treatment in Russian villages and the improved treatment in our own country, and this after making due allowance for mal-nutrition, unhygienic surroundings, malaria, and other conditions which predispose to tertiary syphilis. I have expressed my views guardedly in proposition IX., and have no desire at all to ignore the weakness of such statistics. But we cannot deny the striking difference between the number of tertiary cases previously untreated, and those treated efficiently from the outset.

I need not here cite the well known statistics of Fournier, Haslund, Ehlers, Neumann, and those made by v. Marschalko

from my clinic, which have recently been brought up to date.* You are well aware how impossible it is with our ignorance of the actual numbers of syphilitics, however treated, to institute a comparison between the tertiary cases and the various methods of treatment they had previously undergone. But if

* The following table gives the proportion of tertiary syphilis in relation to previous treatment in cases under my care in Breslau :—

	Private Practice.	Clinic and Policlinic, ending 1893.	Clinic and Policlinic, 1894 and 1895.
	Per cent.	Per cent.	Per cent.
Untreated or only once imperfectly treated	35·4 M. 66·6 F.	72·3 M. 80·45 F.	68·8 M. 76·8 F.
Efficiently treated once	23·3 M. 16·5 F.	20·4 M. 14·25 F.	14·0 M. 16·0 F.
Two or three courses of efficient treatment	29·3 M. 8·5 F.	3·5 M. 2·4 F.	8·9 M. 5·8 F.
Four and more courses of treatment (some good, some bad)	12·0 M. 8·4 F.	3·37 M. 2·85 F.	8·9 M. 1·4 F.

Both hospital and private practice show how much the frequency of tertiary syphilis varies with the number of cases of syphilis that have been well and badly treated.

Private patients, on the whole, are more careful about treatment than hospital ones, and as is well known women remain more frequently untreated than men.

Does anyone believe that in private practice every third patient remains untreated, and that therefore 35·4 per cent. of tertiary syphilitics (untreated) corresponds to the actual number of untreated cases occurring in private practice? Again, are we to admit that 70 per cent. of syphilitics among the working classes remain untreated, as the above numbers indicate? If we endeavour to seek an explanation of the difference between the percentages of untreated male tertiary syphilitics in private and in hospital practice—35·5 per cent. and 70 per cent. respectively—in the social status of the patients, how are we to account for the striking equality among the female syphilitics in both kinds of practice?

If the table does not prove as much as at first sight it would appear to do, it at least is of great value in supporting our views, agreeing as it does with statistics compiled by other observers.

The percentage number 12 after four or more courses of treatment is especially remarkable. In my opinion it is too large; for I have intentionally included cases in which the diagnosis might be questioned, and the tertiary nature doubtful (*e.g.*, lesions of the naso-pharyngeal cavity). Again, the four or more courses of mercurial treatment may have been inefficiently carried out. In fact, I consider almost half of these cases to have been imperfectly treated in spite of the number of courses, and might well have excluded them.

my statistics show that out of all the tertiary cases in In- and Out-patient practice there are no less than 70 per cent. of males and 78 per cent. of females, and in private practice 35·4 per cent. of males and 50 per cent. of females that have had no treatment at all, we certainly know that these tertiary percentages do not correspond to the proportion of syphilitics untreated to those treated. In any case we can safely infer that a disproportionately larger number of tertiary relapses are seen among the former than the latter. What must be said then to Fournier's 177 cases when tertiary syphilis first showed itself after twenty years, and in which there had been no proper secondary symptoms, and, in accordance with the views held at that time, had not been efficiently treated?

Especially noteworthy is the contrast between treated and untreated syphilis as regards heredity. Whereas nearly every serious form of congenital syphilis terminates fatally, early and energetic treatment saves a considerable number of these children from grave lesions and untimely death. (*Cf.* the statistics of Etienne, Le Pileur, &c.).

Jadassohn has compiled valuable statistics based on the practice of the Breslau Lock wards, which were under my care until recently. These statistics refer to syphilitics who have been variously treated and kept under observation for years, so that the appearance or non-appearance of tertiary symptoms could furnish a basis for comparison. The most important conclusion is, that the better and more thorough the treatment was, the less the liability to tertiary syphilis. But if we accept the deduction that the chance of a favourable course of the disease is much greater when only one course of mercury has been given, then it follows that we ought to continue the administration of the drug until we have assured ourselves that the virus is annihilated. The question naturally arises, when does this happy event take place?

