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THE SURGERY OF SYPHILIS

BY

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CHAPTER I

A SHORT HISTORICAL ACCOUNT

SYPHILIS employs the surgeon in many different ways, and it has always done so since the first appearance of the disease in Europe, at the end of the fifteenth century. It is interesting, but perhaps idle, to speculate on the cause of that great epidemic, though there is no mystery as to why the disease has ever since been endemic.

It is always said that the political condition of Europe between 1490 and 1500 was exceptionally favourable to the rapid dissemination of syphilis throughout Europe, and there appears to be no doubt that it then entered the Old World as a new disease. The Nubian pathological collection, which has recently been presented to the Royal College of Surgeons of England by the Survey Department of the Egyptian Government, shows that for a period of 5,000 years the people who lived in the valley of the Nile were probably free from syphilis. Fifty-seven cemeteries have been explored, and the bones of 9,000 bodies have been examined, without discovering irrefutable evidence either of syphilis or of tuberculosis. By the kindness of Professor D. J. Cunningham, F.R.S., I have had an opportunity of examining the right femur of an adult female (Plate I), which was dug up in the cemetery of Nunraw, East Lothian. Mr. Pirrie, who examined it, believes that it shows evidence of syphilis, but nothing is known, even approximately, of the date of the interments. It is difficult, therefore, to say whether or not this is 'the earliest specimen of syphilis on record', as is suggested by Mr. Pirrie. There can be no question, on the other hand, that the disease was well known in the New World before the advent of Columbus (Plate II). It was called Nanavatl in Mexico, and was recognized as a cause of paralysis and of disease of the bones. Baths and a course of guaiacum

formed the routine treatment, which was no doubt successful, because the whole race had become immune to the worst effects. Columbus left Europe on August 4, 1492, sailing with three ships down the broad Guadalquiver from Seville, and landing, on October 12, upon the island which the Spaniards afterwards called Hispaniola, though it is now Haïti. Some of his crew here caught syphilis, and Columbus landed at Palos in Andalusia, upon his return, on March 15, 1493, having previously arrived at Lisbon on the 6th, whilst Pinzen, the captain of the remaining caravel, himself a victim of syphilis, was driven northward about the same time into the French port of Bayonne.

Ruy Diaz de Isla (1462(?)–1542) states definitely that the disease, previously unknown, unseen, and undescribed, first appeared at Barcelona in 1493, and spread thence throughout the world. De Isla spoke this of his own knowledge, for he was practising at Barcelona in 1493, and was a surgeon of repute, who afterwards moved to Seville, and ultimately became surgeon to All Saints' Hospital, at Lisbon.

Charles VIII, king of France, led an army of Swiss, French, Spaniards, Italians, Hungarians, and Slavs through the length and breadth of Italy, at the end of the year 1493. He spent the month of January, 1495, at Rome, where Roderigo Borgia, father of Caesar and Lucrezia Borgia, occupied the chair of St. Peter, under the style of Pope Alexander VI, and at Rome in 1520, when the standard of morality had greatly improved, it was estimated that there were 14,000 prostitutes of Spanish origin alone, not counting those of other nationalities.

Charles VIII entered Naples with his army on February 22, 1495, the entry resembling a triumphal march, and for twenty-four days the soldiers indulged themselves in an unbridled orgy of wine and women in the most sensuous town in Italy. At the end of this time Charles gained a partial victory at Fornuovo, and within a few days his army began to melt away, the soldiers carrying to all parts of Europe the contagion of syphilis which they had contracted in Italy from the Spanish women who had brought it from their own country.

The disease is said to have reached Bristol in 1497 by way of

Bordeaux, but the early records of syphilis in England are singularly scanty, and it is not until 1503 that an entry occurs in the Privy Purse expenses of Elizabeth of York, Queen of Henry VII, concerning 'twenty shillings paid to a surgeon who healed John Petriche, one of the sonnes of mad Beale, of the Frenche Pox'. At the same time she paid 'for a prymer and saulter [book for John] 20 pence', so that the youth seems to have been in want of mental as well as moral training. Syphilis was sufficiently prevalent in Scotland in April, 1497, to demand the serious attention of the Town Council of Aberdeen, whilst the following entry of payment occurs in the accounts of the Lord High Treasurer of Scotland for the year 1497–8 :—'Item, the 24th day of February, given to the sick folk of the grangore at the town end of Glasgow, iis.' The use of the term 'grandgore' as an early name for syphilis throughout Scotland is significant of the way it reached that country. It was the local name for syphilis at Rouen, and is used by Rabelais in the fifth book of 'Pantagruel', where Parazon healed those afflicted with grandgore by touching their vertebrae three times with a piece of a sabot.

But if the records of syphilis in the United Kingdom are scanty, it is far otherwise on the Continent. The sudden appearance of syphilis in Europe at a time when printing was becoming general led to the production of a series of monographs, when other diseases received only short paragraphs of notice in the textbooks of the time, and I was fortunate enough to find in London last year one of the earliest of these syphilitic pamphlets, by Bartholomew Steber (d. 1506), published at Vienna only four years after the introduction of syphilis into Europe. The frontispiece, which is here reproduced (Plate III), shows a patient with a tertiary syphilide, and the method of treatment in use at the time by the application of an ointment. The appearance of syphilis was not only synchronous with the more extensive use of printing, but it was coincident with a general revival of learning, so that the earliest records were made by men capable of giving an intelligent and detailed account of a disease which was new to them. The first occurrence of syphilis, spreading as a pandemic, quickly attracted popular attention, and led to numerous descriptions

by non-professional writers. Attention being thus awakened, it became the custom to devote a special division of every book on surgery to a discussion of venereal disease, until there has grown up a mass of literature which it is impossible for any man to master, merely on account of its bulk, even were it worth while to do so for the few grains of truth which it contains.

The very expression, 'venereal disease,' carries with it one of the most important advances made in connexion with syphilis during the last half-century. The term was used very loosely for many years, though the writers before 1786 had a tolerably clear idea that three separate diseases were included under the general heading of venereal disease: the lues venerea, which is now called syphilis; a condition associated with a chancre and buboes, known as soft sores; and gonorrhoea, which in their minds was confused, as it is still by quacks and clap-curers, with any urethral discharge due to causes ranging from a pyonephrosis to a natural seminal emission.

In 1786 John Hunter, by a single unfortunate experiment upon himself, followed by a hasty generalization, taught that there was but a single venereal poison, and it took the French school many years of hard work to make the medical profession recognize that Hunter was wrong, that the poison of syphilis was distinct from that which produces a soft sore, and that the poison of a soft sore was incapable of causing a gonorrhoea. Clinical evidence has been strengthened by the growth of bacteriology, and this in turn has been made conclusive by the experimental facts which were first obtained by Prof. Metchnikoff at the Institut Pasteur in Paris.

These experiments open up wide fields for speculation, which are as yet wholly uncultivated. The historical account of the rapid spread of syphilis throughout Europe in the sixteenth century is probably correct, but there must have been some underlying cause which led to a predisposition to infection with syphilis entirely apart from the grossness of the time and the laxity of morals which characterized the period of the Renaissance. An explanation of the predisposing cause will probably be forthcoming as soon as the nature of the syphilitic poison is known thoroughly.

Experiments show, even now, that groups of allied animals present very different susceptibility to artificial inoculation with syphilis. The higher anthropoid apes are more easily infected than the lower groups, but even in the highest forms there are remarkable differences, for the chimpanzee is more easily inoculated than the gibbon or the orang-utan. There is evidence, too, that the syphilitic poison itself varies in strength, and even in the effect it produces on different classes of animals. Thus, a rhesus monkey was inoculated with difficulty from a chimpanzee, but when the virus was passed from rhesus to rhesus, it became increasingly virulent for these animals, so that the incubation period was gradually reduced from 19 to 7 days. But the virus which had originally come from a chimpanzee had now lost its effect upon this class of animal, though it was still locally contagious for a human being. Yet the products of this local contagion in a man were again virulent for a rhesus monkey.

In clinical practice, too, the syphilitic poison sometimes exhibits temporary variations in virulence. Thus Major French, R.A.M.C., writes in his most interesting series of articles, 'Syphilis in the Army': 'The type of constitutional syphilis at Aden in 1896–7 was most severe. There were many cases of malignant syphilis, of tertiary ulceration, of iritis, and coincident scurvy. No form of control existed, and although the climate is bad, it could not fairly be considered the cause of initially severe or early malignant manifestations. These are due to virulence of the inoculated virus, no doubt accentuated by lessened resistance on the part of the individual, and aggravated by climate.' These words would apply equally to the first European outbreak of syphilis.

The people of the fifteenth and sixteenth centuries have not yet been submitted to any critical examination of their physical characteristics, though many writers have laid stress upon the peculiarities of mind which raised them rapidly to such an immeasurable height above their predecessors and many of their successors. The preceding generation had been decimated by the black death, and they themselves were periodically weeded out by the bubonic plague. It is quite possible, therefore, that their

tissues may have been peculiarly fitted to nourish the specific form of spirochaete which we have good reason to suppose is the cause of syphilis. Plenty of material exists for such a study by a competent historian of medicine, but as surgeons we are called upon to act and cure syphilis, not to speculate upon its origin.

Correct treatment needs accurate diagnosis, and no treatment of any disease can be more than empirical until the cause is known. Every advance in knowledge in any one branch of science reacts upon many other departments with which at first sight it seems to have no direct connexion. Improvements in the science of optics led to the invention of the compound microscope, by means of which morbid anatomists were enabled to gain a better acquaintance with the structure of the tissues of the body in a healthy and diseased state. Thus arose the science of pathology, and from it bacteriology was developed, whose theory and practice has revolutionized surgery.

These successive advances have been utilized in the diagnosis of syphilis. The changes peculiar to syphilis were soon recognized by means of the microscope, and similar changes due to other causes were readily discriminated. A group of swellings of the joints, which had been classified under the general heading of white swelling or tumor albus, were soon subdivided by histologists into tuberculous disease, syphilitic inflammation, and sarcomatous synovitis. Tuberculous arthritis was further subdivided into a form associated with the presence of tubercle bacilli, and another in which some of the different strains of pneumococci were alone found in the inflamed tissues of the joint.

Still farther advances in physical science led to the discovery of the Röntgen rays, and few discoveries have been of such signal importance to the surgeon for purposes of diagnosis in diseases and injuries of the bones. Many of these diseases and injuries which were formerly left unrecognized are now seen as clearly in the living body as if they existed in museum specimens. The application of X-rays in cases of bone disease due to syphilis has been very instructive, and has enabled the effects of inherited syphilis to be observed at a more advanced period of life than had hitherto been thought possible (Plate VI), whilst at the same time

it has helped the surgeon to distinguish syphilitic osteitis from allied inflammations due to tubercle and rheumatism.

The most recent advances in the diagnosis of syphilis have advanced along the lines of experiment and pathological chemistry. The greatest interest at the present day attaches to the existence of an infective agent causing syphilis, and there are many reasons to suppose that the actual cause has at last been found in the *Spirochaete pallida* or spironema which was described in the spring of 1905 by Dr. Schaudinn and Prof. Erich Hoffmann. The spirochaete has not yet been proved to fulfil all Koch's postulates, and it is sometimes found in such enormous numbers as to make it difficult to believe that it is actually causal, or the effects produced would be greater than they are. On the other hand, its presence has only been demonstrated in connexion with syphilis, and it may therefore be employed for diagnostic purposes.

The presence of the *Spirochaete pallida* can be demonstrated by any one with a competent knowledge of modern bacteriological methods, if he is in possession of a good one-twelfth oil immersion objective. The organisms are best seen in pure lymph from the neighbourhood of a chancre, if care be taken that the lymph shall be as free as possible from blood and from accidental contamination with cellular elements. Prof. Leishman gives the following instructions for staining a film of lymph to show the presence of the *Spirochaete pallida*. Films of clear lymph are made in the usual way upon perfectly clean and polished cover-glasses. The films are allowed to dry in the air, and the thinner and more even they are the better will be the result. Whilst the films are drying, the stain, either Leishman's or Giemsa's (which it is better to buy ready made), is diluted in a watch-glass in the proportion of two parts of water to one part of staining fluid. A cover-glass with the film uppermost is then picked up with a pair of forceps and three or four drops of the diluted stain are allowed to fall upon the film. The forceps are then gently moved from side to side until the stain is evenly distributed over the whole surface of the cover-glass. The stain is allowed to act for twenty-five minutes, and no attempt is made to prevent evaporation. It is then washed off

with distilled water, which is made to trickle over the film with the utmost gentleness. The film is dried with cigarette paper, which is pressed down upon it with a scrupulous avoidance of any rotary movement. The cover-glass is then allowed to dry, and is examined either in a drop of cedar oil, or, after mounting, in Canada balsam. The red blood corpuscles which may be present are deprived of their haemoglobin by the staining process, and the cells have their nuclei stained nearly black, whilst the spirochaetes and other micro-organisms are also stained, but to a less degree. The number of spirochaetes vary greatly in different films. They are sometimes seen at once, whilst at other times it needs much patience to detect them (see vol. i, p. 86).

The staining of tissues to show spirochaetes in sections is a harder matter, and is better fitted for the pathological laboratory than for use in the consulting-room, since it depends upon a complicated silver process based upon Ramon-y-Cajal's method of staining nerve fibrils (see vol. i, p. 92).

There exists also a serum diagnosis of syphilis which rests upon the ' Bordet-Gengou reaction ', in which sensitized red blood corpuscles do not undergo haemolysis in the presence of syphilitic poison, whilst the control with non-syphilitic extracts shows rapid haemolysis. The application of this method is giving interesting results, especially in those difficult cases of parasyphilis which have depended for their recognition rather upon probability than on any proved scientific basis (see vol. i, p. 144).

During the earlier stages of syphilis, surgery deals with the primary sore and its complications, with the enlarged lymphatic glands, with inflammation of the mouth, tongue, and other mucous membranes, whilst in the later stages it is chiefly concerned with the results of inflammatory processes produced by the disease. These inflammatory processes occur over widely extended areas. They lead either to thickening and condensation of the normal tissues and to their replacement by scar tissue, or they form circumscribed masses, which show a tendency to disintegrate, becoming absorbed under favourable conditions ; suppurating if they are associated with pyogenic organisms. The surgery of syphilis in its later stages, therefore, is the surgery of sclerosing

or gummatous inflammation running a very chronic course, and affecting tissues which are accessible to surgical interference, for there are still many tissues beyond the reach of surgery. In the later stages of syphilis, surgery deals, therefore, with the bones and joints, with the muscles and tendons, with the mucous membranes, and with those hollow viscera like the rectum, where the results of chronic inflammation end in a narrowing of the passage, and a consequent interference with the function of the organ.

But syphilis does not always deal so straightforwardly with the tissues, and one of the most important surgical advances in connexion with syphilis has been a clear recognition of this fact. It used to be thought that the working of syphilis was confined to its signs, and that there were no hidden processes in connexion with the disease. The occurrence of aneurysm, the knowledge of the pathology of tabes, and the intimate connexion of syphilis with general paralysis of the insane gradually widened the outlook of every thinking practitioner of medicine. Even the older surgeons were accustomed to call attention to the frequency with which phagedaena is associated with venereal disease, especially soft sores and syphilis.

In like manner it has long been known that cancer is peculiarly likely to occur in tissues which have been the seat of chronic syphilitic inflammation. Speaking metaphorically, syphilis often prepares the tissues for cancer, especially that form known as epithelioma, whether in the mouth as a squamous-celled carcinoma of the tongue or of the skin grafted upon a syphilitic ulcer of old standing ; more rarely as an adenoid carcinoma following upon a long-continued syphilitic ulceration in the rectum. There is no reason to suppose that the syphilitic poison acts specifically to produce cancer, but it causes a chronic irritation, which, if left untreated, may become carcinomatous, though it does not necessarily do so. The exact nature of the change is unknown. It is an alteration in type, not a mere variation in the degree of inflammation. A tongue may remain scarred, fissured, and painful for many years as a result of syphilitic inflammation, and yet show no signs of cancer, until without apparent cause the edge of one of the fissures becomes hardened, and a true cancerous ulcer forms rapidly.

Analogy suggests that such a change of type is due to infection, but as yet there is no scientific proof of the infective nature of cancer.

It is only during the last few years that stress has been laid upon the intimate connexion which exists between syphilis and tubercle, though it is an everyday observation that syphilitic inflammation is prone to attack patches of lupus with especial avidity. There is a general impression that the tuberculous bear syphilis badly, but more detailed examination shows that the relationship of tubercle and syphilis is much more intimate than is warranted by so general a statement, for the two infections may interact under widely different conditions. A person with active tuberculous disease may acquire syphilis, or a child who has inherited syphilis may become infected with tubercle. The two diseases may be active simultaneously in either case—a true symbiosis—they may overlap, or they may be widely separated in point of time. Each condition has its own prognosis, and the various combinations cannot be considered under a single heading.

Many children with inherited syphilis die of tuberculosis, and there are some grounds for arguing that syphilitic tissues are more liable to become affected with tubercle bacilli than others in an equally defective state of malnutrition from other causes of marasmus.

When the tuberculous processes are active at the time of infection with syphilis, as often happens in young men, there is very little doubt that they are increased in rapidity as well as in extent. This happens especially when mercury is withheld under the mistaken idea that tuberculous patients bear the drug badly when they are also syphilitic. But when the tuberculous process is quiet, a subsequent syphilitic infection does not necessarily start it into activity again if the patient be treated rationally and is not reduced in his general health by mercurial courses lasting for too long a time, or by large and depressing doses of potassium iodide. Indeed it would be interesting to ascertain whether the sclerosing inflammation of syphilis does not rather exercise a restraining action upon the disintegrating foci of tuberculous inflammation.

The interaction of syphilis and tubercle is seen by the surgeon

in the bones and joints of patients at all ages and in every condition of life. The diagnosis is generally easy in children and young adults, for both syphilis and tubercle are common in early life, and both leave sufficient traces of their action. But it is far otherwise at a later period, when the traces of inherited disease have vanished, and tuberculous inflammation is rare. The really difficult cases for diagnosis, and still more for treatment, are those in which tuberculous disease of the bones or joints attack a patient late in middle life who has inherited syphilis; in other words, when senile tuberculosis is grafted upon inherited syphilis. Such a patient denies with perfect truthfulness that he has ever acquired syphilis, or suffered from any form of venereal disease. He can point to healthy children and to a wife who has had no miscarriages nor any illness which invalidates his story. He is ignorant of any childish illnesses, and he has long outlived those who could throw any light upon them or upon the medical history of the generation which preceded his own. Syphilitics, like those who suffer from actinomycosis, react to tuberculin, so no help is to be gained from that source of diagnosis. But a skiagram sometimes affords a clue by showing the characteristic thickening of the cortex of the bone with a corresponding diminution in the cancellous tissue (Plate V), and sections of the synovial membrane and articular cartilages will help the diagnosis when a joint is affected. The inquiry as to the exact nature of the inflammation is only too often barren in either case, and it is not assisted by the results of treatment. Mercury is ineffectual; the iodides do little more than reduce the swelling for a short time, and cod-liver oil is useless. Rest, massage, and the adoption of every possible means to improve the general health of the patient alone do good, though, only too often, the surgeon has to perform an amputation as a last sad confession of failure.

The interaction of syphilis and the pyogenic micro-organisms is peculiar and interesting. It is often seen in infants who have inherited syphilis. They suffer during the first few months of life from a suppurative arthritis, which used to be classed as tuberculous, but which recent advances in pathology have shown to be due more frequently to a pneumococcal infection associated

with staphylococci or streptococci. Such cases run an acute course, but they are less liable to leave sinuses or stiff joints than similar tuberculous inflammations occurring in older children. They are, too, more amenable to treatment by mercury.

Staphylococci and streptococci play an important part in the phagedaenic inflammation which is not uncommon in the later stages of syphilis, though it is more common in association with soft sores. The pathology of phagedaena has not yet been elucidated, but it seems to be due to anaërobic organisms acting upon tissues whose power of resistance has been impaired by such changes as syphilis is known to produce. Phagedaena is not caused solely, or even directly, by syphilis. It is often associated with syphilis and may occur at any period of the disease, though it is more common during the later than the earlier stages. It generally attacks those who are worn out by intemperance and excess, but it does not always spare the young and robust. Phagedaenic inflammation runs an erratic course, sometimes leading to extensive destruction of the tissues, and sometimes ceasing abruptly when it seems to be most active ; at one time it advances by leaps and bounds, with intervals of comparative inactivity, at other times it causes the tissues to melt away before it in orderly progression.

The older surgeons knew that an attack of erysipelas often cured, or at any rate arrested the progress of, phagedaena ; modern surgeons act upon the knowledge in a more scientific manner. They treat their patients by the injection of polyvalent serums and by the administration of mercury and potassium iodide in appropriate doses, as well as by local medication in the form of baths after the products of the inflammation have been removed by scraping or destroyed by the application of such caustics as nitrate of mercury, pure nitric acid, or crystallized phenol.

BIBLIOGRAPHY

Dr. G. Eliot Smith, The Alleged Discovery of Syphilis in Prehistoric Egyptians. The Lancet, 1908, vol. ii, p. 521 et auct. ibi cit.

The Cemetery of Nunraw, East Lothian, by the Hon. J. Abercromby and Mr. A. MacTier Pirrie. Proceedings of the Society of Antiquaries of Scotland, vol. iv, 4th series, 1906, p. 331.

Antiquarian Notices of Syphilis in Scotland. Archaeological Essays by the late Sir James Y. Simpson, ed. John Stuart. LL.D., Edinburgh, 1872, vol. ii, p. 301.

Syphilis in the Army, by Major H. C. French, R.A.M.C., London, 1907, 8vo, p. 4.

Schaudinn and Hoffmann, 'Arbeiten aus dem Kaiserlichen Gesundheitsamte,' Bd. 22, Heft 2, April 10, 1905.

Prof. Leishman, The 'British Medical Journal', 1901, vol. ii, p. 757, and 'A Manual of Venereal Disease', by officers of the Royal Army Medical Corps: the Oxford Medical Publications, 1907, p. 62.

On Recent Advances in the Surgical Treatment of Syphilis, by D'Arcy Power. Transactions of the Medical Society of London, vol. xxxi, 1908, pp. 309–324.

CHAPTER II

THE BONES

THE relationship of syphilis to inflammation of the bones has been known for so long a time that the old term ' node ' to denote a local plastic periostitis of syphilitic origin has passed into folk-speech.

Bone consists of a basis of inorganic material, which is chiefly phosphate of lime, permeated by a living connective tissue loaded with fat at the central or medullary part, more fibrous at the periphery, where it forms the periosteum, specialized in function at the cancellous ends, where it is the red marrow with the power of making red blood corpuscles. The living portion of the bone, which is continuous from the periosteum through the whole thickness to the medulla, and again from the medulla to the periosteum, is alone capable of inflammation. But as its structure varies slightly in different parts, the stress of any inflammation may fall more markedly upon one portion than another. It happens, therefore, that inflammation of bone may be divided clinically, but not pathologically, into periostitis when the covering of the bone is chiefly affected; osteitis, or more properly osteomyelitis, when the bone itself is involved to a greater or less extent; and ' epiphyseal ' inflammation when the intermediary cartilage and the tissues in its immediate neighbourhood are involved. The intermediary cartilage is the layer of cartilage which lies between the epiphysis and the shaft of the bone. It is distinct from the epiphyseal cartilage because it contains blood-vessels, and from the newly-formed bone because its matrix is calcified and not ossified.

Inflammation of bone due to syphilis occurs both in the acquired and inherited forms of disease, and under both conditions it is usually a late manifestation, though children are occasionally born with nodal swellings on their bones.

The tabulation of the different forms of syphilitic inflammation of the bones is made better from a pathological than from a clinical standpoint, and it may be given in the following form :—

- Acquired
  - Periostitis
    - Local.
    - Diffuse.
  - Osteitis (or Osteomyelitis)
    - Local.
    - Diffuse.
- Inherited
  - Periostitis.
  - Osteitis or Osteomyelitis.
  - 'Epiphyseal' inflammation.

Any of the bones may be attacked by syphilis—long, short, and flat bones, those developed from cartilage as well as those which are laid down in membrane.

General Pathology. The bone affections occur both in acquired and in inherited syphilis. They are due primarily to the action of the specific micro-organisms producing syphilis and of the toxins derived from them. But when once the inflammatory changes begin they follow the ordinary lines of an osteitis. The course taken by the inflammation varies under different conditions. In the simplest forms the inflammation is limited in extent and ends in the formation of denser bone in somewhat larger quantity because the inflammatory products become ossified after a time. More frequently the inflammatory products, being of the nature of gummata, undergo caseation. The inflamed bone then becomes rarefied, and either becomes infected by pyogenic organisms, in which case suppuration takes place, or the inflammatory products, under the action of suitable remedies, are absorbed, and the bone resumes its original condition or it remains either wholly or partially thickened. Gummatous inflammation occurs, either in a localised or a diffuse form, always in those parts of the bone where the blood supply is most abundant and usually as a result of injury. The injury may be of a gross nature, or it may be of a physiological character, such as is produced by over-use and the consequent congestion of the tissues. The occurrence of syphilitic inflammation in bone does not prevent the changes due to tubercle, as has often been stated. On the

other hand bones exhumed from the prehistoric burial grounds of the New World show inflammatory changes which more closely resemble those known to be due to syphilis than any met with in the ancient cemeteries of Europe or Africa. This is well seen in Plate II, which represents portions of a skeleton from a burial mound in Colorado. The bones are preserved in the Peabody Museum of American Archaeology and Ethnology, Cambridge, Mass. There are good grounds for suspecting that in many cases a syphilitic inheritance paves the way for extensive destruction of bone, either by necrosis or by that process of rarefaction to which the name caries is often given. Infection with tubercle or with any of the pyogenic organisms is a common ending to syphilitic bone disease. It has already been shown (p. 13) that there may be so intimate a relationship between syphilis and tubercle as to make it difficult or impossible in many cases to distinguish between the two causes leading to inflammation and destruction of the bone, though when either is acting alone a radiograph gives some help in the diagnosis.

Radiographic appearances. Radiographs show that in syphilis the epiphyseal ends of the bones are enlarged and translucent, whilst the periosteum of the shaft is thickened. The compact tissue of the bone is so greatly increased that the shadow of the medullary cavity may be entirely wanting, but the epiphyseal end of the diaphysis retains its natural appearances unless the joint is also affected. The general appearance of the skiagram in a case of syphilitic disease of the bone, therefore, is a darker shadow marking out the bone, the thickening being fusiform in shape and regular (Plates IV and V), unless there is an active gummatous inflammation in progress, when the newly-formed bone is seen to be deposited irregularly and is marked by a characteristically serpiginous outline (Plate VI).

There is much less thickening of the periosteum in cases of tuberculous inflammation. The bone seems more porous than in syphilis, and the epiphyseal end is less translucent, although the soft parts in the neighbourhood of the affected bone are more widely affected. The actual outline of the bone, therefore, in tuberculous inflammation is not so well defined as in syphilis. The

density of the shadow near the bone is greater. The compact tissue and the cancellous tissue of the bone retain their natural proportions, and the medullary cavity is of its usual size.

The active changes in rickets are seen at the epiphyseal line, and the radiograph often shows a cup-shaped defect of the neighbouring diaphysis.

When the syphilitic inflammation of the bone is not associated with suppuration, the sclerosing inflammation continues for years, and leads to the conversion of the whole bone into a compact tissue of ivory-like hardness. The process is usually associated with a bending of the bone in the direction of its natural curvature and an increase both in its length and girth (Plate VIII). The inflammation is often painful, and chronic ulcers form on the skin, which are sometimes so troublesome as to lead the patient to consent to amputation.

Osteocopic Pains.

The bones are subject to vague 'osteocopic' pains, both in acquired and in hereditary syphilis. The pain is more often felt by women than by men, and it is most marked during the early secondary period of the disease, for the tertiary pains in bone are generally associated with signs of definite inflammation, either in the bone itself or in the periosteum. 'Osteocopic' pains, on the other hand, are not usually or even necessarily associated with any definite lesion, though periostitis sometimes follows later when they have been unusually troublesome, and it is well known that localised inflammation of the ribs, sternum, and other bones may occur very soon after contracting syphilis.

The pain is felt when the patient is warm in bed, at night with most people, but in the daytime when the patient is regularly engaged on night-work. The most superficially placed bones are generally the seat of osteocopic pains, because they are surrounded by much dense fibrous tissue. The tibia, sternum, ribs, and bones of the skull suffer most, and the patient complains of an aching in the legs, of a stitch in the side, or of a bad headache. The pain is rarely localised, although definite areas of

tenderness can sometimes be discovered by pressure upon the bones.

The localisation of the pain to the bones which are most superficially placed, and to those parts covered with dense fibrous tissue, as well as the absence of all signs of inflammation, make it possible that the pain is due to the formation of toxins associated with an increased activity of the *Spirochaete pallida*, the increased activity being synchronous with a lowered blood-pressure.

The pain is generally mistaken for rheumatism, neuralgia, or megrim, though its greater severity in the early morning, coupled with the existence of signs of secondary syphilis, should easily betray its true cause.

Osteocopic pains are not relieved by salicylates or by correcting any errors of refraction, but are cured by mercurial inunction over the painful parts, by the administration of mercury and a soothing application of belladonna liniment, or of lead and opium lotion, locally.

Periostitis

Syphilitic periostitis is either localised or diffuse, and it occurs both in acquired and inherited syphilis. Periosteal inflammation due to syphilis shows less tendency to suppurate than the allied condition caused by tubercle. The function of the periosteum therefore not only remains in syphilis, but is increased, and there is consequently a greater formation of new bone over the affected area in syphilis than in tubercle. Local syphilitic inflammation of the periosteum in its simplest form occurs in the subcutaneous bones because they are most exposed to injury, and typically upon the shins, where they have long been known as 'nodes'.

(*a*) *Localised Periostitis.* The usual history given is that a patient who has contracted syphilis eighteen months ago or longer complains that he had a slight injury to one of his shins which ought not to have caused him any trouble. But instead of getting well the injured place has remained swollen and tender in spite of local applications, whilst the pain prevents him sleeping at night or wakens him up early in the morning. An examination confirms the truth of the patient's statements. He has a tender

swelling on the shin which is indefinite in shape, for it shades off in every direction. It is rounded in outline and is firmly attached to the bone, of which it clearly forms a part. The skin is movable over it and may be free from any inflammatory changes, though it sometimes looks slightly redder than the surrounding parts, and it may feel rather oedematous. A skiagram merely shows the existence of a little periosteal thickening at the seat of swelling, for the bone is unaffected at this early stage, though in the later stages it becomes thickened.

The skiagram (Plate V) obtained by my former house-surgeon, Mr. J. G. Gibb, shows the appearances presented by such a node. The patient was a man aged 35, who had contracted syphilis several years before he came to the hospital. He had complained for two years of an aching pain in the left leg, which was worse at night. An examination showed a rough swelling on the front of the shin. The swelling was not tender and was as hard as the bone itself, except near the centre, where it was slightly softer. It had no definite outline because it faded off into the surrounding bone above and below. The skiagram shows a uniform inflammatory deposit beneath the periosteum of the tibia, with a slight periostitis of the fibula which is not opposite the most thickened part of the tibia.

The administration of potassium iodide and the application of mercurial ointment locally will soon remove every trace of periosteal swelling in the earlier periods, and the patient should at once be submitted to a thorough course of treatment by mercury. Too often, however, the disappearance of the node is thought to be synonymous with the cure of the disease, and the patient is allowed to go without treatment until the appearance of fresh symptoms of syphilis. In unhealthy persons, especially if they are subject to repeated injuries, such nodes may suppurate when they are left untreated. The process of suppuration extends from the deeper layers of the periosteum until the skin is involved and a clean-cut funnel-shaped ulcer is produced, often with a chamois leather-like slough covering the base (Plate XXI). The amount of pus produced is not usually very great, and the ulcer heals rapidly if it be kept clean with dressings of black wash (lotio nigra) and if

potassium iodide (p. 244) be administered at the same time. If untreated, the suppuration continues until necrosis of the underlying bone takes place.

In adults who are healthy, except for the syphilitic infection, and who are not very sensitive to pain or slight discomfort, the local periostitis continues untreated until a layer of new bone is formed. This remains unaltered as an osteoma, telling its own tale years afterwards to those who are looking for signs of former syphilis.

(*b*) *Diffuse Periostitis.* Diffuse periostitis occurs with tolerable frequency in the children of syphilitic parents, more rarely in the subjects of acquired syphilis. It often involves several bones, and may be so extensive that the whole or the greater part of the shaft is increased in size. The swelling is generally greatest near one end of the bone, and tapers off so gradually (Plate VII, Fig. 1) that it is difficult to say where it ends. The swelling is hard, smooth, and covered by healthy tissues. It does not appear to be attended by pain, and the movements of the limb are not impaired.

The periosteum continues its function of producing bone whether it remains attached to the bone or is separated as in Plate VII, Figs. 2 and 3. When it is completely separated the space between the shaft of the bone and the separated periosteum may be filled with disintegrating products of the syphilitic inflammation. If the periosteum be not separated the bone is uniformly thickened by the osteoplastic periostitis. In either case the uniformity of the swelling, its painlessness and apparent spontaneity, may lead to an erroneous diagnosis of periosteal sarcoma. A skiagram may prevent such a mistake by showing that the syphilitic swelling involves the whole circumference of the bone, whereas a periosteal sarcoma grows only from one side. Spicules of bone derived from the ossifying periosteum are also seen in diffuse syphilitic periostitis and do not occur in the ordinary forms of periosteal sarcoma, though they are seen in the rarer form of ossifying sarcoma, which runs a very different course. The tapering character of the syphilitic periostitis serves to distinguish it from the expansion caused by an endosteal sarcoma.

The remarkable changes which sometimes result from the stripping off of the periosteum are well seen in the drawings

(Plate VII), taken from specimens in the Museum of St. Bartholomew's Hospital. The right femur (Fig. 1) is greatly enlarged in the lower half of the shaft, and transverse sections of the bone (Figs. 2 and 3) show that the enlargement is due to an ossification of the periosteum which has been separated from the lower half of the shaft of the bone. The space between the shaft and the periosteum is traversed by fibrous bands and contained pus.

The patient from whom the specimens were obtained was an infant, aged one year, who was admitted into the Metropolitan Hospital, under the care of my colleague, Mr. A. A. Bowlby, C.M.G. A few days before admission the legs and thighs were noticed to be swollen and the child seemed ill. He had never been strong or healthy, and had suffered from bronchitis. On admission he was restless and in pain, and his temperature was 100° F. The legs were swollen and oedematous; the lower part of each thigh was greatly swollen, the right being larger than the left. There was no effusion into any of the joints. There was no evidence of rickets, and the head, chest, and upper limbs were well formed. Fluctuation was detected on the outer side of the right femur and pus was let out by incision. The leg was put up in splints and gave but little further trouble, but the bronchitis increased and the child died seventeen days after it was first seen.

Another form of diffuse periostitis occurs in children who have inherited syphilis. The inflammation is very extensive, and is most frequently seen between the ages of eight and fourteen years. Several bones are affected and often symmetrically. The inflammation is sometimes localised to one aspect of the bone, which seems to be curved (Plate VIII), and the child is thought to be suffering from rickets. Careful examination always affords other evidence of syphilis, either in the facial appearance, in the teeth, or from the history, whilst the appearances shown in a skiagram are conclusive. In rickets the uniform bending, with a buttress of new bone along the concavity of the curve, is characteristic; in syphilis the deposit of bone is seen to be additional to the compact surface, there is no real bending of the shaft, and the newly-formed periosteal bone is porous and irregular, as it is seen in a skiagram, owing to the amount of gummatous tissue which it contains.

When the whole circumference of the bone is involved the swelling is funnel-shaped (Plate VII), the widest part being situated near the epiphysis, from which the swelling tapers upwards or downwards until it shades off into the normal shaft. This condition may easily be mistaken for a periosteal sarcoma, and every pathological museum contains specimens of bones which have been removed for malignant disease, and have been found afterwards to be merely inflammatory. The error is easy. The syphilitic swelling occurs later in life than the form of periostitis just described, often in men between twenty and thirty. There is a history of the swelling having appeared spontaneously, though if the question be pressed there is proof that the affected bone has been subjected to rougher use or to some determining cause from which the rest of the bones were exempt. There are no nocturnal pains, and the history of syphilis is absent because in many cases the patients have inherited the disease and have not acquired it, so that they say truthfully they have never caught any venereal complaint. The inflammation has often continued without notice for a long time, and as there is a considerable deposit of new bone the effect of treatment by mercury and iodide of potassium is not very apparent, though an observant patient will often notice after such a course that there is an improvement, especially in the direction of increased freedom of movement in the affected limb. A skiagram will greatly assist in making a differential diagnosis between late syphilitic periostitis and a periosteal sarcoma. The outline of the swelling is clear and definite in the more simple cases of syphilitic periostitis (Plate IV), whilst in many it is clearly associated with an osteomyelitis (Plate VI). In periosteal sarcoma, on the other hand, the swelling is much more shadowy in outline and the erosion of the bone is of an entirely different character.

Osteitis and Osteomyelitis.

The syphilitic inflammation, instead of being chiefly limited to the periosteum, may affect the bone either in its whole extent or in parts only, so that just as there is a localised and diffuse

syphilitic periostitis, so there is a localised and diffuse form of osteitis.

In former days, when it was usual to give mercury in large and ill-regulated doses, with the accompaniments of sweating, bleeding, and low diet, the patients were so reduced in general health that the inflamed bones suppurated and extensive necrosis and exfoliation were common. Our pathological museums, therefore, are full of specimens of syphilitic necrosis. At the present time, when mercury is given in sufficient doses, carefully regulated, and when the patient is submitted to a tonic regimen, the resistance of his tissues is so far increased that the more severe affections of the bone are rarely seen, and they have been in some danger of being overlooked or mistaken for tubercle. The use of the radiograph, however, shows that they still exist, and that they can be differentiated with comparative ease. This is the more important because osteitis and osteomyelitis can be readily treated in the earlier stages, though they are rebellious to all treatment when ossification has advanced to any extent.

(*a*) *Diffuse osteitis.* The simplest form of diffuse inflammation in bone, due to syphilis, is seen in sclerosis of the long bones and of the skull. The sclerosing process affects the femur and the tibia, the frontal and the parietal bones, more frequently than the rest of the skeleton. The cylindrical bones are longer and heavier than they ought to be, and they are curved, the bending taking place in the natural curves of the bone, which retains its cylindrical shape and never becomes flattened as in rickets. Sections of the bone show that it is densely sclerosed, the result of a uniform osteitis which has obliterated the cancellous tissue and converted it into compact bone. Usually there is no trace of a node, and the periosteum has not been markedly, or even at all, inflamed, because the bone remains smooth in its whole circumference.

It is difficult to obtain a history in many of these cases. The patient limps and complains of long-continued aching pains in his leg or thigh. The bone is tender, and is larger and longer than its fellow on the opposite side. There may be a history of acquired syphilis, but it is more often one of the later manifestations of inherited disease. In many cases, too, there is an association of

tubercle with syphilis, as in the following case which was shown at the Pathological Society of London by Dr. Newton Pitt.

A cab-driver, aged 23, was admitted into Guy's Hospital on account of a painful swelling over the left tibia. The symptoms of which he complained were of a fortnight's duration.

Examination showed that he had a painful swelling behind the left internal malleolus which did not contain any pus, but was situated over bare bone. A week later, a swelling appeared over the left shoulder, and two days afterwards the left knee became swollen and painful and the right carpo-metacarpal joints were involved. He died a month after admission to the hospital with a diagnosis of syphilitic osteitis of the tibia and phthisis, of which there were well-marked physical signs.

At the post-mortem examination a large cavity was found at the apex of the right lung, the whole of the upper lobe being fibroid. There were a few caseating nodules of broncho-pneumonia in both lungs.

There were two symmetrically placed ulcers on the edge of the epiglottis, which exposed the cartilage, and there were also two deeper ulcers placed symmetrically above the false vocal cords, one of which extended into the right sacculus. On the trachea there were scars of healed ulcers measuring one-third to half an inch in diameter, with radiating bands of connective tissue.

The right tibia was the seat of an abscess containing two drachms of pus, separating the periosteum from the bone over an area one and a half inches square. This abscess was situated on the internal and posterior surfaces of the bone, commencing three inches above the lower end.

Immediately above it, and also on the posterior margin, was a worm-eaten depression measuring half an inch by three-eighths of an inch in extent and one-eighth of an inch in depth ; a second depression, similar in character, occupied the tibia higher up, whilst at a lower point was an elongated, flat, and raised sheet of bone, one quarter of an inch long, a third of an inch broad, and less than a twentieth of an inch thick.