The followers of Fournier's method are constantly asked, "how long must treatment be continued?" Some state two years, others four years. Fournier himself has modified his views and mentioned various periods, and such hesitancy naturally calls forth considerable objection on the part of the opponents to his method. It is perfectly true we cannot give a decided answer—one point at least we admit, viz., the absence

of symptoms during the first year is no proof that the disease is cured. But we have no intention of giving a definite answer, as we consider it wrong to formulate a fixed scheme of treatment. If we follow the rule to treat every patient for several years at intervals with mercury, we do away with any cut-and-dried formula to be adopted in every case. The intensity of each single course, their number, the length of the intermission period, vary with the nature of the case and must be regulated accordingly. Just as I do not single out any special preparation as the best, but employ them all according to whether I wish to get the patient gradually or rapidly under the influence of mercury, so similarly, I do not lay down any fixed plan for treatment. Robust patients are treated more energetically than those already debilitated by other diseases. Those suffering from frequent and grave relapses are brought rapidly under the influence of mercury, in contrast to those in whom the virus is latent. Similar steps are to be followed in the prescription of baths and diaphoretic measures.

The various preparations and methods of use of mercury should be thoroughly understood by the physician who, intent upon treating a chronic affection chronically, desires to carry out efficiently such a principle. For not only is the disease to be treated, but the patient's condition to be carefully considered. In cases of phthisis mercury may be more harmful in stimulating tubercular processes than beneficial in counteracting the poison of syphilis. But such risks are not to be attributed to the falsity of Fournier's method, but to the want of care on the part of the physician in not appreciating correctly the general health of the patient.

In my own practice, I continue treatment for four years after infection, and during this period give 7 to 8 mercurial courses, the intensity of which, as above stated, depends upon the course of the disease and the individual equation. If I have any fixed plan at all, it is with the first course; this is energetically carried out—if no contra-indications are present—by inunction or subcutaneous injections.

I scarcely ever prescribe mercury by the mouth, although I admit that treatment can be properly conducted by the administration of calomel, but I am convinced that sometimes the intensity of the effect may be purchased at a serious risk

to the patient, *e.g.*, stomatitis, enteritis, loss of weight—results which are not necessary to the remedial action of the drug. If we avoid these complications, then the therapeutic action of calomel is satisfactory enough. In this method of administration, I am opposed to Fournier, who treats almost all his patients internally. He does not ascribe the same value as we do to inunction and injection; in fact, he disapproves of such methods.

No doubt his reasons are good, and probably practical considerations have induced him—based on differences of race and nationality—to administer mercury in this the most convenient of all methods of treating syphilis. It is probable, however, that this "pill treatment" is not in reality as good as more energetic methods. Years will have to elapse before we can arrive at a definite conclusion upon them; at present I recommend our external methods as being more thorough and quite harmless in their action.*

I shall not dwell upon questions connected with the various methods of exhibiting mercury, though it be a subject well worthy of discussion; in proposition IV. I have briefly set forth my views. I would here confess my inability to determine definitely whether treatment should begin as soon as the nature of the primary sore is diagnosed, or only until constitutional symptoms appear. Latterly I have followed the former plan, but cannot speak decidedly upon the results being more favourable than in following the general rule. Theoretically we should urge treatment to be commenced as early as possible, for it certainly seems more rational than to allow time to elapse for the further development and dissemination of the virus.

Furthermore, I wish to state again that I by no means bind myself to any one particular method of mercurial administration; in fact, I consider it a mistake to treat all syphilitics on a uniform plan. The mercurial course should be regulated according to the stage of the disease, and the nature of the symptoms present. Sometimes it should be energetically or mildly, at other times rapidly or gradually carried out, depending upon the nature and

* Judging from the numerous discussions and articles, French syphilologists are gradually recognizing the value and necessity of injections (calomel, oleum cinereum, &c.), which have been in use among us for the last ten years. Besnier, Wickham, Feulard, Jullien, Barthélemy, Blondel, Morel-Lavallée, have on several occasions strongly expressed themselves in favour of calomel injections.

surrounding of the case. We must take the individual into consideration, and thus determine whether inunction or injection—and here again whether soluble or insoluble mercurial salts should be used—is more suitable.

The last point I wish briefly to touch upon is Fournier's statement that cerebral and spinal affections are very frequent forms of tertiary syphilis.

In proposition VIII. I have succinctly stated my reasons for combating such a conclusion. The majority of statistics of tertiary syphilis, includes cases of tabes and general paralysis which cannot be forthwith recognized as syphilitic, as well as cases of nerve disorders undoubtedly syphilitic, but the tertiary nature of which, as I have already mentioned, is by no means proved. From a therapeutic point of view, a strict separation of secondary from tertiary symptoms is immaterial, as we give both mercury and iodide of potassium; but for statistical purposes we must insist upon only those cases being included under tertiary syphilis in which either the autopsy has proved the diagnosis to be correct, or the administration of potassium iodide only has been followed by cure.

In my opinion tabes and general paralysis should be excluded. I do not deny that there may be an intimate connection between the appearance of these diseases and previous syphilis, but it is surely an error to assume a direct relationship between them and the micro-organism of syphilis or its toxines. We can only admit that syphilis engenders in the brain and spinal cord a condition that renders these viscera less capable of resistance to lesions than is normally the case. Thus it happens that syphilitics are much more liable to acquire such diseases, which, as we know, may occur without such specific predisposition.

Of course, if the object be to study the baneful influence of syphilis over the general health, and to determine this statistically, then tabes and general paralysis would necessarily have to be included. But in statistics of tertiary syphilis assuredly they do not find a place, an opinion I must hold notwithstanding Fournier's authority.

It is quite possible more light may be thrown on this matter by Weigert's researches in the neuroglia; but at present, I repeat, we know nothing of a purely syphilitic affection of the sustentacular tissue of the brain and spinal cord.

With this reservation, then, an examination of his tertiary statistics yields very different conclusions from those Fournier has obtained. In 3,431 cases of tertiary syphilis, Fournier has included no less than 1,086 cases of syphilitic nerve lesions, *i.e.*, 31·4 per cent. If we deduct the cases of tabes and muscular atrophy, we get 625, and even this figure includes cases in which the tertiary syphilitic character is doubtful. At all events the percentage drops from 31·4 per cent. to 21 per cent. admitting their tertiary nature to be proved, and therefore of value for statistics. Even this number is rather high, but it corresponds more nearly to those of Hjelmann, Ehlers, Haslund, and Dina Sandberg (12·25 per cent.) provided we only include definite tertiary syphilis of the central nervous system. Further, we must remember in this calculation that whereas a considerable portion of slighter (tegumentary affections, &c.) cases is excluded, and therefore the sum total of tertiary cases diminished, practically all grave cerebral lesions are included.

	Fournier.	Haslund.	Hjelmann.	Ehlers.
Tertiary syphilis of the skin, subcutaneous tissue with and without implication of the bones, cartilage (mouth, nasal cavity, larynx)	1,700	604	1,684	914
Definite cerebral and spinal syphilis (secondary and tertiary lesions) and ocular paralysis	625=21 %	—	254=13·1 %	*244=16·4 %
Tabes, general paralysis, and muscular atrophy	461	—	—	17
Sum total	1,086=31 %	200+	—	261
Visceral syphilis (liver, testicles, &c.), joints, syphilis of the sense organs	643	259	346	326
Total, *with* Tabes, &c.	3,429	1,063 distribution in 791 persons	2,284 distribution in 1,860 cases	1,501‡ with tabes.
without ,, ,,	2,968			1,484 without tabes. Added to this: Cerebral syphilis.. 172 Tabes ... ... 150 General paralysis. 486

* Including 19 cases of ocular paralysis.

\+ Indefinite, as the figure does not state how many cases of tabes and paralysis are included.

‡ Including 23 cases of malignant syphilis.

My own statistics, based on hospital and private practice, owing to the patients being distributed in the wards according to which system is implicated, are not sufficient for elucidating this question.

Before I conclude, I must mention a point that has just occurred to me as specially bearing on this subject. Dr. Glück has informed us that neither he nor any of his colleagues have met with a single case of tabes in Bosnia, although syphilis is prevalent enough, a fact which is of supreme importance in the oft-discussed question of the relationship between syphilis and tabes. Other nervous affections, on the other hand, are by no means infrequent, especially hysteria, hystero-epilepsy, &c. It is to be hoped that the author will give us further results of his interesting observations.

Finally, I must express my satisfaction with the discussion that has taken place; it has been very instructive to me to hear how gradually Fournier's principles are gaining ground, and all the more do I feel it my duty to promote their dissemination, for I am convinced of the necessity of the chronic-intermittent treatment of syphilis, and possess sufficient optimism to believe that you all will be obliged to accept it if for no other reason than that of the pessimism that prevails among us in the prognosis of this disease. *Laisser aller* means nothing else but harm to the patient: that is my firm conviction.

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