A longitudinal section of the tibia showed extensive disease of the cancellous tissue. Three inches from the top there was

a yellowish-white irregular sequestrum an inch and a half long and an inch and a half wide. The sequestrum consisted of denser bone than the surrounding tissue. There were several small patches of cancellous tissue in the tibia at a point nearer the ankle than the sequestrum. These patches were whitish in colour, and were different in structure from the surrounding bone. Although the disease extended throughout the cancellous tissue of the tibia, there was only a single sequestrum. The periosteum was thickened over the greater part of the shaft, and, on stripping it off, the surface of the bone was found to be irregular and thickened by periosteal changes in the middle portion of the inner and posterior surfaces.

The surface of the left tibia was but little changed, though the bone was slightly bent. On section the medulla was found to be extensively diseased. Two inches and a half from the upper end a sequestrum of thickened caseating bone extended for two inches. The bone below this point had undergone a fibro-gummatous change, and an inch above the ankle there was a dense yellowish-white sequestrum which was loose, but had not become wholly separated.

Dr. Newton Pitt sums up the lesions in the tibiae as: '(1) A periostitis which had occurred in patches and had led to an irregular deposit of bone on the surface, together with spots where small pits of bone had been eroded by thickened periosteum. (2) A diffuse osteitis which had led to a local condensing osteitis, together with the formation of sequestra ; while the tibiae were decidedly bent. The question to be decided is whether these lesions are tubercular or syphilitic. A careful review of the whole case leads to the conclusion that the latter is the true explanation, which also agrees with Dr. Goodhart's view of the case from the clinical standpoint. The healed ulcers in the trachea, with scarring and ulcers in the larynx, are undoubted evidence of the coexistence of syphilis. The periosteal changes in the bone, which in places consist of excavated pits corresponding to thickened fibroid periosteum, showed no tubercle microscopically and are unlike tubercular changes.'

There is very little doubt that the changes here described,

and many similar ones, are the result of a mixed infection of tubercle and pyogenic micro-organisms acting upon tissues whose vitality is already impaired by the action of inherited syphilis.

Mercury in these cases does more to relieve the symptoms than the administration of iodide of potassium, and in cases where the pain is severe, linear osteotomy of the bone may be performed, although in the two or three cases in which I have operated the relief has only been temporary.

Sclerosis of the bones forming the vault of the skull leads to enormous thickening of the calvaria, often with early synostosis, and a great deepening of the vascular grooves running along the inner table. This thickening is generally the result of inherited syphilis, and is often associated with defective mental development.

Simple diffuse osteitis due to syphilis may be distinguished from osteitis deformans in museum specimens of the bones by the fact that the skull is not increased in size though it is increased in thickness. In the long bones, syphilitic osteitis leads to the conversion of the cancellous tissue into compact bone; in osteitis deformans the trabeculae of the cancellous tissue remain as irregular and thickened layers of bone, whilst on section the cancelli appear to be clumsily moulded rather than wholly absent, as is the case in syphilis.

(*b*) *Localised osteitis.* Localised gummatous osteitis is not uncommon in a condyle of the femur or humerus, either as a purely local lesion or in association with a gummatous synovitis (p. 50) of the knee or elbow. Although it is usually a manifestation of late or tertiary syphilis, localised gummata have been seen in the clavicle, ribs, sternum, and bones of the skull early in the secondary stage of the disease. The gummata weaken the bones by a process of rarefaction and perforation, or spontaneous fracture may be the consequence.

The localised inflammation causes pain, alterations in the shape of the bone, and some limitation of movement in the neighbouring joint. The condition is often mistaken for inflammation due to local deposits of tubercle, because it occurs most frequently in children affected with inherited syphilis.

Gummatous osteitis is distinguishable from the allied tuberculous form by finding other evidence of syphilitic taint, rather than by any marked difference in the two varieties of local inflammation. In gummatous osteitis there is little or no muscular wasting, whilst in tubercle wasting of the muscles in the neighbourhood of the affected bone is an early and constant sign. In syphilitic inflammation the surrounding fibrous tissues are usually thickened, the thickening involving the periosteum and extending, therefore, some distance up the shaft of the bone; in tubercle the actual thickening is less marked, though there may be a considerable amount of swelling due to oedema of the connective tissues. Tuberculous osteitis, too, is more painful than the syphilitic form; it is more active and shows a greater tendency to suppurate and form sinuses. But occasionally a sinus forms in cases of syphilitic osteitis, though it is associated with a more localised inflammation than the corresponding tuberculous form, and it shows a slighter tendency to ramify. As in many other syphilitic conditions, tubercle may be grafted upon syphilis or a localised tuberculous inflammation of bone may become the seat of active syphilitic changes.

In an adult a myeloma may be mistaken for a localised syphilitic osteitis when it grows in the extremity of one of the long bones. But in a myeloma the growth is uniform, the bone gradually becomes expanded, there is evidence of interference with the blood-flow, since the cutaneous veins become engorged and the limb below the swelling becomes oedematous. Too much stress must not be laid upon the occurrence of 'egg-shell crackling' in cases of myeloma. But stress should be laid upon the necessity of skiagraphing the swollen part at regular intervals. At first the radiographic appearances will not give much assistance, but the presence of a myeloma will soon be made out by the absorption of the bone in and around the growth without any thickening of the periosteum, which is so characteristic a feature in the syphilitic inflammation of bone.

Inherited syphilis is associated with various alterations in the shape of the skull caused by local inflammations of the bones. The best known is 'the natiform' skull due to Parrot's nodes. These

nodes are found in children of some months or years old. They are caused by a symmetrical inflammation of the bones in the neighbourhood of the anterior fontanelle. The inflammation affects, therefore, the anterior portion of each parietal bone and the posterior part of the frontal, thus causing definite bosses (Plate IX), separated by the sagittal and coronal sutures.

Instead of a heaping up of bone, as in the case of Parrot's nodes, the bones of the skull may be unduly thinned, leading to a condition of craniotabes. This thinning of the bone is generally seen in infants in the region of the lambdoidal suture. Syphilitic craniotabes is said to differ from craniotabes associated with rickets, marasmus, and hydrocephalus in the fact that it does not necessarily occur at the points of greatest pressure, and that it is often most marked in the outer table of the skull.

Both Parrot's nodes and syphilitic craniotabes, however, seem to be due to the general asthenia which is so often associated with inherited syphilis, rather than to any direct action of the syphilitic virus. Both conditions are common in rickets (see vol. i, p. 340).

Prof. Fournier also recognizes an 'Olympian' forehead and a 'keeled' forehead, a forehead with bosses on each side and asymmetry of the skull generally, as indications of inherited syphilis, if due regard be paid to their association with other signs of inherited disease. It is quite certain that all these varieties in the shape of the skull are often associated with causes other than syphilis, and are the results of the general marasmus which attends many of the debilitating influences caused by the bad hygiene of child-life in large towns.

Osteomyelitis

The term osteomyelitis, strictly speaking, includes every form of inflammation of bone, from a simple periostitis to the results of the most acute infection with pyogenic organisms. But periostitis and osteitis ending in rarefaction and sclerosis are not usually spoken of as osteomyelitic, the distinction being personal to each surgeon and appearing to vary with the extent and severity of the inflammation rather than with any definite pathological change.

Osteomyelitis implies an inflammation of the living portion of the bone. The term may be widened to any extent, but care must be taken not to limit it merely to an inflammation of the medulla of the bone, a sense in which it was ordinarily used by the older surgeons.

Gummatous osteomyelitis is one of the commoner inflammations of the bones in syphilis. It occurs both in acquired and in inherited syphilis, and may affect any of the bones, long or short, cylindrical or flat, membranous or cartilaginous. The inflammation sometimes involves the whole bone, more frequently it is localised only to one part.

Osteomyelitis attacks the bones which contain the largest quantity of cancellous tissue, and this form of inflammation has been very carefully studied in connexion with the fingers and toes under the term Dactylitis syphilitica.

Syphilitic dactylitis occurs both in acquired and inherited syphilis. In acquired syphilis, as early as two years or as late as ten years after infection ; in children at any time, as sucklings, when they are two or three years old, or as adolescents.

The phalanges of the fingers are affected more often than the toes, and the metacarpals more frequently than the metatarsals. The inflammation attacks the proximal rather than the distal phalanges, and the lesions are usually multiple and may be either circumscribed or diffuse.

The inflammation begins as a painless swelling which attracts attention by its interference with the movements of the part. The skin covering the swelling is movable, but only slightly reddened ; the tumour itself is firm, but not tender, and in the earlier stages the tendon sheaths are healthy.

These swellings often remain unchanged for many months, especially in children. Ulceration of the skin and tissues lying over the inflamed bone sometimes occurs, as is seen in Plate X, Fig. 1, but the inflammatory products are more usually absorbed, or a sinus may be formed through which they are discharged. The sinus may close after a time, leaving an expanded and rarefied bone with a depressed scar over it, or the bone may be thicker and denser than its neighbours. Complete absorption of the bone

takes place occasionally, and the finger or toe is then left permanently shortened, as is seen in Plate X, Fig. 2, which shows a shortening of the index and ring fingers of the right hand. The index-finger is so deformed and shortened that its extremity scarcely reaches the first phalangeal joint of the middle finger. The greater part of the first phalanx and the distal extremity of the metacarpal bone have been absorbed, the remnants of the two bones being connected by fibrous tissue. In a similar manner the second phalanx of the ring-finger has been reduced to about a quarter of its original length. I am indebted to the kindness of Mrs. Walford of Newark, New Jersey, the daughter of the late Professor Robert W. Taylor, for permission to use these illustrations. They first appeared in his classical paper on Dactylitis Syphilitica. The joint in the neighbourhood of the inflamed bone remains unaffected at first, but in the course of a month or two it shows signs of synovitis, and later of a destructive arthritis which ends in ankylosis or in the formation of a flail joint owing to the destruction of the ligaments.

The disease runs a more rapid course in acquired than in inherited syphilis, and, as a broad rule, the earlier the period at which the inflammation shows itself the more rapid is its course.

The diagnosis of dactylitis is not difficult, for a skiagram shows the character of the swelling, which is usually confined to the shaft of the bone in the earlier stages of the inflammation ; the epiphysis becoming involved at a later period. The existence of other signs of acquired or inherited syphilis enables it to be distinguished from the tuberculous form, though it is probable that many cases are due to syphilis in association with tubercle. The tumours caused by enchondromata of the fingers, which are also multiple, are harder than those due to syphilitic inflammation ; enchondromata, too, show very little tendency to suppurate, and they run an extremely chronic course.

The prognosis is good if the nature of the swelling be recognized early, and the effects of treatment are very marked even in the later stages.

Constitutional and local treatment are usually all that is

necessary, and these should invariably be tried before any surgical means are employed. The hand or foot should be put upon a splint and the affected part should be strapped with a mercurial ointment, whilst grey powder is administered in half-grain doses three times a day in the case of a child. Black wash and the application of fomentations give more satisfactory results than strapping when there is a sinus. Even when the swelling is so soft that it fluctuates and appears to be on the point of breaking through the skin, it is better not to open it, for absorption may still take place under proper treatment, if the part be at the same time kept on a splint.

When there is a sinus with evidence of caries or necrosis, the affected bone may be removed subperiosteally, the limb being first rendered bloodless by the application of an Esmarch's bandage. When there is reason to think that the inflammation is partly tuberculous, the administration of cod-liver oil in some form is very advantageous in combination with the mercury, and in children of the out-patient class at hospitals I invariably order the two remedies simultaneously.

The bones of the skull and face are peculiarly vulnerable to syphilitic inflammation, owing to the large amount of cancellous bone of which they are formed. The inflammation is either an osteomyelitis, which begins in the diploe in the case of the bones of the calvaria, or it is a true gummatous formation in the deeper layers of the pericranium or in the dura mater, which is morphologically a part of the skull rather than of the brain. If the inflammation begins as an osteomyelitis it spreads, apparently according to the blood-vessels which are most affected, either through the external or the internal table of the bone. The pericranium becomes inflamed and a series of painful tumours are formed, known as soft nodes. Transmitted pulsation can sometimes be felt from the brain when the inner as well as the outer table of the skull has been absorbed at corresponding points. The inflammation extends after a time through the soft structures to the skin, which ulcerates (Plate XI). The process of ulceration involves the bone, and may lead to extensive loss of substance due either to rarefaction (caries) or to actual necrosis. These lesions were

formerly common (Plate XII), but they are now only seen in very cachectic patients worn out by drink or bad hygiene.

In the earlier stages this form of syphilitic osteomyelitis is peculiarly amenable to treatment by a combination of mercury and iodide of potassium. The ulcer heals, leaving a white scar devoid of hair and adherent to the bone, which long remains as a tell-tale mark.

Patients with syphilitic osteomyelitis of the skull bear operative interference badly. The nodes should not be opened even when they simulate an abscess most closely, for it often happens that a course of mercury and potassium iodide causes them to be absorbed. When necrosis (Plate XIII) has occurred, I prefer to allow the sequestrum to separate itself very completely before making an attempt to remove it.

True suppuration of soft nodes occurs in some cases, and it is then necessary to open the abscess, lest it should penetrate the skull and lead to death from inflammation of the brain. The following case illustrates such a result in a drunken labourer :—

A man, aged 53, was admitted into St. Bartholomew's Hospital under my care on May 11, 1907, suffering from a boggy and fluctuating swelling over the right parietal bone. He said that he had struck his head at this spot a month ago whilst he was at work. The swelling came on two or three days later with headache and vomiting. The fluctuation increased whilst he was under observation in the hospital, and on May 13 pus was let out by an incision carried through the swelling to the bone, which was found to be rough, bare, and carious. The pus was sterile, but a few days later pus taken from the bottom of the wound contained many colonies of pure *Bacillus pyocyaneus*.

The patient continued in a drowsy condition, with a slow mental reaction time and an increasing optic neuritis. He was trephined on June 17, about half an inch in front of the centre of the right half of the occipital. Both surfaces of the bone at this spot showed extensive evidence of caries, and the outer surface of the dura mater proved to be rough and inflamed. No pus was found either beneath the dura mater or within the brain. The condition of the patient was not improved by the operation ;

the right side of his face gradually became completely paralysed; he had many convulsions of his whole body, and he died on July 6.

The post-mortem examination showed the following conditions in the skull:—The greater part of the right half of the occipital bone was bare of pericranium and was pitted with numerous small erosions. The trephine hole was situated in the middle of the area of bare bone, and led to a sloughing abscess cavity in the right occipital lobe. This cavity communicated with the descending horn of the lateral ventricle, which contained pus. There were four or five ounces of green and odourless pus between the arachnoid and the dura mater on the left side of the brain, and the cerebral sinuses were plugged with suppurating blood-clots.

The patient was too ill during his stay in the hospital to give any history of former syphilis, but the appearance of the soft parts of the skull during life and the condition of the bones after death were characteristic of a gummatous osteomyelitis. The patient's wife, too, stated that four of her eight children had died of convulsions whilst teething.

Osteomyelitis of the long bones occurs as one of the latest manifestations of inherited syphilis. The cases form an interesting and misleading group to which very little attention has yet been paid. An extended use of the Röntgen rays to elucidate the more difficult cases of disease of the bone has shown that an injury may sometimes be followed by appearances which are indistinguishable from those presented by gummatous osteomyelitis. These changes may occur in adults who consider themselves to be otherwise in perfect health, and in whom, except for the radiographic findings, there would be very little reason to suspect syphilis. The skiagram, however, shows such definite inflammation as to make a more critical examination of the body imperative, and some other sign of long-standing syphilis will then be found.

The inflammation of the bone runs a very chronic course in these cases; it is osteoplastic in character, and may lead to ankylosis if it occurs near a joint. There is no doubt that in the absence of a skiagram, or without an unusually careful examination of the body, these cases of syphilitic osteomyelitis occurring very late in inherited syphilis are usually looked upon as rheumatic or tuber-

culous in origin, starting, as is not uncommon, from some slight injury. But the effects of mercurial treatment, and the slight, though definite, evidence of syphilis in other parts of the body, show clearly the true nature of the inflammation.

The details of such a case of osteomyelitis due to inherited syphilis are well given in the following case, for the notes of which I am indebted to my house surgeon, Mr. J. Glenny Gibb :—

A carman, aged 26, had his left arm crushed between two vans in 1905. His arm was painful and swollen for a short time, but the man continued his work for six months, when it gradually became so tender and stiff that he applied for relief at St. Bartholomew's Hospital. It was then noticed that he had an ulcer on the right side of his neck. The ulcer had a shallow base with serpiginous edges. There was also a tender, boggy, and fluctuating swelling over the central area of the left parietal bone. The left elbow-joint could not be bent beyond an angle of 75°, nor could it be fully extended. The lower half of the left humerus was irregularly thickened and nodular, the thickening also involved the upper part of the radius and ulna. The left humerus just above the condyles measured three-quarters of an inch in girth more than the right humerus at a corresponding part, but it was not lengthened, and there was only slight tenderness on pressure.

The skiagrams show the conditions of the patient when he was first seen, and after treatment for a month with antisyphilitic remedies. Plate VI, Fig. 1, shows the lower half of the humerus with an extensive rarefying osteitis, beginning just above the condyles and extending upwards for a considerable distance. At one point the rarefaction has involved the whole thickness of the bone. The contiguous sides of the ulna and radius are also involved in the upper third, but the joint is healthy. Plate VI, Fig. 2, shows that the effect of treatment has been to cause absorption of the inflammatory products, leaving the bone rarefied, indeed, but with the outline clear and sharp where before it was irregular and diffuse.

Close questioning of the patient failed to elicit any history of acquired syphilis. He had married early, was the father of two

healthy children, his wife had never miscarried, and he had never been under treatment for any previous illness so far as he could remember. He was a well-grown man, of dark complexion, with good teeth. But the characters of the ulcer in his neck, the puffy swelling on the side of his head, and the gummatous nature of the osteomyelitis made a diagnosis of syphilis inevitable. He was therefore ordered the hospital mixture of perchloride of mercury and potassium iodide. It contains a drachm of the solution of corrosive sublimate and five grains of potassium iodide. The ulcer on the neck healed quickly, the puffy swelling on the head disappeared, and the movements of the elbow became so free that the patient was able to resume his work, declaring that he could use both his arms equally well.

There is very little doubt that this was a case of syphilis acquired very early in life in which a slight injury to the arm was the determining cause of a gummatous osteomyelitis, and that when once the syphilitic virus became active again its effects were manifested in parts remote from the seat of injury.

It was not possible to determine in this case whether the spirochaete causing the gummatous inflammation was born with the patient—true inherited syphilis—or whether he had acquired it by inoculation at or shortly after birth—acquired infantile syphilis. The latter seems the more likely explanation; indeed, one of the difficulties of accepting the spirochaete as the cause of syphilis lies in the difficulty of believing that the organism is passed from father to child without visible infection of the mother.

The older textbooks of surgery give detailed accounts of very serious cases of osteitis with which we are quite unfamiliar at the present time, and their accounts are borne out by the specimens which are preserved in all our older pathological museums. These cases of chronic osteitis ended in the formation of large sequestra, or in extensive caries associated in some parts of the bone with rarefaction, and at other parts with sclerosis. Amputation was performed, or the patients died of septic infection.

The disappearance of this severe form of osteitis was attributed to the more careful use of mercury, but an examination of the

specimens makes it certain that this was not the only cause. It is due to the general improvement which has taken place in the physical surroundings of the poor in every large town in the kingdom. When these cases were most common the poor were infamously housed, worse fed, and mostly drunken. The elements of sanitation were unknown. Bread was dear and gin was cheap. Their bodily condition, therefore, was extremely bad. Hospitals, too, were hotbeds of disease, and septic inflammation ran riot in every ward. Inflamed bone, a debilitated constitution, and the free access of pyogenic organisms converted a simple into a chronic inflammation, and it is more marvellous that so many escaped, than that our museums contain such admirable examples of the effects of chronic suppurating osteitis.

Better hygiene, greater temperance, and the strict application of Lister's teaching to the treatment of wounds have almost banished the worst cases of bone disease in connexion with syphilis. But not quite, for occasional instances are still seen, and here is a case in point which was recently under my care at St. Bartholomew's Hospital :—

The patient was a girl of 16, who was not more developed physically or mentally than a child of 10 years old. She had suffered from an attack of interstitial keratitis at the age of 14. When she was 8 years old she bruised her left leg, and a painful lump formed upon her shin. She was admitted to St. Bartholomew's Hospital when she was 9 years old, and the notes state that the left tibia was then an inch longer than the right, and that the bone was thickened in its central half. The thickened bone was removed by gouging, the wound healed, and the patient was able to walk without pain until she was re-admitted to the hospital at the age of 15½. The leg was then painful and the foot was becoming everted. Examination of the leg showed that the left tibia was two and a half inches longer than the right, and that it measured an inch and a quarter more in circumference. The left foot was pushed outwards, and was everted by the overgrowth of the tibia. The skin covering the shin was destroyed by ulceration of long standing, leaving a huge and foul ulcer, at the bottom of which lay the shaft of the tibia.

The tibia itself was ulcerated. It was soft and porous, with great masses of stinking and caseating material; patches of dense bone intermingling here and there with sequestra. The epiphyses of the tibia and the whole of the fibula seemed to be healthy. I therefore removed the whole of the diseased shaft of the tibia, leaving the epiphyseal ends of the bone. The wound granulated well, but in process of time the epiphyses became diseased and the fibula inflamed. I amputated the leg three months later, and the patient made a good recovery.

The skiagram (Plate XIV) shows that the stress of the disease has fallen upon the bone itself, so that the case was one of true osteomyelitis, the periosteal inflammation in that part of the shaft which has escaped destruction being of a simple type.

Syphilis affects the **vertebral column** both in the acquired and in the inherited forms. It is found, therefore, in adults as well as in children. The inflammation is gummatous in character, and affects the cervical more often than the dorsal vertebrae, and the lesions are sometimes multiple, several healthy vertebrae intervening between the separate foci of inflammation.

The signs of the disease are obscure, and for a long time the patient may only complain of stiffness and vague pains. Should he show evidence of syphilis and be treated, these symptoms quickly disappear. More usually, however, the gummata caseate, and a humpback is produced very rapidly, even in the course of a few days. The caseation is often associated with the formation of an abscess.

Spinal disease is thought to be rarer in syphilis than it really is because it is usually mistaken for tubercle, or perhaps more correctly it is often associated with tubercle. In children the syphilitic form occurs earlier than the tuberculous; in adults it is definitely associated with other syphilitic bone lesions. The effect of treatment, too, is almost diagnostic, for when cod-liver oil and rest have failed the administration of mercury and potassium iodide sometimes causes a marked improvement.

The treatment consists in rest and drugs rather than in the use of any apparatus. The patient should be put to bed as soon he complains of pain in his back, and he should remain there

until all rigidity has disappeared. In the case of a child, skiagrams taken from time to time will give useful information about the progress of the disease

Epiphyses

The epiphyseal changes taking place in the intermediary cartilage of infants born of syphilitic parents have been most carefully studied (see also vol. i, p. 333). The long bones in newly born children show a double change as a result of inherited syphilis. The periosteal bone is increased in amount and there is a thickening of the calcified cartilage at the epiphyseal line. The thickened periosteum develops additional bone, which is either deposited irregularly as an outgrowth on the surface of the bone or is laid down circularly to form a thickening round the bone. The new bone is spongy and is mingled with the results of the gummatous inflammation to which it is due. These changes are found in children born alive as well as in those who are stillborn.

Further changes take place between the ages of a few weeks to three months. The cells of the intermediary cartilage multiply more rapidly than in the healthy child, whilst they calcify more slowly. An area of irregular thickening is therefore produced at the line of the intermediary cartilage, and a section through the extremity of the bone shows a reddish-yellow zone of degenerating tissue at the point where the epiphysis joins the bone. The vascular supply is interfered with partly by these changes, but chiefly by the changes in the walls of the vessels themselves; the inflammatory products caseate and the cancellous tissue in the neighbourhood of the epiphysis is seen to be filled with a soft yellow material which also shows a tendency to caseate. This gelatiniform degeneration, as it is called by the French writers, leads to a separation of the epiphysis with parts of the intermediary cartilage from the shaft of the bone, and the pseudo-paralysis is associated with the slipping of the epiphysis upon the shaft.

When suppuration takes place at the intermediary cartilages in very young children the epiphyseal cartilage may be penetrated by the inflammatory products, and a suppurative arthritis may be caused by the direct entry of pus into the joint. It is not

unusual, therefore, to find a spontaneous suppuration in the larger joints of marasmic children. The suppuration is not very virulent, for it soon clears up if the joint be drained and mercury administered, and the joint regains its full use even in those cases which at first seem most unpromising.

The processes described above continue if the patient be left untreated, and by the time the child is six months old the bones may be so softened as a result of decalcification and rarefaction that the case may be considered as one of rickets.

The epiphyseal changes may affect any of the joints, and they are often multiple, but the arms are more often affected than the legs, and the distal joints more frequently than the proximal ones. The affection is often symmetrical, though one side is more seriously involved than the other.

The inflammatory changes in the neighbourhood of the epiphyses are usually associated with pain and tenderness, so that the baby cries out when the joints are handled, though pain is not an invariable or even a marked symptom, as there may be considerable swelling which alone draws attention to the condition. When the intermediary cartilage is the seat of gelatiniform degeneration the limb hangs limp ; it is useless and motionless, and if it be lifted and allowed to drop it falls heavily, a condition to which Parrot gave the name '**syphilitic pseudo-paralysis**'. In such cases the attitude of helplessness assumed by the child is very characteristic, especially if, as sometimes happens, all four limbs are affected. The arms lie alongside the trunk and are pronated, whilst the legs are stretched out straight, and when the baby is lifted they hang loose and sway from side to side.

Suppurative arthritis, secondary to the epiphyseal changes, often occurs during the first year, or even within the first month, after birth, generally in the knee or the shoulder. The joint becomes flexed and is held stiff ; movement is limited, there is pain, and the joint rapidly fills with pus. In a short time the capsule yields and the abscess bursts externally, though the skin may not appear reddened until the abscess points. Such secondary arthritis occurs in children who have other signs of inherited syphilis to render the diagnosis easy. Pathologically the suppura-

tion is often due to infection with pneumococcus and staphylococcus, though it is often erroneously thought to be tuberculous in origin.

The prognosis is favourable, especially when only one joint is affected. The epiphyses become reunited to the shaft of the bone without causing shortening, and the pseudo-paralysis disappears. The suppurating joints recover with little if any loss of function. But when several joints are affected and the child is suffering markedly from marasmus, death occurs from exhaustion; and if the intermediary cartilage is very extensively destroyed the limb may remain permanently shortened.

The treatment must be conducted on the general lines indicated in Chapter XII, combined with local measures. If the case be seen in the earlier stages the joints may be wrapped in strips of wash-leather upon which blue ointment or white precipitate ointment has been spread. Mercury, in the form of grey powder, should be given by the mouth, and the child should be laid upon a cushion or pillow and carried out daily into the open air, when the weather is sufficiently fine. Abscesses must be opened at once and drained thoroughly.

Inherited syphilis is also responsible for various **facial deformities**. The palate is narrow and highly arched, the nasal bones fall in as a result of inflammatory changes taking place in the ethmoidal cells, abscesses occur in the malar bones and in the antrum. But these changes have been considered at length in the section devoted to the subject of congenital syphilis (see vol. i, pp. 283–367).

BIBLIOGRAPHY

Ware, Syphilis of the Bones and some Radiographic Findings. The Annals of Surgery, vol. xlvi, 1907, p. 199 et auct. ibi cit.

Waldeyer, Beiträge z. Kenntniss der hereditären Knochensyphilis. Virchow's Archiv, 1872, Band 55, p. 367.

Hahn and Deycke-Pascha, Knochensyphilis im Röntgenbild: Hamburg, 1907.

Hochsinger and Kienboeck, Archiv f. Dermatologie und Syphil., 1901, vol. lviii, p. 273.

Pitt, Dr. Newton. Trans. Pathological Soc., vol. xl, p. 270.

Taylor, Prof. Robert W. Clinical Observations on the Syphilitic Lesions in the Bones of the Hands in Young Children. Arch. Scient. and Pract. M. and S., New York, vol. i, 1873.

Chassaignac, De la dactylite syphilitique. Clinique Européenne, 1859, p. 238.

Nélaton, Du Panaris Syphilitique. Gaz. des Hôpitaux, 1860, p. 105.

Lücke, Die syphilitische Dactylitis. Berlin. klin. Wochenschrift, 1867, vol. iv, pp. 525 and 534.

The Diseases of Children, by Professors Pflaunder and Schlossmann. English Translation. Philadelphia and London, 1908, vol. ii, p. 522.

Risel, Berlin. klin. Wochenschrift, 1870, vol. vii, pp. 77–81.

Jasiński, Ueber syphilitische Erkrankungen der Wirbelsäule. Arch. für Dermatol. und Syphilis, 1891, vol. xxiii, p. 409 et auct. ibi cit.

Ridlon, Syphilitic Spondylitis in Children. Trans. American Orthopaedic Association, vol. iv, 1891, p. 118.

CHAPTER III

SYPHILITIC DISEASE OF THE JOINTS

It is remarkable that the effect of syphilis in producing disease of the joints long escaped the notice of surgeons. This was due in great measure to the fact that the earlier pathologists were content to class every chronic inflammation as scrofulous when it was not due directly to injury. But credit must be given to James Russel, who called attention to syphilis as a factor in producing joint disease as early as 1817, in his work on 'Diseases of the Knee-Joint', and to Louis Richet (1816–91), who mentioned gummatous synovitis in his book on the white swellings of joints.

It is easy to mistake syphilitic inflammation of a joint for a similar condition produced by tubercle or rheumatism. It is, indeed, a question whether a syphilitic inheritance does not predispose to tuberculous joint trouble, or whether those who have suffered from tuberculous arthritis in youth will not be more liable to gummatous synovitis if they afterwards acquire syphilis.

The joints may be affected at any time during active syphilis, whether the disease be inherited or acquired. For the sake of convenience, the joint affections will be considered under the following headings :—

- Secondary
  - Arthralgia.
  - Synovitis
    - Intermittent.
    - Chronic.
- Tertiary . .
  - Gummatous synovitis.
  - Chondro-arthritis, ulcerating or Virchow's joints.
  - Tabetic, sclerosing or Charcot's joints.

Inherited . .	Suppurative arthritis. Hydrarthrosis. Symmetrical serous synovitis or Clutton's joints. Gummatous synovitis. Chondro-arthritis, ulcerating or Von Gies' joints.

Arthralgia or Neuralgia.

The earliest sign of joint trouble in acquired syphilis may be a neuralgia, or more properly speaking an arthralgia, occurring a few weeks after inoculation, and in some cases even before the appearance of any other secondary symptoms.

The patient complains of a neuralgic pain which is sometimes diffuse and at other times is localised to various points in a joint. The pain is often felt in several joints, and although the larger ones are usually affected the smaller ones do not escape. The joints are more painful at night than in the day-time, and are most painful on getting out of bed in the morning. Pressure may increase the neuralgia, or may excite it when it is absent. Similar neuralgic pains are often felt in the muscles, tendon sheaths, bones, and bursae near the affected joints. A careful examination of the joint usually fails to show any adequate cause for the pain, as there is neither swelling, redness, nor heat; but in a few cases there is evidence of a very slight synovitis with some oedema of the surrounding connective tissues.

Syphilitic arthralgia occurs in people who live in damp and warm climates more often than in England, and it is therefore treated as rheumatic in origin until the appearance of other signs of syphilis gives a clue to the correct diagnosis. The pain in the early morning, its limitation to the joints first affected, the absence of fever, and the failure of the salicylates to give relief, should lead the surgeon to doubt his diagnosis of rheumatism as a cause, and ought to make him cast about for some other explanation of the symptoms. Gonorrhoeal arthritis will naturally

occur to him as a possible explanation, as soon as he ascertains that the patient has been exposed to a risk of venereal infection. But gonorrhoeal arthritis is usually more acute and painful. The pain, too, is felt on movement, is not necessarily worse at night, and does not wear off in the course of the day. Gonorrhoeal inflammation is generally limited to a single joint, and it is worse than a mere neuralgia, for the joint is swollen, the synovial membrane is thickened, and the skin may be reddened. It is also a more intense inflammation, and may lead to disorganization of the joint. Arthralgia like that due to syphilis is sometimes an early symptom in scarlet fever and in diphtheria, and in each of these diseases it seems probable that the neuralgic pain is caused by the action of the toxins produced by infective agents acting upon nerve-endings in the synovial and connective tissue.

Left untreated, or treated incorrectly, the neuralgia lasts indefinitely, though it wears itself out in process of time like the other symptoms of early syphilis, without leaving any permanent evil effects. The administration of mercury in the usual medicinal doses speedily cures it, and even the local application of mercurial ointment, under the mistaken notion that it is of a tuberculous nature, may accidentally give relief.

Synovitis.

Synovitis occurs under at least two forms during the earlier period of acquired syphilis. The one is intermittent and painful, the other chronic and painless.

Intermittent synovitis is characterized by the rapid effusion of fluid into one of the larger joints, generally the wrist, knee, or elbow, more rarely into the hip. The pain is often considerable. It is worse at night, and is not increased on movement. The skin may be slightly reddened over the affected joint, but it is usually natural in colour. The perisynovial tissues may be thickened and the tendon sheaths inflamed, so that the outline of the synovial membrane is not seen so clearly as in a case of simple synovitis, whilst the tissues surrounding the joint feel thickened by the oedema. But in spite of this the movements of the affected

joint are smooth and easy, and as the effusion is not plastic no crepitation or stickiness is felt on passive movement. The swelling sometimes disappears from one joint as rapidly as it appeared, another joint becoming affected. Several joints may be affected simultaneously.

This form of synovitis occurs less frequently, and at a later period in the course of secondary syphilis than the arthralgia, and on account of the pain and the attendant constitutional disturbance it is very likely to be looked upon and treated as rheumatism. But syphilitic synovitis is nearly always associated with such other signs of the disease as a rash, mucous patches, enlargement of the lymphatic glands, falling out of the hair, or even iritis. There is no valid excuse, therefore, for making a mistake, and the more especially as the symptoms are in no way relieved by the usual remedies which are so useful in the treatment of rheumatism.

The inflammation is very amenable to treatment by mercury given alone or in combination with iodide of potassium. It is well, therefore, to put the patient upon a mercurial course and to strap the affected joint with Scott's dressing or some other ointment containing mercury.

Chronic synovitis runs its course with so little pain that it is often only discovered accidentally in the course of a medical examination, or the patient mentions incidentally that the joints are swollen. It is rather more common in women than in men, the knees are most often affected, and the swelling is symmetrical. Examination shows that there is considerable serous effusion, but the affected joints are never tense nor are they equally swollen. There is neither heat nor tenderness, nor is there any great limitation of movement. The patient uses the affected joints with considerable facility, and there is consequently very little muscular wasting.

The prognosis is not quite so good as in the more acute form of synovitis. The affection runs a very chronic course. Improvement takes place up to a certain point when mercury is administered and the joints are treated locally by massage, but even if all the symptoms subside it is uncommon to see

recurrence as soon as the treatment is abandoned. Destructive changes take place in the joint when complete resolution does not occur, and ankylosis may lead to permanent interference with the use of the joint. It is important, therefore, to adopt more active surgical measures when the condition remains stationary in spite of treatment, or when increased creaking on movement gives evidence that the inflammatory changes are progressive. In such cases the joint should be opened, the synovial fluid allowed to escape, and passive movement with massage should be adopted as soon as the wound is healed.

The following cases which have been under treatment at St. Bartholomew's Hospital illustrate some points in the diagnosis and treatment. I am indebted to Mr. Howard Marsh, Master of Downing College and Professor of Surgery at the University of Cambridge, for permission to publish them.

Case 1. Thomas T., aged 19, was admitted into St. Bartholomew's Hospital suffering from a stiff, swollen, and painful knee-joint. He stated that he had contracted syphilis two years previously, and that he had frequently suffered from various secondary affections. Three weeks before he came under observation his right knee became swollen, stiff, and subject to shooting pains which were worse at night. Latterly the symptoms had increased in severity.

He was an emaciated and cachectic-looking lad, with numerous pigmented scars on his body and legs. There were recent and painful nodes on his shins, and both testicles were enlarged by syphilitic inflammation. The patient had only been treated for syphilis for a few months after he had contracted the disease. An examination of the right knee showed that it could not be completely bent, and that movement caused pain. It was therefore kept straight. The joint was a little swollen and the synovial membrane on either side of the patellar ligament was thickened and pulpy, but the synovial membrane at the upper part of the joint seemed to be healthy. No thickening of the tibia or femur could be felt, and there was only a slight increase in the amount of the synovial fluid in the joint.

The patient was ordered a twelfth of a grain of perchloride of

mercury and three grains of potassium iodide three times a day. The greater part of the swelling disappeared in a week, and in three weeks the joint was quite free from pain and swelling and was freely movable. The nodes on the tibia had disappeared and the swollen testicles were smaller.

Case 2. A man aged 32 came to the out-patient room at St. Bartholomew's Hospital for the treatment of secondary skin eruptions and a sore tongue, six months after he had contracted syphilis. His right elbow-joint was partially stiff. It was painful and was somewhat swollen, the swelling being due partly to thickening of the synovial membrane and partly to the presence of fluid. The skin over the joint was very slightly warmer than natural. He was ordered a twelfth of a grain of perchloride of mercury and five grains of iodide of potassium three times a day, and under this treatment he improved steadily. The skin eruptions disappeared in about three weeks, the ulcers on his tongue healed, and his elbow became much less swollen and painful. A fortnight afterwards the joint had returned to its normal condition.

Six months later the patient returned with a node on his tibia, renewed soreness of his tongue, and with the elbow again stiff and painful, especially at night. Under similar treatment to that adopted previously the node disappeared, the sores on the tongue healed, and the patient ceased to complain of pain in his elbow, which became less swollen, though the joint remained rather stiff.

These cases show how small an amount of mercury is sufficient to arrest the inflammation of the joints in these cases, and how difficult it is to treat them adequately in the out-patient room of a large hospital. The patient discontinues his attendance as soon as he is relieved of present discomfort, and rarely allows himself to be properly cured of his disease. The last case shows too that a joint may become ankylosed as a result of syphilitic synovitis lasting for a long time, the ankylosis being due to fibrous thickening of the perisynovial tissues.

Gummatous Inflammation

Gummatous disease of the joints occurs under two forms: the one in which the synovial membrane is chiefly affected; the other where the articular ends of the bones are more involved than the synovial membrane.

Gummatous synovitis is more frequent in the later stages of acquired syphilis than gummatous periostitis. It occurs as an infiltration of the tissues beneath the endothelial layers of the synovial membrane, the infiltration extending to the neighbouring fibrous tissues, including the periosteum. The bone itself and the cartilages remain unaffected and the intrinsic ligaments of the joint are not involved. The synovial hypertrophy is usually uniform, but gummatous nodules sometimes occur in greater or less numbers.

The knee is most often affected, and the condition is generally unilateral. The patient complains that his knee is swollen and that it is awkward for him to walk, rather on account of limitation of the movement than because it hurts him, but occasionally the pain is severe.

Examination of the joint shows that it is enlarged uniformly as in a case of tuberculous synovitis, and that the enlargement is limited to the synovial membrane. Several points immediately strike the observer and should make him question the cause of the enlargement, for he will naturally think at once of tuberculous synovitis. First, the ease with which the patient moves the joint; secondly, the absence of wasting of the limb above the swelling, for there has been no disuse; and thirdly, the absence of displacement in the direction of the triple deformity even when the history relates that the swelling has lasted for a long time. A careful examination of the joint shows either that the enlargement of the joint is due to a uniform thickening of the synovial membrane, for there is very little fluid in the joint, or that the synovial membrane is thickened in patches. When gummata are present they may be more easily felt in the synovial pouches beneath the quadriceps extensor than in other parts of the joint. They occur as masses of varying size and shape which may be moved

a little between the fingers, but they should not on this account be mistaken for hypertrophied synovial fringes or for loose bodies in the joint due to osteo-arthritis, even though there should be a little creaking when the joint is flexed.

Gummatous inflammation of the joints is often associated with other evidence of syphilis, which makes the diagnosis easy, for there may be rupia, nodes, gummatous ulcers, caries, or necrosis.

The following is a good case of gummatous synovitis of the knee in which we were fortunate enough to obtain the joint; and as the patient was in the hospital for more than a month before his death, the history is unusually full :—

W. W., a wire-worker, aged 24, was admitted into St. Bartholomew's Hospital suffering from a great swelling of the right leg and thigh which had increased gradually for the previous five months. He confessed to being a drunkard, and although he had contracted syphilis about three years since he had never been treated regularly.

On admission to the hospital the whole of the right leg and thigh were found to be enormously swollen and tense, as a result of venous and lymphatic congestion. The right knee-joint was bent and immovable, and a large tumour could be felt beneath the muscles in front of the lower part of the thigh. The limb was not tender, but was the seat of a dull and constant pain. His temperature was 99·6° F. The patient also had ptosis of the left upper eyelid, the left eyeball did not move as freely as the right one, and the left pupil was the more dilated. Gummata were present in the upper lip and face, and whilst he was in the hospital he developed extensive necrosis of the upper jaw, his left testicle became swollen, and shortly before death he suffered from a phagedaenic ulceration of the left leg and foot.

When the right knee-joint was opened at the post-mortem examination it was found to contain several ounces of blood-stained pus, and after this had been washed away the appearances seen in Plate XV were observed. A gummatous deposit had taken place all round the lower portion of the femur beneath the muscles in such a way as to lead to thickening and chronic inflammation of the periosteum. The gummatous inflammation had

also involved the upper and outer parts of the synovial membrane, which projected into the joint in the form of lumps and ragged fringes, some of which had ulcerated. The bone lying beneath the thickened periosteum was superficially inflamed, but the bulk of the changes were confined to the fibrous tissues, for the articular cartilages were healthy. The other joints were unaffected, and no traces of gummatous inflammation could be found at the base of the brain to account for the ocular disturbance observed during life.

The treatment of gummatous inflammation consists in the administration of potassium iodide until the pain and swelling have subsided, after which the patient should be put upon a prolonged course of mercury. Strapping the affected joint with a mercurial ointment, or massage, will assist the action of the potassium iodide in causing absorption of the more recently formed inflammatory products. But when the disease has been allowed to continue untreated for a long time the connective tissues in the neighbourhood of the joint become so thickened with inflammatory products that very little can be done to restore movement. In such cases the affected joint may be protected by a leather splint, it may be massaged, and it may be submitted to the action of dry heat.

Just as in tuberculous disease of the knee the stress of the inflammation falls sometimes upon the articular ends of the bone and sometimes upon the synovial membranes, so in syphilis the epiphysis and the shaft in the immediate neighbourhood of the epiphyseal line are sometimes more affected than the joint itself. In such cases the joint alters in shape and becomes globular, the altered outline being due clearly to the bone, for there is no increase of fluid in the joint and the synovial membrane does not seem to be thicker than it is in the unaffected joints. The knee and elbow are most often affected, and the inflammation is generally limited to the joint of one side. The swollen parts are neither tender nor painful, but the patient often suffers from osteocopic pains. The swelling may increase rapidly, and the diagnosis is easy because there is plenty of other evidence of a severe attack of syphilis. The swelling ends in chronic perios-

titis, in the formation of fistulous tracts which open from the bone through the skin without involving the joint, in general suppuration of the joint, in ankylosis, or even in a flail joint. I believe that the suppurating cases usually occur in patients who are also tuberculous. It should not be forgotten that tuberculous arthritis may occur in patients who have had syphilis, and that a syphilitic inflammation may be modified by subsequent infection with tubercle and the pyogenic micro-organisms which so often accompany it.

Here is such a case: A man aged 38 was admitted under my care at St. Bartholomew's Hospital on January 15, 1907. He was the night porter at an hotel, and came to the hospital saying that he was quite well until eight weeks ago. He then had a rigor followed by pain in his knuckles, fingers, wrists, and knees. This attack was probably due to influenza. All the joints recovered except the right knee, which remained red, swollen, and painful. Many years ago he had syphilis, and both his parents had died of consumption. The temperature of the patient was normal, and no evidence of tubercle could be found in his lungs. Examination of the right knee showed that the greater part of the swelling consisted of thickened synovial membrane, though there was a little excess of fluid in the joint. The thickening of the synovial membrane was not uniform, for a distinct band of less inflamed tissue ran transversely across the joint just above the upper border of the patella. The movements of the joint were free and smooth, and the bones were not enlarged. I examined the joint through an incision on January 24. There was a little turbid synovial fluid; the whole synovial membrane within reach of the finger was irregularly thickened, the cartilages were healthy and smooth. A piece of thickened synovial membrane was submitted to the pathological department, and in due course a report was received that the thickening was not tuberculous, but the arteries showed evidence of extensive inflammation of the internal and middle coats, which in some places had caused complete obliteration of the lumen. No improvement followed the operation, and the joint became stiffer and stiffer until it was partially ankylosed. The patient was unable to follow his

occupation with a stiff knee, and I therefore amputated through the middle of the thigh on April 8. The patient appeared to be doing well from the day of the operation, until April 18, when he suddenly began to lose blood from the wound in considerable quantities. This was controlled by a firm bandage, but the bleeding recommenced on the following day. I therefore removed the stitches and found that there had been no attempt at repair, as the flaps simply fell apart, disclosing a general oozing wound free from any trace of suppuration. The bleeding was arrested by the use of saline solution at a temperature of 127° F., and the common femoral artery was tied, after which the patient made a good recovery.

Examination of the joint after it had been properly injected and hardened in formalin showed that the articular cartilage on the inner condyle of the femur and covering the upper end of the tibia was succulent, blood-stained, and pitted, the edges of the eroded portions being crescentic. In parts the bone was exposed. It was softened and rarefied, and some of the eroded bone showed a striation in the line of action of the joint. The synovial membrane was greatly thickened and oedematous. It measured 1·5 cm. at the side of the joint, and it was fringed and oedematous where it overlapped the articular cartilages of the femur. The articular surface of the patella was separated from the femur by a mass of fatty, fibrous, and blood-stained tissue measuring 0·5 cm. in thickness which was continuous with similar tissue occupying the subcrural pouch, whilst the synovial membrane was so greatly hypertrophied as almost to conceal this surface of the patella. The cartilage covering it was eroded in its outer part and vertically striated throughout, but without any appearance of the villi commonly seen in cases of osteo-arthritis.

Tabetic Arthropathy

Charcot's disease of the joints is so often associated with a previous history of syphilis that it cannot be ignored in any systematic consideration of syphilitic disease of the joints.

Professor Charcot first drew attention to the condition in 1868, and not only described the symptoms but correlated them with the degenerative changes taking place in the spinal cord, to which the names locomotor ataxy and tabes dorsalis are given.

A single joint is usually affected, though the changes are sometimes bilateral. The knees, ankle, hip, and tarsal bones are more often affected than the shoulders, elbows, and wrist. A few cases are recorded where the articulation of the lower jaw has been involved. Men suffer rather more frequently than women, and the arthropathy may occur at any time in the course of the disease, for Kredel found that in 132 cases of tabes with arthropathy the joint lesion occurred

21 times during the premonitory period of tabes.
38 times between the first and the fifth years.
32 times between the fifth and the tenth years.
41 times after the tenth year.

The affection is never painful, and the first signs usually take the patient by surprise, though he may have felt some lightning pains near the joint, or there may have been a little crepitation or some transient swelling. The onset therefore always seems abrupt, and it may be so sudden that a patient falls owing to his legs giving way beneath him whilst he walks, or he comes complaining that he has put his shoulder or his elbow out of joint without knowing how the accident happened.

An examination of the joint shows that it is swollen, and if it is seen early the swelling is limited to the joint, though the whole limb becomes swollen and sometimes so rapidly as to make it probable that the capsule of the joint has given way and has allowed extravasation of the synovial fluid into the cellular tissues. The swelling reaches a maximum in a few hours or a few days, and the skin then feels firm, whilst the tissues do not pit on pressure. The skin is pale and often shiny ; the veins are dilated, but there is no sign of inflammation ; haemorrhage is rare and suppuration hardly ever occurs.

The swelling of the limb diminishes after a period varying from days to months, disappearing last from the neighbourhood of

the joint, and when it has subsided, or when an X-ray photograph is taken, the joint is found to be completely disorganized, partly from absorption of the articular heads of the bones and partly from the disintegration of the ligaments. The joint can therefore be moved in many abnormal directions so freely that it is said to be ' flail-like '. In spite of this abnormal mobility the patient goes about with comparative freedom, at any rate in the earlier stages, only complaining of the weight of the limb and that he is easily tired. Very little muscular wasting occurs, therefore, during the earlier stages so long as the limb is used. But the inco-ordination, the shortening, and the weakness of the limb make the patient bed-ridden in the later stages, when the hip, knee, or ankle is involved.

A pathological examination shows that every part of the joint is altered in a case of tabetic arthropathy of long standing (Plates XVI and XVII). The ligaments are converted into fibrous tissue and are greatly elongated. The capsule of the joint is thickened or even calcified in parts, whilst in other parts it is so greatly thinned that it easily gives way. The synovial fringes are increased in size and become pedunculated in the manner which is seen so often in chronic osteo-arthritis. The cartilages undergo vertical fibrillation and wear away, whilst ecchondroses or calcified masses spring from the points where the cartilage becomes continuous with the synovial membrane. But the most characteristic changes occur in the articular ends of the bones, which become ground down so that in the case of the knee, hip, and shoulder the distal bone slides upon the more fixed one, and at the knee the articulating surfaces become oblique instead of transverse. The portions of bone which remain at the joint show signs of osteitis and may become markedly increased in size.

The process of erosion and absorption is sometimes replaced by a more conservative change, especially when the shoulder is attacked, so that the head of the humerus becomes concave and surrounded by osteophytes, whilst the glenoid surface of the scapula becomes convex.

There is also an atrophic form of Charcot's joint which is seen much less commonly in England than the hypertrophic variety

just described, though the two types are sometimes seen in different joints of the same patient. In the atrophic form there is more or less complete wasting of the cartilage and of the articular surfaces of the bone. The wasting is so complete in some cases that a considerable portion of the shaft may disappear, leaving only pointed extremities to represent such bones as the humerus, the radius, and the ulna. The atrophic form of tabetic joint does not seem to be very uncommon in France, and is seen more frequently in the shoulder, elbow, and hip than in the knee or ankle.

The pathological appearances are well seen in Plate XVII, taken from the left knee of a woman who was under my care in St. Bartholomew's Hospital in July, 1907. She said that she was 45 years of age, and that whilst she was engaged as a cook in Canada, some three years ago, her left knee suddenly swelled without any cause. It was not painful, but it was so weak that it often caused her to fall. A plaster of Paris splint was put on in Montreal, and this enabled her to continue her occupation until the summer of 1906, when she came to England and was admitted to the hospital under the care of my colleague Dr. Howard Tooth, C.M.G. For the last ten or twelve years she had suffered from 'lightning' pains in the legs, and during the last six months she had lost control over her bladder. She was married at the age of 33 to a soldier who had just completed twelve years' service in India. She had one child by him who died of convulsions at the age of nine months, but she had no miscarriages, nor had she suffered from any rash or sore throat. Her husband died of consumption in 1904.

The patient was a thin and anaemic woman with good sight. The movements of the eyeballs were perfect and the pupils reacted naturally both to light and accommodation. The thoracic and abdominal viscera seemed to be healthy. Both legs were wasted and the knee-jerks were absent. The left knee was greatly swollen and the joint contained free fluid. The joint was so disorganized as to be 'flail-like' and the patella was displaced to the inner side. The edges of the articular surfaces of the femur and tibia were lipped (Plate XVI), osteophytes were present in

the immediate neighbourhood of the joint, and there was much grating on movement. There was well-marked analgesia all over the left leg, and to a slighter extent in the right, but the right knee-joint and all the other joints of the body seemed to be natural. During the patient's stay in the hospital her pupils became unequal, the left being always larger than the right, but they continued to react both to light and accommodation.

For nearly a year I resisted her entreaties to remove the left leg on the grounds that some of the other joints were sure to become affected, that the extensor muscles of the left thigh were too weak to allow of her using an artificial limb, and that I did not know what course wounds took in persons affected with this form of locomotor ataxy. But as she was determined to lose her leg, and as after several months' watching and treatment she remained very much in the same condition as when she was first seen, I amputated in the lower third of the thigh. The operation was performed on July 25, the wound healed by first intention, and the patient left the hospital on August 14. I heard afterwards that she died suddenly in the following December of some cerebral affection, probably a haemorrhage.

Subsequent examination of the knee showed the appearances represented in Plate XVII. The synovial membrane was thickened and villous; the articular cartilages were worn away in many places, leaving inflamed and bare bone on the patella, femur, and tibia. The remaining articular cartilages were shaggy from fibrillation. There were many ecchondroses, some of which were pedunculated, and all were densely calcified. The edges of the condyles of the femur were markedly lipped, and there were irregular calcified masses in the fibrous tissues surrounding the joint. The weakness of the knee and the inward displacement of the patella were easily explained by the condition of the internal tuberosity of the tibia, which was so worn away behind that the articular surface slanted backwards instead of being on the same plane as the external tuberosity. The crucial ligaments were stretched, but neither they nor the interarticular fibrocartilages had undergone any material change.

The differential diagnosis of tabetic arthropathy is not difficult,

though it has to be distinguished from osteo-arthritis and syringomyelia. The absence of pain and of the patellar reflex, the iridoplegia, in which the pupil acts in accommodation but does not respond to the stimulus of light, are the negative signs, whilst the apparently rapid onset and the swelling of the affected limb are positive indications of the tabetic arthropathy, even if it occurs before there is any inco-ordination of movement or gastric crises.

In syringomyelia the shoulder, elbow, and wrist are much more often affected than the hip, knee, or ankle. There is a great alteration in sensibility, muscular wasting is a marked feature in the disease, and there are other trophic lesions besides those of the joints, so that ulcers and whitlows are not uncommon. Suppurative inflammation of the affected joints is usual in patients suffering from syringomyelia; it is very rare in the cases of tabetic arthropathy.

The treatment of Charcot's disease can only be palliative. Whilst the limb is swollen in the earlier stages massage and passive movements may be employed to relieve the inconvenience caused by its size and weight. The patient may be allowed to take a moderate amount of exercise. Complete rest and application of a well-moulded leather splint to the affected limb are often useful in the later stages, and for a time the condition of the limb may seem to improve. Operative measures do not help the patient, because a careful examination nearly always shows that several joints are involved although the changes are only noticed or complained of in a single one. I have never yet seen a case in which all the conditions seemed to me to warrant amputation of the affected limb, and in doubtful cases I was deterred from recommending such a method of treatment—except in the case just mentioned—in view of the opinion expressed by older surgeons that such an operation is very likely to be attended by an unfavourable result, and that excision is equally to be avoided, for in neither case can sound repair be anticipated.

The Joints in Hereditary Syphilis

It is doubtful whether syphilis ever affects the joints primarily in very young children. The nearest approach to an early inherited syphilitic arthritis is the suppuration occurring in the knees and ankles of marasmic babies only a few weeks old who are the offspring of syphilitic parents of the out-patient class at hospitals. But suppuration and inflammation of the joints secondary to inflammatory changes in the neighbouring epiphyses are by no means uncommon in infants, whilst later in life the joints are affected in at least three different ways: in the form of symmetrical serous synovitis; by gummatous synovitis, which is often a combination of syphilis and tubercle; and by an extremely interesting form of chondro-arthritis, which appears to begin as a syphilitic inflammation of the articular cartilage.

Symmetrical Serous Synovitis

Mr. H. H. Clutton first drew attention to the occurrence of symmetrical serous synovitis in children in the year 1886, and showed that it was associated with syphilis. All surgeons in charge of a children's hospital are familiar with patients affected in this manner. Von Hippel has published an account of forty-three cases which occurred in his own practice; and Dr. G. H. Melville Dunlop of Edinburgh has published an excellent account of the cases which have come under his personal observation.

The average age of children affected with symmetrical serous synovitis is thirteen years, and they are usually between the ages of eight and fifteen. The knees and shoulders are affected most frequently, but the ankles and wrists are sometimes involved.

The synovitis is characterized by its symmetry, freedom from pain, long duration, and the power of movement which remains in the joints throughout the whole course of the attack.

Symptoms. The patient complains of stiffness in one joint, which is found on examination to be full of fluid, though it is never tense. Further examination shows that the opposite joint is also swollen, but to a less extent than that of which complaint is made. If the

patient is seen early the opposite joint may be free from fluid at first, but if the nature of the case is not recognized, and the patient is not treated with mercury, it sooner or later becomes affected. The skin is not hot and is natural in colour, whilst the limb above and below the joint is not wasted. The appearances are well shown in Plates XVIII and XIX. I am indebted to the kindness of Dr. Melville Dunlop for Plate XVIII.

The swelling may remain for many months unchanged, and neither the application of splints nor prolonged rest seems to relieve the condition. From time to time the chronic character of the swelling is interrupted by periods of active increase without any apparent cause, and even when the patient appears to be cured relapses may occur.

An important feature in these cases is that they are often associated with other symptoms of inherited syphilis. Interstitial keratitis accompanies or precedes the synovitis in a large proportion of cases, and as a rule the joints are involved first and the keratitis comes on afterwards. The patient, too, is often deaf and may present nodes on the long bones near the affected joints. Of the sixteen cases seen by Dr. Melville Dunlop, twelve developed keratitis, four had periostitis, three suffered from deafness, but only two had Hutchinson's teeth. This bears out Von Hippel's statement that syphilitic joint trouble is much more common than the development of syphilitic changes in the teeth, and he thinks that the occurrence of effusion into the joints should always be inquired about when an attempt is made to establish a history of inherited syphilis.

Pathology. A considerable proportion of the cases of symmetrical serous synovitis show definite pathological changes when the joint is examined. The synovial membrane is infiltrated and studded with gummata, and the membrane is everywhere thickened and much more vascular than normal. Villous processes grow from the endothelial aspect of the synovial membrane, and the synovial fringes are especially infiltrated, hanging down into the joint and filling its cavity with a soft, gelatinous, and poorly developed material resembling that seen in tuberculous joints. It presents a soft, reddish, elastic appearance, and in the centre it is greyish

white and caseated like the granulation tissue of tuberculous disease. In some cases nodes are felt in the capsule of the joint which give it a firm and almost cartilaginous feeling, whilst in others the synovial membrane is only a little thickened and hyperaemic, and the condition is then one of true hydrops articuli or synovial dropsy.

Diagnosis. The condition may be distinguished from tuberculous synovitis by its symmetry, by the absence of wasting of the limb, by the freedom from pain on movement and starting pains at night, by the ability of the patient to walk long after a similar condition of the joint due to tubercle would have confined him to bed, and lastly by the absence of the triple displacement—flexion, displacement backwards and rotation outwards in the case of the knee—which is so marked a feature in the later stages of tuberculous disease.

Treatment. The treatment consists in strapping the affected joints with mercurial ointment whilst mercury and iodide of potassium are given simultaneously. The fluid is then rapidly absorbed in most cases and the thickened synovial membrane returns to its natural condition. When these measures fail—and they do so more often in the cases of hydrops than in those where the synovial membrane is markedly affected—I have not hesitated to open the joints and let out the synovial fluid, the greatest care being taken not to introduce any pathogenic organisms into the joint, which is already ripe to allow of their rapid multiplication.

Gummatous Synovitis

A gummatous synovitis without much synovial effusion, and somewhat resembling a tuberculous synovitis, is met with in children as a result of inherited syphilis. It occurs in the knee, elbow, and ankle more frequently than in the other joints, and it differs from the synovitis just described in the fact that it is not symmetrical, though more than one joint may be affected.

Gummatous synovitis is distinguishable from tuberculous synovitis by the slower course, less pain, greater amount of

movement, less wasting of the limb, as well as by the slighter tendency towards suppuration and fungation. The cartilage remains unaffected for a long time, and there are consequently no starting pains to awaken the patient when he falls asleep and cause the ' night screaming ' which is so characteristic a feature in tuberculous arthritis of the knee and hip.

These cases of gummatous synovitis respond very readily to treatment by mercury, even though the patient be allowed to go about his ordinary work, whether at school or in business.

The following case shows how easily a patient suffering from gummatous synovitis may be diagnosed erroneously :—

A boy aged 14 came under my care on January 31, at the Victoria Hospital for Children, to be treated for an inflammation of the right knee. He had suffered from diphtheria four months previously, and a month later sores appeared on his body. He had been limping for a month before I saw him. His younger brother had had an ankle-joint excised, presumably because the surgeon thought he had tuberculous arthritis.

My patient's complexion was muddy, and scattered over his trunk, limbs, and scalp were patches of superficial ulceration covered with thick scales or with black and raised crusts. His voice was husky, but his teeth were healthy, and there was no evidence of keratitis or of iritis, either present or remote. The glandulae concatenatae on both sides of his neck were slightly enlarged.

The right knee was affected with synovitis. It measured 12½ inches over the centre of the patella, whilst the left one only measured 10¼ inches in circumference at the same level. There was a little synovial fluid in the left knee. The synovial membrane in both joints appeared to be thickened, and this was especially marked at the sides. The patient occasionally had some throbbing pain at nights, but unless the knee was moved he did not complain of pain, and he had never been awakened by any starting pains.

The boy was brought by his mother, who presented such obvious signs of tertiary syphilis that he was at once ordered one-grain doses of grey powder. In ten days' time his complexion

had cleared and his voice was less husky. There was also less synovial effusion in the right knee, whilst the left appeared to be healthy. This improvement continued until March 7, when the patient was allowed to go home with his right knee in a plaster of Paris case. He returned on March 26 complaining of much pain in both knees with increased swelling. A plaster of Paris bandage was put round each knee, but he returned again on April 2 with increased swelling of both knees and with some synovitis of both elbows. He then confessed that, boy-like, he had not taken his grey powders for a fortnight. He was made to understand that medicine was necessary for his cure and was ordered to continue the one-grain doses of grey powder three times a day. His elbows were less swollen and painful on April 9, though his knees still remained enlarged. He was then given half-drachm doses of the solution of perchloride of mercury with five grains of iodide of potassium three times a day. A week later he returned saying that his elbows were well, his knees better, and that he had suffered no pain since he began his new medicine. He increased in weight from 64½ lb. on April 16, to 71½ lb. on April 30. I kept him under observation for two or three years, treating him with intermittent courses of mercury, and during the whole time he remained well and worked uninterruptedly as an errand-boy.

Chondro-Arthritis

Chondro-arthritis is that condition in which the articular cartilages are destroyed by a process of serpiginous ulceration which involves the bones secondarily, and is generally associated with gummatous periostitis. It is, fortunately, very rare, and it occurs as one of the last manifestations of inherited syphilis. Professor Bertarelli has succeeded in demonstrating the presence of the *Spirochaete pallida* in the affected tissues. Professor von Gies, in 1881, first drew attention to the occurrence of syphilitic joints in which the cartilage was chiefly affected, and in 1884 Professor Virchow described them more fully.

The following case occurred at St. Bartholomew's Hospital

a few years ago, and I am indebted to my colleague Mr. A. A. Bowlby, C.M.G., for permission to use his description of it:—

A boy aged 16 was admitted into St. Bartholomew's Hospital on November 20, 1882, on account of ulceration of the left leg. He had been in good health until three years before his admission, when he first had an attack of synovitis of the left knee. A year later swellings appeared on his shins, and after several months one of these swellings burst, some bone came away, and an ulcer remained. The patient had no evidence of congenital syphilis, but the appearance of the shins was so suggestive that he was treated with mercury and iodide of potassium and the ulceration was cured. A year later he was readmitted to the hospital for an ulcer of the right shin. This ulcer proved most intractable, and it was only after six months' rest in bed and several gouging operations that the ulceration healed.

The patient was then sent to a convalescent home, and whilst he was there the joints began to show signs of inflammation, and a sharp attack of synovitis of the left knee and of both elbows obliged him to return to the hospital. The affected joints contained a good deal of fluid and were rather painful, but under treatment by Scott's dressing the fluid was quickly absorbed and the patient was discharged in March, 1885. He returned again on September 1, saying that he had noticed a swelling on the left side of his forehead and on his right arm for about three weeks, and that the ulcers on his shins had broken out again soon after he left the hospital.

An examination of the boy showed a swelling attached to the right humerus about its centre and on the outer side; the skin being red and hot, and the swelling fluctuating. The surrounding bone was thickened. Over the left eyebrow was a lump as large as a walnut, firm and attached to the subjacent bone. The shins were ulcerated, the tibiae were thickened, and there was considerable effusion into each knee-joint. There was also effusion into the left elbow, but none of the affected joints were painful. The swelling in the arm was incised and pus with caseous material was removed, leaving bare and rough bone. The general health of the patient steadily got worse. He began to cough, an effusion

occurred in each pleura, his liver and spleen became greatly enlarged, and he died with the signs of amyloid disease five months later.

A post-mortem examination of the right upper extremity showed that the articular cartilage of the head of the humerus (Plate XXVI) was thinned in almost its whole extent and was of a bluish colour. On the posterior aspect of the head, near the anatomical neck, was a deeply cut groove, extending for an inch or more towards the centre, after which it turned towards the great tuberosity and ramified over the greater part of the posterior surface of the head. The posterior portion of the articular surface looked as if portions of the cartilage had been gouged away, leaving irregular tracts with crescentic margins. Islands of cartilage remained intact here and there. Where the cartilage was most deeply destroyed the ulceration had involved the bone, which had undergone the same gouging process as the cartilage. A thin membranous layer covered the bone and was closely attached to it. When this was peeled off the bone was found to be rough and softer than usual. This membrane was cellular and was continuous with the synovial membrane, fading gradually as it reached the centre of the cartilage. In other parts the cartilage was thickened and lumpy, its thickness being at least twice as great as that of normal cartilage. The synovial membrane was more vascular and thicker than usual, but otherwise it appeared to be natural. The shaft of the humerus was thickened and misshapen by the deposit of porous new bone, which in parts was tolerably firm, but in other parts was soft and crumbling. There were some deposits of inspissated pus beneath the periosteum. The lower two-thirds of the shaft were more affected than the upper third, and at the centre of the shaft, at a point corresponding to the external ulceration, there was a considerable destruction of bone with the formation of a deeply excavated cavity.

The right elbow-joint contained much thickened synovial fluid. Part of the cartilage covering the trochlear surface of the humerus was converted into fibrous tissue, whilst the cartilage over the capitellum was fibrillated and pitted, but the bone was not exposed.

The posterior surface of the right olecranon fossa was rough and carious, and the periosteum was separated by caseating inflammatory products. The cartilage on the articular surface of the olecranon was partially destroyed, whilst the bone was exposed and roughened. The articular surface of the coronoid process was in a similar condition, and between the olecranon and the coronoid processes the bone was grooved longitudinally in the manner seen in osteo-arthritic joints.

The left shoulder-joint contained some thickened synovial fluid. The cartilage of the glenoid cavity was normal and the scapula did not seem to be diseased.

The shaft of the humerus was natural, but the head presented appearances similar to those seen in the right shoulder-joint. The articular cartilage was thinned over the greater part of its surface, the thinning being less marked at the centre than towards the circumference. There were deeply excavated tracts near the anatomical neck, the bases of which were covered by a fibrillated membrane continuous with the thickened synovial membrane. A process of the synovial membrane extended forwards and fitted accurately into the excavated surface, though it was not adherent to it. From the lower portion of one of the excavated surfaces the ulceration extended downwards along the shaft of the humerus into the substance of the bone. The synovial membrane was thickened and fringed as it is in cases of osteo-arthritis.

The right knee-joint (Plate XXVII) contained a considerable quantity of viscid fluid, and its synovial membrane was everywhere thickened and congested. The patella was surrounded by a mass of fringes, some very pedunculated, others almost sessile; some large and resembling masses of fat, others delicate and filamentous. The external condyle was deeply grooved, the groove extending down to the bone, which was covered by a membrane similar to that which lined the ulcerated or grooved portions of the shoulder-joint. This groove became shallower at the upper and anterior part where an island of cartilage remained intact. The cartilage on the upper part of the condyle was rough and fibrillated and it was greatly increased in thickness. There was a large nodular outgrowth of cartilage on the upper part of the

internal condyle, and on the most convex portion of this condyle was a small mass of fibrillated cartilage. The rest of the cartilage on this condyle was normal. The cartilage of the patella was rough and fibrillated, whilst that covering the upper end of the tibia was slightly roughened and fibrillated on the surface. The ligaments were natural.

The left knee-joint had undergone similar changes to those described as occurring in the right knee. The bottom of the grooves was covered with a similar membrane, and at the edges of the condyles were outgrowths of cartilage like those seen in osteo-arthritis, whilst there was marked ' lipping ' of the edges of the bones. A microscopical examination of the joints showed that the bones had undergone a process of rarefaction with the formation of fibrous tissue which occupied the cancellous spaces. The cartilage had undergone extensive destruction, and had been replaced by fibrous tissue which was continuous with that found in the cancellous tissue of the bone.

These cases of chondro-arthritis are interesting because they appear to be instances of a primary gummatous inflammation of cartilage which is comparable, at any rate histologically, to the primary changes which have long been known in the joints of patients suffering from osteo-arthritis. In syphilitic chondritis the changes sometimes occur by the fibrillation of the matrix taking place horizontally in the cartilage, whilst in osteo-arthritis it is vertical. In syphilis, therefore, the cartilage is reduced to a membrane, whilst in osteo-arthritis it becomes like velvet. The result, however, is the same in both cases, for the cartilage is replaced by fibrous tissue and becomes scarred and puckered. The changes in the synovial membrane, too, are analogous in syphilis and in osteo-arthritis, but in syphilis the enlarged fringes do not contain the cartilaginous nodules which are so common in osteo-arthritis.

The signs and symptoms of chondro-arthritis are sufficiently exemplified in the case mentioned. The diagnosis is not difficult, as the patient shows abundant evidence of his inherited taint. Treatment, therefore, is not of much use, though if he seek advice in the earlier stages, a course of mercurial fumigation with local inunctions of mercurial ointment over the affected

joints and tonic treatment with good hygiene may give him some relief.

The whole question of syphilitic inflammation of cartilage stands in need of scientific examination at the present time. It is probable that there are several varieties of joint disease associated with syphilis in which cartilage is affected. The changes in the form described above are due to fibrillation of the matrix over considerable areas. In other cases rounded pits appear in the articular ends of the cartilage, whilst in yet other cases there is scarring of the cartilage, which differs from that seen in osteo-arthritis because it does not take place at the point where the pressure within the joint is greatest, nor is it associated with eburnation of the exposed bone.

BIBLIOGRAPHY

Von Gies, Deutsche Zeitschrift f. Chirurgie, 1881, vol. xv, p. 591.

Virchow, Berliner klin. Wochenschrift, August 18, 1884, p. 534.

Rasch, Beiträge zur Kenntniss der syphilitischen Gelenkkrankheiten. Arch. f. Dermatol. u. Syphilis, 1891, p. 91.

Dr. Gangolphe, De l'ostéo-arthrite syphilitique. Bull. de la Soc. Anatomique de Paris, 1885, p. 193.

Marsh, Diseases of the Joints and Spine, 1895, p. 148.

Morestin, Syphilis articulaire. Arch. Gén. de Méd., 1901, vol. clxxxvii, p. 101.

Bowlby, Disease of many Joints probably of Syphilitic Origin. Trans. Medico-Chir. Soc., 1894, vol. lxxvii, p. 43.

Clutton, The Lancet, 1886, vol. i, p. 391.

Dr. G. H. Melville Dunlop, Syphilitic Synovitis in Children. The Edinburgh Medical Journ., N.S. vol. xvi, 1904, p. 516.

Dr. J. M. Charcot, Archives de Physiologie, 1868, vol. i, p. 161. Sur quelques arthropathies qui paraissent dépendre d'une lésion du cerveau ou de la moelle épinière.

Dr. Joseph Rotter, Die Arthropathien bei Tabiden. Arch. f. klin. Chirurgie, vol. xxxvi, 1887, p. 1.

Dr. Krönig, Wirbelerkrankungen bei Tabikern. Zeitschrift f. klin. Med., vol. xiv, 1888, S. 50.

Dr. Ludwig Kredel, Die Arthropathien und Spontanfrakturen bei Tabes. Volkmann's Sammlung, Chirurgie, No. 96, 1888, p. 2899.

Dr. Pierre Marie, Lectures on Diseases of the Spinal Cord. Translated by Dr. Lubbock, New Sydenham Soc., 1895, p. 220.

Bertarelli, Spirochaete Pallida und Osteochondritis. Centralblatt für Bakteriologie, &c., I. Abt., Originalband 41, Heft vi, p. 639.

D'Arcy Power, Syphilitic Disease of the Joints. The Hospital, January 18, 1908, p. 411.

CHAPTER IV

MUSCLES, TENDONS, AND BURSAE

The Muscles

Syphilitic disease of the muscles was certainly recognized as long ago as 1553, when J. Baptist Theodosius, an Italian surgeon, published his ' Medicinales epistolae LXVIII ', at Basel. He says in his forty-third letter : ' cum scilicet musculi tendones . . . nodis seu gummis infecti sint propter quos nullo pacto possunt ad ambulandum extendi ' (when indeed the muscular tendons are affected with nodes or gummata, on account of which it is quite impossible to stretch them in walking).

The muscles are affected in syphilis either directly or through the nerves supplying them. The inflammatory conditions of the muscles are alone dealt with in this chapter. The syphilitic paralyses will be considered in vol. iv ; syphilitic myositis of the heart in vol. iii ; enough is not yet known about the effect of syphilis on the involuntary muscles to warrant any dogmatic statements.

Muscle pains are not unusual in the earlier stages of syphilis ; they are sometimes felt before the primary sore has disappeared. The pain is usually felt in the thighs and legs, sometimes in the shoulder, more especially in the deltoid ; in the flexors of the forearm ; in the cervical portion of the trapezius ; and in the erector spinae.

As is usual in the earlier stages of syphilis, the pain is worse at night than in the daytime, and is felt both when the muscles are at rest and when they are in movement. The sensation varies from a mere soreness to one of such severity that the patient is confined to bed. Examination of the affected muscles shows points of local tenderness, which are often well limited, and are not very large. There is no swelling or irregularity, and the interference

with function seems to depend rather upon the pain than upon any gross lesion. Wryneck, the stiffness characteristic of lumbago, inability to walk even short distances without excessive fatigue, and impaired movements of the hand are the results of this form of myosalgia, or syphilitic rheumatism, as it is sometimes called.

The treatment consists in the administration of mercury, with the application of stimulating applications over the affected muscles. A Turkish bath often relieves the pain, which in any case is usually transient, and disappears even without treatment.

Diffuse gummatous infiltration or interstitial myositis is best known as occurring in the biceps and in the hamstring muscles, about the end of the first year after infection with syphilis. Anatomically it is a primary change in the interstitial connective tissue with secondary degenerative changes in the muscle fibres. The infiltration has also been noticed in the flexor muscles of the forearm, the pectoralis major, the sterno-mastoid, the masseter, and the rectus abdominis. The affected muscles undergo a slow and painless increase in size, whilst at the same time they shorten. When the biceps and the hamstrings are involved the elbow and the knee are partially bent, and the tendons stand out in sharp relief though the muscle is not contracted.

The onset is very insidious, and the patient has only suffered a little cramp from time to time, until he suddenly realizes that he is unable to straighten his arm or leg. Examination of the joint shows that it is fixed at an open angle, and that any attempt to straighten it causes pain. The overlying skin is healthy. There is no alteration in the shape of the muscle, nor is it harder than usual, but there is a marked increase of tension when it is put upon the stretch. It reacts less to mechanical stimulation than a healthy muscle, and it responds badly to galvanism. The change is nearly always unilateral, or if it is symmetrical the corresponding muscles are affected successively and not at the same time.

The prognosis is good, as the patient generally recovers with a perfectly useful arm, although the stiffness may have lasted four or five months, but the improvement is only gradual.

The treatment consists in the local inunction of mercury with

subsequent massage of the affected muscle. Iodides should be given at the same time.

Prof. Fournier calls attention to other changes taking place in the muscular system during the earlier stages of syphilis. He has often noticed a progressive weakening of the muscular power as measured by a dynamometer, and he alludes to an irregular and intermittent trembling which sometimes attacks patients suffering from the secondary manifestations of syphilis, when as yet they have not been treated with mercury. Both these conditions, as well as the progressive wasting of the muscles which is seen occasionally, are due rather to a neuritis, or to the general effects of the syphilitic poison, than to any local action upon the muscles themselves.

The muscles are affected with a localised gummatous inflammation during the later stages of syphilis, generally within three to five years after infection, often later, sometimes much earlier. The inflammation is either a general infiltration of the muscular tissue, or else localised gummata are produced; very frequently the two forms occur in combination. One or many muscles are involved—the triceps, rectus abdominis, and muscle of the tongue most often; but cases are reported where the inflammation has attacked the gluteus maximus, the vastus externus, the sartorius, the levator ani, the trapezius, the sterno-mastoid, the intrinsic muscles of the larynx, and even the external sphincter of the anus. When the inflammation assumes the form of localised gummata the individual swellings may be felt; but when, as is usual, the gummata are associated with diffuse inflammatory changes the muscle is increased in size, it becomes globular, flattened, fusiform, or irregular in outline, firm and resistant to the touch, the alterations in its character being felt more easily when it is relaxed than when it is contracted. The swellings slowly increase in size until whole groups of muscle may be involved. The inflamed muscles after a time become adherent to the surrounding tissues, and the use of the muscle is then impaired. The gummatous masses may soften and discharge through the skin, leaving an ulcer which readily heals under treatment. The end of the inflammation, if it be untreated, is not known, but it is suggested that a shortened and useless

muscle may be left, or that calcification and even ossification may take place.

The prognosis is very good, because the inflammatory changes are easily arrested by the administration of potassium iodide even when they have been allowed to proceed for a long time.

A localised swelling in the sterno-mastoid muscle of newly born children is not uncommon, and it has often been ascribed to syphilis and described as a gumma. I have never been able to satisfy myself that such swellings bore any direct relation to syphilis, and it has always appeared to me that they were better explained as the result of injury to the muscle at the time of birth, with subsequent inflammatory changes within the sheath of the muscle. The inflammation is interesting, because it sometimes leads to a slight form of wryneck.

Gummatous inflammation of the muscles also occurs as a result of inherited syphilis, when it may be one of the latest manifestations, as it occurs from the fifth to the twentieth year of life.

Tendons and their Sheaths

Tendons and their sheaths may be affected with syphilitic inflammation either separately or together, but if the inflammation is at first limited it soon spreads until both parts are involved.

Teno-synovitis occurs in two forms, in the earlier period of secondary syphilis as a simple serous inflammation leading to effusion, or as an oedema associated with plastic effusion which may lead afterwards to impaired movement owing to the formation of adhesions. During the later periods of syphilis the inflammation is of the usual gummatous type, either interstitial or localised.

Serous teno-synovitis has been most frequently observed in the tendon sheaths at the back of the wrist, and in those of the front of the ankle, peronei, and hamstrings. The tendon sheaths of the biceps and supinator longus are sometimes involved in the front of the arm.

The swelling begins rather rapidly and is painless. It does not interfere materially with the movement of the neighbouring joint, and the attention of the patient is drawn to it by the soft crackling

sensation felt accidentally on movement. Sometimes the onset is more acute, and it is then attended with pain on movement, some impairment of movement, and a reddening of the skin. But even if it be left untreated this subacute form soon settles down and runs the same indolent course as the serous teno-synovitis.

The oedematous form of teno-synovitis is most often seen on the back of the wrist, where it causes a triangular swelling with the base directed towards the fingers, the apex following the course of the extensor tendons as far as the dorsal ligament of the wrist, where the inflammation ceases. Left untreated the swelling pursues a peculiarly indolent course. It continues almost indefinitely, and the movements of the wrist are either hampered by adhesions or weakened by the play of the tendons in the distended sheath.

This condition of syphilitic teno-synovitis must be distinguished from tuberculous disease of the wrist, for which it is often mistaken. In the syphilitic form the inflammation is really due to a teno-synovitis, whilst in the tuberculous form the inflammation of the tendon sheath is associated with, and, perhaps, is always secondary to, inflammation of the synovial membrane or bones of the wrist. The swelling in the syphilitic form, therefore, is limited to the back of the wrist, whilst in tuberculous inflammation there is a swelling on both the dorsal and palmar surfaces of the joint, though that on the dorsal aspect may be the more evident. The tuberculous inflammation, too, is associated with much more wasting of the fingers, and the wrist quickly becomes more useless; the disease progresses in tubercle, whilst in syphilis it remains stationary. Syphilitic teno-synovitis improves rapidly under treatment by mercury, whether applied locally or administered by the mouth, whilst the tuberculous form usually goes from bad to worse.

Gummatous teno-synovitis is of more common occurrence than the secondary form just described, though many of the reported cases should rather be classed as instances of perisynovial inflammation than of true teno-synovitis. The inflammation begins either as a deposit infiltrating the tendon sheath for a considerable distance or as a circumscribed mass, small, single and discrete at first, but later becoming multiple, the separate masses

fusing to form an irregular and lumpy nodule to which the skin presently becomes adherent. The swelling then softens, ulcerates, and discharges, leaving a tertiary syphilitic ulcer with serpiginous edges, which is often so chronic that it lasts for years as in the case represented in Plate XXI.

Gummatous inflammation of the tendon sheaths occurs late in the course of the disease, and often in those whose general health has become greatly enfeebled. The prognosis is good even in an advanced state, for the ulcer heals rapidly under treatment with a lotion containing mercury and the internal administration of potassium iodide, especially if a tonic regimen be adopted at the same time. Occasionally the tendon in the affected sheath may slough as a result of the inflammatory processes, and its use may thus be destroyed.

Tendons

The tendons, being less vascular than their sheaths, are not so liable to undergo inflammatory changes, and only a gummatous inflammation has been described in connexion with them. The largest and strongest tendons are most prone to inflammation, which is either superficial and infiltrating, or deep and circumscribed.

The infiltrating form of gummatous inflammation merely leads to thickening of the tendon and may end in its calcification. It is rarer than the form which occurs in the later stages of acquired syphilis as slowly growing nodules which are painless and do not interfere materially with movement. The nodules disappear readily enough under treatment and rest, but if they are neglected the inflammation tends to involve first the tendon sheath and afterwards the surrounding tissues, until it ends as a gummatous ulcer.

Bursae

The bursae are sometimes enlarged quite early in the course of acquired syphilis, and as a part of the general toxic process which leads to widely spread manifestations of serous inflammation

throughout the body. Prof. Fournier has given the name 'syphilitic pseudo-rheumatism' to this condition, because the patient is generally treated with salicylates as the real cause of the inflammation is overlooked. An examination of the bursae in the neighbourhood of the painful joints will show that in these cases they are swollen and tender, though if they be watched the swelling is found to be very transient. The inflammation often disappears spontaneously, or it yields readily to a course of mercurial treatment.

The bursae are also subject to a gummatous inflammation, which either occurs about the latter half of the second year after infection or as one of the latest manifestations of acquired syphilis in those whose health is completely broken down and who show evidence of severe syphilis in the form of rupia (Plates XXVIII and XXIX), nodes on the skull, or extensive inflammation of the soft palate. The earlier manifestation occurs as a sharply defined tumour which is indolent and painless; in the later forms the swelling is hard, tense, and elastic, attaining to a considerable size. It may remain for a long time in a chronic condition until it softens, ulcerates, and ends in a typical gummatous ulcer as a result of an injury in association with some cause which leads to a lowering of the general health of the patient.

Any bursa may be the seat of gummatous inflammation, but it is commonest in those which are more especially exposed to irritation and injury, and it is often symmetrical. In women it is most frequently seen in the bursa over the patella; in men it is not uncommon in the bursa situated over the tuber ischii, especially in cabmen and car-drivers. It is thus almost a trade disease, for it appears in miners over the olecranon and in carpenters on the radial side of the first phalanx of the right index-finger, where they often have an adventitious bursa. It is sometimes seen as a bunion in the bursa over the metatarso-phalangeal joint of the great toe.

Mr. Jonathan Hutchinson has described a gummatous inflammation of the perisynovial tissues in the epitrochlear hollow at the elbow, which is interesting because it may involve the ulnar nerve, causing a neuritis marked by lancinating pains correspond-

ing with the distribution of the inflamed nerves or with partial anaesthesia of the two inner fingers.

Syphilitic inflammation of the bursae responds readily to treatment in every stage, and even ulcers of long standing heal quickly when iodide of potassium is given and the general health of the patient is improved.

BIBLIOGRAPHY

Ostermayer, Beiträge zur Kenntniss der syphilitischen Muskelentzündung. The Transactions of the Leipzig meeting of the German Dermatological Society. Archiv für Dermatologie und Syphilis, 1892, Ergänzungsheft, p. 13.

D'Arcy Power, The Relationship which exists between Wryneck and Congenital Haematoma of the Sterno-Mastoid Muscle. Medico-Chirurgical Transactions, vol. lxxvi, p. 137.

CHAPTER V

THE TEETH

Every condition which leads to a serious interference with the general health is reflected by the growing layers of the skin and its appendages. It is not unusual for a patient to lose his hair or to show alterations in his nails after an illness. It is not surprising, therefore, that similar changes should take place in the teeth, if the illness should occur at a time when they are still capable of receiving impressions, and as they are more permanent structures than the hair and nails any alteration will persist as long as the teeth themselves. The teeth, therefore, give evidence of interference with their nutrition years after the illness has passed away, and often after all remembrance of it has been forgotten.

Syphilis in its inherited form acts upon the organism of the child during the period of utero-gestation and during the first few months of life. The teeth in process of development at this period are the first permanent molars, which begin to calcify in the sixth month of foetal life ; the permanent incisors in the first month of extra-uterine life, and the canines during the third or fourth month after birth. These teeth are situated deeply in the dental groove, they are very small, and the most complex changes in connexion with their development take place in the enamel organ. The teeth of some persons who have suffered from inherited syphilis show changes in their size and development which are valuable guides in diagnosis, if proper care is taken to avoid mistakes. But it must be clearly recognized that all faulty developments of the teeth are not to be attributed to inherited syphilis, and even in cases of undoubted inheritance it is only a few persons, probably not more than 2 per cent., who show the changes in at all a typical manner.

Here, as in other cases, the stress of syphilis falls upon

different tissues in different individuals. Sometimes the bones are chiefly affected, sometimes the blood-vessels, and sometimes the nervous system. In like manner, a patient may have a perfect set of teeth although he bears marked evidence of inherited syphilis in other parts of his body, and it is thought by some that patients with inherited syphilis who show a special tendency to phagedaenic ulceration rarely show any signs in their teeth. On the other hand, Mr. Jonathan Hutchinson, to whose acumen we owe much of our knowledge on this subject, points out that typical syphilitic teeth are often associated with deafness and interstitial keratitis. Syphilitic changes in the teeth must not, therefore, be expected in every case of inherited syphilis, though they form valuable corroborative evidence; neither must every case of imperfect teeth be considered as syphilitic.

Syphilis does not exercise any very marked effect upon the milk-teeth. The children of syphilitic parents often cut their teeth earlier than healthy children, and it is by no means uncommon to find one or two teeth present at birth, which soon fall out, owing to the want of development of the root and the alveolar process. Peg-shaped, deciduous teeth have occasionally been seen in children who have inherited syphilis, but the stress of the disease falls upon the permanent teeth.

The Incisor Teeth. The changes in the permanent teeth occur in the upper and lower incisors, the first molars, and more rarely the canines. The teeth are altered in size, in shape, and in texture. Mr. Hutchinson, who described them first, says: 'At or after the age of puberty the recognition of the subject of inherited syphilis may sometimes be made with great certainty; at other times it is surrounded with difficulties. Our most valuable aids are the evidence of past disease, more especially of inflammations which may have occurred in infancy. A sunken bridge of the nose caused by long-continued swelling of the mucous membrane when the bones were soft, a skin marked by little pits and linear scars, especially near the angles of the mouth, the relics of an ulcerating eruption and protuberant frontal eminences, consequent upon infantile periostitis, together with a silky softness of the skin and absence of colour, are amongst the points which go to make up

what we recognize as an heredito-syphilitic physiognomy. Added to them we have very valuable aid furnished by the shape of the incisor teeth. In these patients it is very common to find all the incisor teeth dwarfed and malformed. Sometimes also the canines are affected. These teeth are often narrow, rounded, and peg-like (Plate XXII, Fig. 1); their edges are jagged and notched. Owing to their small size the sides of the teeth do not touch, and interspaces are left. It is, however, the upper incisors which are most trustworthy for the purposes of diagnosis. When the other teeth are affected these rarely escape ; very often they are malformed when all the others are of fairly good shape. The characteristic malformation of the upper central incisors consists in a dwarfing of the teeth, which are usually both narrow and short, with atrophy of the middle lobes. This atrophy leaves a single broad notch (vertical) in the edge of the tooth ; and sometimes from this notch a shallow furrow passes upwards on both the anterior and posterior surfaces nearly to the gums. This notching is usually symmetrical. It may vary very much in degree in different cases ; sometimes the teeth diverge, and at others they slant towards each other.'

The evidence afforded by the central incisors of the upper jaw is chiefly to be relied upon, for, if they are dwarfed—that is to say, if they are too short and too narrow—and if they show a single central notch in their free edge, with bevelling of the front of the tooth and rounding of the lateral angles, the diagnosis of inherited syphilis is almost certain. The coexistence of deafness and the signs or history of an attack of interstitial keratitis make it quite sure. The changes in the incisors are symmetrical and are most marked in the teeth of the upper jaw, but the incisors of the lower jaw sometimes show a dwarfed and foliated condition.

The characteristic appearances dwelt upon by Mr. Hutchinson are only seen for a short time. When the tooth is first cut the notch is not so visible as it is after it has been used for some time, because it is at first filled with small projections of dentine, which presently become worn away; the process of attrition continues, and the notch itself eventually disappears, so that about the age of twenty to thirty years all trace of the typical crescent is lost, and the

teeth merely remain shorter and more convergent than they ought to be.

The Molar Teeth. Mr. Henry Moon, of Guy's Hospital, has pointed out that the first permanent molars also exhibit a change of form in the subjects of inherited syphilis. The crown of the molar fails to expand, so that the sides fall together and produce a sort of dome rather than the normal flattened surface. It is, in fact, the counterpart of what happens in the central incisors, where an arrest of the development of the middle denticle leads to a falling together of the sides of the tooth, which becomes narrow where it should expand. These peculiarities in the first molar teeth are far less easy to recognize, and are less definite than the notching and dwarfing of the incisor teeth which have just been described. The permanent central incisors, therefore, must remain ' the test teeth for hereditary syphilis ', but in cases in which from early decay or other causes they cannot be employed, valuable corroborative evidence may be obtained by observing whether or not the patient possesses dome-topped first molars in the permanent dentition.

Minor Changes. Ill-health of the mother during the period of her pregnancy, when the germs of the permanent teeth are beginning to assume a definite form in the foetus, and ill-health of the newly-born child may lead to faulty development, or to molecular absence of some of the tissues of the teeth. These errors usually affect the enamel, but they may extend to the dentine. Syphilis is one of the causes of such ill-health, but many other conditions may produce similar appearances in the teeth, so that minor dental defects must not be placed in the same category for purposes of diagnosis as the changes in the incisors and the molars described by Mr. Hutchinson and Mr. Moon. Chief amongst these minor changes are the erosions and furrows to which the name of hypoplasia or honeycombing has been given by dental surgeons, and the changes in the teeth which are often noticed in those who have suffered from rickets.

Honeycombed or hypoplastic teeth are due to faulty development of the enamel and dentine. The enamel is indented by small pits or grooves, which are usually arranged transversely and in rows, although they are sometimes vertical. The erosions

occupy exactly the same level in each tooth, and the appearances produced are much as if a line had been stretched horizontally across them. The enamel covering the pits and grooves is extremely thin, and in some instances may be entirely absent, although between the rows of erosion the enamel is usually well formed and healthy. The dentine also shows signs of imperfect development by containing a large number of interglobular spaces.

The dental erosion is most frequently seen in the first molars, the incisors, and the canines, which appear rugged, pitted, and dirty-looking (Plate XXII, Fig. 2). The premolars are not affected, because they are new teeth which are not even present in rudiment when the inflammatory conditions leading to hypoplasia attacked the other tooth-germs. Sometimes only the edge of the incisors is affected, and as the central portion of this edge is developed before the sides, it is affected earlier and becomes the sooner worn down by use, so that the teeth show a well-marked notch which must be distinguished from the crescent of syphilis. Hypoplasia affects the milk teeth as well as those of the permanent set, and the dwarfing of the teeth is an important characteristic in distinguishing hypoplasia from syphilis. Hypoplastic or honeycombed teeth are dirty and notched, but they are of normal size, whilst syphilitic teeth are stunted as well as being badly developed in point of size and structure.

Mr. Hutchinson gives me the following note of the patient from whom the drawing represented in Plate XXII, Fig. 2, was taken. The patient, aged 11, was the second of a family of eight, and was brought to the hospital on account of a cataract. None of the other children were known to have suffered from cataract, but a first cousin of the mother had defective sight from early life. 'The patient had lamellar cataracts, which, however, were unusual in presenting the densest part of the opacity in front. The discs were healthy. She regained good sight after needling.' The incisors and first molars are craggy from defective enamel. The patient has a tendency to bronchocele, and she is rather small for her age.

The eldest sister, aged 13, has a large bronchocele, but is well grown, and has perfect teeth. There is no evidence of fits, or of mercury having been administered.

The teeth of rickety children are also often affected by disease, in consequence of malnutrition at the time of dentition. Any of the teeth may give evidence of this rachitic condition. They taper more than well-developed teeth should do, and often show a slight notch in the centre of the cutting surface of the incisors which bears a superficial resemblance to the syphilitic notch, but the teeth themselves are not dwarfed, though they easily decay. The enamel, too, in rickety persons is very smooth, and is often of a bluish translucent appearance.

It is not uncommon to see serrations at the edges of normal incisors. The serrations vary in number and in the degree of their distinctness, but they are not connected either with syphilis or rickets, and the teeth are easily distinguished from the dwarfed and discoloured teeth described above, because they are natural in size, and have a coating of well-formed enamel.

Differential Diagnosis. Mr. Hutchinson gives the following memoranda by which to distinguish developmental errors in the teeth due to inherited syphilis from those due to other inflammatory causes attacking the tooth-germs at an early period, causes which, though they may be syphilitic, are not necessarily or usually due to this disease :—

'No special peculiarities are to be looked for in the milk teeth, because the permanent set alone show any reliable features. It is not in cases in which any conspicuous defects are present that syphilis is most to be suspected. Craggy teeth and many forms of imperfect teeth due to early stomatitis are far more conspicuously deformed than are those of syphilis. There can be no more serious blunder than to imagine that bad teeth in proportion to their badness of form are to be suspected of syphilis.

'The upper central incisors of the permanent dentition are the teeth which should chiefly be looked at, because they are the only ones which afford evidence beyond dispute. The other teeth, and those of the lower set, the lateral incisors, the canines, and the first molars, often afford corroborative testimony, as they are frequently peculiar in form, but they are not to be trusted alone.

'The chief peculiarity is a general dwarfing of the tooth, which is both too short and too narrow. Its sides slant, and it tends therefore to become pointed. The tendency to point is always defeated by the cutting off of the end of the tooth by a line curved upwards so as to produce a single shallow notch. The enamel at the bottom of the notch is defective, and the dentine is exposed,

but there is no irregular pitting as in stomatitis teeth. The malformations in syphilis are usually symmetrical, that is to say, pairs of teeth are affected. The two central incisors resemble each other, and the lateral incisors are also alike. If any defect passes across all the incisors at the same level, and affects them all alike, the cause in all probability is not syphilis.

'In syphilis the lateral incisors show little or no change.

'The occurrence of the peculiarities due to syphilis and of those due to the administration of mercury to young children in the same mouth are exceedingly common.'

It seems probable that Mr. Hutchinson has attributed too much importance to the administration of mercury to children as a cause of dental erosions. Hypoplastic or honeycombed teeth have been seen in cows, dogs, and other animals, and Prof. Fournier draws attention to the fact that they are seen in the children of mothers who have had attacks of acute illness during the later months of pregnancy. They occur much more often in children who have been fed artificially than in those who have been suckled for the full time, yet they are commoner in the children of the lower than in those of the upper classes.

Syphilitic inheritance sometimes shows itself by causing one or more of the teeth to be truly dwarfed without any evidence of disease. Such a condition is known as 'Microdontism', and the affected teeth are smaller than their fellows in every respect, smaller in height, smaller in width, and smaller in thickness. The teeth usually affected by this dwarfing are the upper central incisors, next in frequency the upper lateral incisors, more rarely, the lower central incisors, and in all cases it is the permanent teeth which are affected. The diminution in size varies from a small amount to one which is at once remarked upon by every person who notices the teeth.

BIBLIOGRAPHY

Hutchinson, Mr. Jonathan. Trans. Pathological Society, vol. ix, 1857–8, p. 449; and Illustrations of Clinical Surgery, vol. ii, p. 8. London, 1888.

Moon, Mr. Henry, in Bryant's Practice of Surgery, ed. 4, vol. i, p. 646. London, 1884.

Parrot, Dr. De la Syphilis dentaire chez les enfants. Gazette des Hôpitaux, 1881, vol. liv, pp. 585, 618, 634 and 649.

CHAPTER VI

THE MOUTH AND TONGUE

Leukoplakia

Syphilis exercises a marked but intermittent effect upon the epithelial cells derived from epiblast, chiefly by interfering with their nutrition, owing to the changes produced in the blood-vessels and lymphatics, partly also by the direct action of the toxins upon the cells themselves. The changes are more readily observed in the moist epithelial cells of the mucous membrane than in the thick and horny layers of the skin.

Leukoplakia is the general name given to these inflammatory conditions, owing to the white patches of epithelium which mark the affected epithelial areas. Leukoplakia was synonymous originally with a mucous patch, but it has long since lost this special significance, and a leukoplakic inflammation now denotes a special pathological condition of the mucous membranes which is usually syphilitic in origin, though it is sometimes due to other causes. The condition of leukoplakia is always associated with chronic irritation of the epithelium, and it is therefore seen most commonly in the mouth and upon the tongue, though it also occurs on the mucous membranes covering the larynx, vulva, cervix uteri, prepuce, and anus.

Leukoplakia has received a variety of names at different times, for it is sometimes called ' mucous tubercles ', ' mucous patches,' ' condylomata,' ' rhagades,' ' flat tubercles,' ' moist pustules,' and ' flat pustules '. The older authors called every skin eruption pustular when it occurred in the course of venereal disease, and it is not remarkable, therefore, that the exact description of leukoplakia, or mucous patches, in the early stages of syphilis, does not date back much beyond the time of Ricord (1800–1889), although Nicolas Massa (died 1569) appears to allude to them in

1532, when he says, speaking of the signs of syphilis : ' demonstrativa sunt pustulae cum quadam duritie, aut eminentiâ, et malo calore in capite toto, vel fronte circa originem capillorum, vel in aliis corporis partibus, et maxime in angulis oris, et hoc saepe in infantibus accidit, et in adultis quandoque, quae sint eminentes, humidae' ('The diagnostic signs of syphilis are pustules with some induration or raised feeling and of bad colour situated all over the head or on the forehead near the roots of the hair or in other parts of the body, but chiefly at the corners of the mouth, and this often occurs in babies, sometimes in adults too ; these pustules are raised and moist.')

Pathology. The pathology of leukoplakia has been very carefully studied by many observers, and it has been shown that the changes are due to the increased formation of keratin in the superficial layers of the epithelium, with a general thickening of the mucous membrane until it closely resembles the skin in microscopic appearance. The deeper layers of the true skin are infiltrated with many small round cells.

A microscopical examination of a patch of leukoplakia shows that the cells of the stratum mucosum are swollen and increased in number (see vol. i, Plate XIX). The intercellular substance is oedematous, and the protoplasm of the cells themselves has undergone such micro-chemical changes as to modify the staining reaction to a very considerable extent. The stratum corneum and the stratum granulosum remain unaffected in the earlier stages, but in the later stages the stratum corneum is much thickened and the rete mucosum may contain the 'cell-nests', which are so familiar in squamous epitheliomata, though they are also found in rapidly growing and inflamed squamous epithelium. There is no change at first in the true skin, but after a time the corium is invaded by a small celled growth, which appears to start from the immediate neighbourhood of the lymphatics and smaller arteries.

The result of these histological changes is the formation of bluish-white, pearly-white, or greyish-white patches on the mucous membrane, which looks just as if it had been touched with nitrate of silver (see also vol. i, p. 209). The patches are sometimes thin and level with the surrounding mucous membrane,

at other times they are thickened and raised above it. The leukoplakic patches vary greatly in shape, for they may be rounded, reticular, or stellate; sometimes they form bands, more rarely they occur in thick layers. They undergo various secondary changes, for they may become eroded, the erosion deepening until ulceration takes place. Cicatrization of the small celled infiltration in the deeper layers of the mucous membrane often leads to the formation of fissures and sclerosis, with or without previous erosion and ulceration. There is a remarkable tendency for these diseased mucous membranes to develop epithelioma, and it is probable that if the exact nature of the changes undergone by a leukoplakic patch were known the origin of cancer would be elucidated.

Leukoplakia bears a very intimate relationship to syphilis, and although it is not yet possible to state that every case of leukoplakia is syphilitic, it is remarkable how few other causes of chronic irritation produce this particular change in the mucous membranes. Dr. Milian, in his official report upon leukoplakia made to the International Congress of Medicine held at Lisbon in 1906, arrived at the conclusion that 'idiopathic leukoplakia starts from syphilis'. He supports his conclusion by arguments drawn partly from pathology, partly from clinical experience, and partly from the result of treatment. But there are other factors besides syphilis in the causation of leukoplakia, and foremost amongst these is undoubtedly chronic irritation. Smokers, and those who drink strong alcoholic liquids, suffer so frequently from leukoplakia of the tongue that the condition is often alluded to as 'smoker's tongue'; whilst leukoplakia is very rare in women, partly because they smoke less, partly because they attend more carefully to the cleanliness of their mouth and teeth. But even this is not the whole truth, and there must be some other cause besides the lessened irritation to account for this difference between men and women. Zambaco-Pacha, of Constantinople, states that cigarette smoking is so habitual in the East that women and even girls of ten and eleven years old have become slaves to it. Many women in the upper classes of society smoke as many as sixty cigarettes a day. They suffer from indigestion, their teeth are

blackened, their throats are congested, their fingers and thumbs are stained with nicotine, yet he has never seen any lady with mucous patches in her mouth, though men have them frequently, but not so often as amongst the Western nations. On the other hand, some of the most typically leukoplakic tongues which have come under my observation have occurred in women who have inherited syphilis, and have afterwards died of phthisis.

Treatment. The general treatment of leukoplakia resolves itself into prophylactic, curative, and palliative.

The preventive treatment should be commenced as soon as the patient is known to be suffering from syphilis. It depends for its efficacy on the fact that there is a distinct relationship between chronic irritation and the development of patches of leukoplakia. Smoking, bad teeth, the irritation of food and drink are the usual causes of the inflammation, and the patient should be warned against them. The warning may further be emphasized by pointing out that leukoplakia in its earlier stages is one of the most common means of transmitting syphilis, and that if he gets these patches inside his mouth he must refrain from kissing, and be scrupulously particular in avoiding the introduction into his mouth of anything which may be used afterwards by other persons.

The curative treatment depends upon the cure of syphilis and the relief of the inflammatory processes. The cure of syphilis is effected solely by mercury, and the patient is therefore placed upon a mercurial course as soon as the leukoplakia is discovered if he has not already been submitted to it; and if erosion or ulceration appears, the addition of iodide of potassium will give better results and more quickly than if mercury alone be used.

The inflammation in the earlier stages is best controlled by local applications of a stimulating nature. The patches should be carefully dried with a piece of blotting-paper, and should then be touched with a solution of chromic acid of the strength of ten grains to the ounce; nitrate of silver, thirty grains to an ounce of distilled water; bichromate of potassium, 1·50; or a saturated solution of lactic acid. The application should be made daily, and, if necessary at first, twice a day. The patient should afterwards wash out his mouth with warm water.

The leukoplakia soon disappears, but it reappears as readily if the patient commits any indiscretion which irritates the mucous membrane, and if leukoplakia once becomes chronic it is impossible to cure it, and there is a marked tendency for it to become epitheliomatous in course of time. Palliative treatment can alone be adopted in the later stages of leukoplakia, when the inflammation has lasted for years and the products of irritation in the deeper layers of the affected tissue have become converted into scar tissue. The process of cicatrization interferes with the nourishment of the surface epithelium so that the epithelial layer becomes thinned and unhealthy, whilst the shrinking of the fibrous tissue leads to puckering and scarring of the surrounding tissues. No cure, therefore, can be expected, though the inflammation may be relieved, and the process of cicatrization may be retarded.

The administration of potassium iodide will promote the absorption of the more recently formed inflammatory products, whilst the application of the more powerful caustics at appropriate intervals may relieve the more acute symptoms by temporarily increasing the blood-supply to the surrounding tissues. But, as a general rule, the indications are rather to soothe the chronically inflamed tissues than to irritate them still further. The judicious use of a Paquelin's cautery or the application of acid nitrate of mercury to a tongue which is painful, bleeding, and fissured, as a result of chronic leukoplakia, is sometimes followed by the greatest relief, but, as a general rule, the milder methods detailed at page 111, with the use of a mouth-wash of Vichy water or of a solution of magnesium chlorate of the strength of twenty grains to the ounce is the better practice. It will be found as a matter of experience that magnesium chlorate is less irritating, and consequently gives better results as a mouth-wash than the chlorate of potassium which is generally prescribed.

Mucous Patches

The earliest form of leukoplakia occurs as 'mucous patches' or 'mucous syphilides'. They are amongst the most common signs of syphilis, and they are important not only on account of

their diagnostic value but because they are very infectious, and it is by their means that the disease is often spread. The patient should therefore be told of the risk he runs as a transmitter of syphilis so long as he has mucous patches, and he should also be warned that, although the patches are easily cured, they show a very great tendency to recur.

Symptoms. A mucous patch appears as a small and painless spot, which is usually slightly raised and of a whitish-grey colour. A careful examination shows that the patch is due to thickened epithelium covering the filiform papillae and the interspaces, so as to produce the pearly-white or bluish-grey appearance which is almost characteristic of the condition, for it is hardly ever seen in other forms of chronic irritation of the mucous membranes. An epulis, for instance, is never covered with white patches, nor is it usual to see them in the neighbourhood of a dental ulcer or after an accidental wound of the tongue.

Prof. Fournier, who has studied mucous syphilides with especial care, divides them into the following groups :—

An erosive type, which is at once the simplest and the most common, for it is a mere abrasion of the mucous membrane ; the papulo-erosive type, only differing from the preceding in the fact that it is raised above the surface of the surrounding tissues ; a papulo-hypertrophic type, rarely seen in the mouth ; and a true ulcerating syphilide which is by no means uncommon.

Mucous patches occur at any time within the first two or three years from infection, often coincidently with the earliest eruptions on the skin, sometimes even before the chancre has disappeared, occasionally as late as five or eight years after the patient has contracted syphilis.

Mucous patches occur in the mouth, where the epithelium is liable to irritation. They are seen most frequently near the tonsil or actually upon its surface, along the line where the gum is reflected upon the lips or cheek, opposite any roughened tooth, on the dorsum of the tongue, and in children at the corners of the mouth. They are less often seen on the floor of the mouth and upon the palate.

When the patches are multiple they coalesce either by

spreading from the circumference, or by putting out processes, which join one with another until they may be mistaken for diphtheria. The mistake seems, at first sight, to be impossible, but a mucous patch on the tonsil with an accidental sore throat, or an attack of laryngitis, may simulate diphtheria very closely, especially when it occurs in a young married woman who is ignorant that she has contracted syphilis. It is well, therefore, in such doubtful cases to examine the rest of the body to ascertain whether there are other signs of syphilis, and the presence or absence of a rash may be used as the first guide.

Differential Diagnosis. Accidental injuries to the tongue or lips may produce appearances like mucous syphilides when they are in process of healing, but these points of injury are always surrounded by a zone of inflammation, they are usually single, and they do not occur at the places where mucous patches are most frequently seen.

Aphthous patches may easily be mistaken for a mucous syphilide, but an aphthous patch is yellow and has not the opaque appearance of a mucous patch. It is more circumscribed, more raised above the surface of the epithelium upon which it is growing, and always more painful, for it has an inflammatory zone all round it, at any rate in its earlier stages.

Hydroa of the mucous membrane of the mouth resembles a mucous syphilide very closely. Hydroa stands midway between herpes and pemphigus. It occurs in paroxysmal attacks upon the surface of the skin and mucous membranes. The diagnosis from syphilis is made by finding an eruption on the skin which has many of the characteristics of that in the mouth. The spots begin as papules, which show a distinct tendency to form vesicles, and there is often a definite collar of inflammatory induration round each spot. The rash on the skin is to be looked for on the back of the hands and wrists, and on the knees, whilst in the mouth it occurs on the mucous membrane inside the lips, and upon the back of the tongue.

Herpes. Many syphilitic patients whose general health has become reduced suffer from herpetic eruptions which may attack the mucous membrane of the mouth, and more especially the sides

and back of the tongue. These eruptions are very chronic and rebellious to all treatment, and they are sometimes mistaken for mucous patches when they have lasted for a considerable time. They may, however, be distinguished by their painful nature. A careful examination of the inflamed outline will show that the edges are irregular owing to the fusion of a large number of small round vesicles, whilst the mucous syphilide has been produced by circumferential enlargement. Local treatment by cauterization makes the eruption of herpes worse, but it improves a mucous patch, and doses of mercury which should cure the syphilide have no effect upon herpes. Herpes, too, occurs much later in syphilis than the ordinary mucous patch.

The slighter forms of mucous syphilide often pass unnoticed by the patient owing to the fact that they are painless and produce very little discomfort. A patient should therefore be warned, as has been said already, of the necessity of observing their occurrence, for these mucous patches form the most important source of infection when syphilis is not transmitted as a venereal disease. He should be told that kissing, and the use of spoons and drinking vessels in common, may readily transmit the disease, so long as he has any signs of it in his mouth.

Treatment. As mucous syphilides depend to a large extent upon local irritation much can be done to prevent their occurrence. The teeth must be carefully attended to by a competent dentist, who should remove all irregularities and every trace of tartar. The mucous membrane of the mouth must be kept in the healthiest condition. Smoking must be discontinued ; alcohol in all forms should be abandoned, and spices or condiments which burn the tongue must be given up. The teeth should be brushed after each meal with a solution of boric acid (ten grains to the ounce), and frequent use should be made of a mouth-wash of the decoction of althaea (marsh-mallow) evaporated to the consistence of honey (see also page 112), or of chlorate of magnesium of the strength of twenty grains to the ounce.

Local treatment consists in pencilling the patches with a stick of nitrate of silver once or twice a week. This application is usually sufficient, but if the patches ulcerate and tend to spread it may

be necessary to paint them with a solution of chromic acid, ten grains to the ounce, or of a saturated solution of lactic acid.

The patient must always be placed upon a mercurial course, but it is of no advantage to give potassium iodide unless ulceration occurs; the mercury must be continued long after the mucous patches have disappeared, or else they will certainly return, and the treatment will have to be recommenced both locally and generally.

Syphilitic Inflammation of the Lips

The lips, like the tongue, are liable to become inflamed, ulcerated, and thickened during the later stages of syphilis. Such an affection is detailed in the following case, for the notes of which I am indebted to Dr. S. Hartill, the dresser in charge of the case :—

A. S., married, aged 37, the mother of seven children, first attended St. Bartholomew's Hospital as an out-patient under my care in 1903, complaining of a sore throat and a rash. She was treated with mercury, and as the sore throat soon improved she did not come again until May, 1907, though she had a lump on her forehead which broke in 1905, and a swelling on her head in February, 1907. She said that her husband was alive and well except that he had ' boils ' on his left arm and shoulder like the ulcerated gummatous patch on her forehead.

An examination of the patient showed that she had a soft node on her scalp, and an ulcerated syphilide on the forehead. Both lips were greatly thickened, especially the upper lip, which was the first to be affected. The upper lip was purplish-red in colour, the overlying skin was cracked, and a brown crust of epithelium covered the red margin. There were five raised brown patches between the nose and the edge of the lip which had begun as vesicles. A large inflamed mass covered by a scab occupied the right corner of the mouth, whilst the inner side of the lip was irregular, and in parts ulcerated.

The lower lip was everted, and presented the same general appearances as the upper lip. A large ulcer had formed on the left side of the lip about a quarter of an inch from the angle of

the mouth. The edges of the ulcer were irregular and clean cut, but not undermined; the base was uneven, but fairly clean. A brown crust of epithelium covered the whole of the red edge of the lip.

The tongue presented a deep longitudinal fissure running down the middle, and from it two or three furrows branched out on either side. Whitish patches of heaped-up epithelium lay alongside the longitudinal furrow, and there were numerous small red areas round the edge of the tongue; the areas were especially numerous at the sides of the tongue, and they were clearly devoid of epithelium.

The patient was ordered to take an ounce of the following mixture three times a day, viz. solution of perchloride of mercury ℥j, iodide of potassium grs. v, caramel a sufficiency, chloroform water to ℥j, and to wash her mouth out frequently with a decoction of althaea. Within three weeks she was reported to me as cured of her symptoms.

If the ulceration of the lips is allowed to continue without treatment, it passes on into a condition of diffuse and chronic inflammation leading to so much thickening of the lip that a condition of macrocheilia is produced. The thickening is in the highest degree unsightly, for the lips are everted, and the lower lip presents a median fissure which is constantly becoming cracked and painful. It is desirable therefore to treat syphilitic inflammation of the lips as early as possible by the administration of mercury and potassium iodide internally, and by the local use of the decoction of althaea (page 112).

Sloughing phagedaena of the lips still occurs from time to time, and forms one of the most ghastly and disfiguring results of late syphilis. I have had a case within the last three years under my care in the person of an engine-driver, aged 57, who had suffered from syphilis when he was a young man. The ulceration began at the right-hand corner of the mouth as a chronic inflammation which suddenly began to spread with amazing rapidity. The patient was extremely ill, and I found it necessary to scrape away the inflamed tissue under an anaesthetic and thoroughly cauterize the whole of the inflamed surface with

acid nitrate of mercury. The application was repeated more than once. I ordered him five-grain doses of quinine every four hours, intramuscular injections of half a grain of calomel twice a week, and six ounces of brandy every twenty-four hours. The spread of the inflammation was stopped, and in due course cicatrization took place and left the patient with a condition similar to that seen in Plate XXX. The patient was sent home with instructions to have an injection of mercury once a week, and six months later he returned to the hospital and I performed a plastic operation on his lip with a considerable measure of success.

Plate XXXI is a colour photograph from the wax model of a case of sloughing phagedaena which is preserved in the Pathological Museum at Guy's Hospital. It represents the face of a woman with a spreading ulceration of the lips and nose. The angles of the mouth are so completely destroyed that they form two wide ulcerating cavities with red, everted edges, and a floor which is in part yellow, in part covered with black sloughs. The portion of lower lip situated between the ulcers is swollen and everted, but it is not ulcerated. The whole of the upper lip has been destroyed. A sloughing surface extends directly from the gums to the under surface of the nose, the tip of which is flattened, and, having lost its support, has fallen in upon the sloughing mass. The nostrils are completely destroyed, except the anterior edge of the right nostril, the position of which can just be distinguished. The ulceration also extends upwards on each side between the nose and the cheek, forming a deep sloughing cavity on the left side, whilst the diseased surface on the right side is covered with a crust. The nose and the cheeks on the right side are connected together by a little bridge of skin. The margins of the ulcerated surfaces are deeply reddened and swollen, but the skin shows no indication of having been the seat of any new growth such as would have been present in lupus.

The patient from whom this model was taken was admitted into Guy's Hospital in 1830 under the care of Mr. Bransby Cooper (1792–1853). She was about twenty-five years old, and 'she denied all knowledge of syphilis or mercury'. The nature

of the case is very obscure, and is made more so by the absence of a good clinical history of the patient, but there can be little doubt that it was a phagedaenic ulceration associated with syphilis rather than tubercle.

Syphilitic Inflammation of the Palate

Gummatous infiltration of the palate takes place both in acquired and inherited syphilis. It affects the hard and the soft palate, and may assume several well recognized forms. About 75 per cent. of the cases in which the palate is involved occur within the first ten years of infection, and the remaining 25 at a later time.

Pathology. The inflammation begins either as a local gummatous mass, or as a diffuse inflammation of the deeper submucous layers of the palate, more rarely as an osteomyelitis of the bone. A localised gumma is rare, but when it is present it projects as a flattened tumour from the soft palate, which is at first firm and elastic, but is afterwards soft and fluctuating owing to the process of caseation which it has undergone. It discharges its contents and leaves a characteristic gummatous ulcer.

Course. A diffuse infiltration of the soft palate is much commoner as a result of gummatous inflammation in the later period of syphilis. The soft palate becomes thickened and congested, ts shape is altered, and the movements are impaired. The inflammation may be limited to a part of the palate, or it may involve the whole arch. Sooner or later the thickened palate softens at some spot, the caseous products escape, and an ulcer is produced, which spreads quickly and destroys the whole of the infiltrated tissue. Sometimes the ulceration is limited to one or other surface of the palate, but more often it extends to the velum palati, the uvula, and the pillars of the fauces or through the entire thickness of the soft palate, so that a perforation is the result. The perforation varies greatly in size from a mere pinpoint to a hole which is nearly as large as the soft palate.

The ulceration ends spontaneously when all the products of

syphilitic inflammation have been discharged, or it may be shortened by appropriate treatment. When the perforation is small, it may close by a process of granulation in the same manner as a cleft palate; when it cicatrizes, the palate is left scarred and deformed, but the ulcerated tissues which hung loosely during the period of active inflammation unite again, and the palate resumes its arched shape, whilst the edges of the ulcer contract adhesions to the walls of the pharynx. The communication between the mouth and the nasopharynx may thus be shut off altogether or may be very greatly narrowed. The perforation may continue unaltered in shape and in size, its edges becoming a little more rounded and indurated with the lapse of years.

Symptoms. Diffuse syphilitic inflammation of the palate occurs as often in women as in men, and the early symptoms are so slight that a patient rarely applies for advice until the ulceration is well advanced, or until the perforation is complete. He will then say that he has had no symptoms of sufficient importance to make him feel anxious about his mouth. He may have had a slight sore throat, his voice has been rather thick, and his hearing has been a little impaired. For a day or two there has been a tickling in his throat, and he may perhaps have noticed that it was not quite easy to swallow liquids, as they have regurgitated through his nose, but the entire absence of pain has made him quite unsuspicious of any serious change in the palate. Suddenly, without warning, and from no assignable cause, he wakes up one morning and finds that his voice is reduced to a whisper, or that it is so nasal as to make his speech unintelligible, whilst solids as well as fluids are returned through the nose instead of being swallowed. He is thus debarred from society and has to cancel all his engagements. Nor is the patient altogether to be blamed for his seeming carelessness, for if he had examined his palate before the onset of the ulceration he would only have seen that it was rather more red than usual, and if he had felt the roof of his mouth with his fingers it would merely have seemed to be irregularly thickened.

Should the patient come early his anxiety can be relieved, for he may be told that the inflammation yields readily to local and

general treatment. If he delays, the ravages of disease can only be partially effaced by time, though art may restore his speech and deglutition by the use of skilfully contrived obturators. As the inflammation subsides, the deafness is cured, for it was caused by the oedema of the tissues composing the walls of the pharynx and surrounding the orifices of the Eustachian tubes.

Treatment. The treatment consists in arresting the ulceration by the administration of potassium iodide, whilst the ulcerated surfaces are kept as clean as possible and free from the products of septic inflammation. Iodides must be given at once in full doses of fifteen to thirty grains three times a day. The palate should be sprayed frequently with very dilute solutions of iodine (a teaspoonful of tinct. iodi in a pint of water), and gargles of iodine and potassium iodide may be ordered, according to the following formula :— iodine grs. vi, pot. iod. grs. xx, tinct. opii m. ij, glycerini ℥ j—the gargle to be diluted with water, used frequently, and not to be swallowed. The amount of potassium iodide must be increased rapidly if the ulceration continues, and the edges of the ulcerated surface may be painted with chromic acid of the strength of ten grains to the ounce, or they may be lightly touched with a stick of nitrate of silver. But, as a rule, it is best to avoid local irritants so long as the inflammation is acute. It is of course a cardinal rule not to attempt any surgical procedure until the ulceration has ceased completely, partly because nature carries out her own processes in a most satisfactory manner, and partly because any cutting operation may easily start a fresh inflammation followed by renewed ulceration.

Differential Diagnosis. The diagnosis is usually easy, but the palate is also ulcerated as a result of lupus, tubercle, and cancer.

Lupus. Ulceration of the palate due to lupus runs a much slower course than that caused by syphilis, and the ulceration creeps over the surface of the mucous membrane, whilst in syphilis it starts in the deeper tissues of the palate. Lupus, therefore, does not affect the bone, whilst in syphilis there is often a rarefying osteitis. Lupus affects the gums and the mucous membrane covering the hard palate and is rare ; syphilis causes ulceration of the soft palate and is of frequent occurrence. When the

ulceration is phagedaenic in character it is always syphilitic. Neither in lupus nor in syphilis are the neighbouring lymphatic glands necessarily affected.

Tubercle. In tuberculous ulceration the area of inflammation is shallower than in syphilis, it is more limited in extent, and it is more ragged, with less sharply-cut edges, whilst the base is redder and more granular. The lymphatic glands beneath the chin and the anterior cervical glands are often affected in tubercle. Tubercle, too, causes more pain and functional disturbance than syphilis. It rarely leads to perforation. Tuberculous ulceration of the palate is generally associated with pulmonary and laryngeal tuberculosis. It is not difficult to demonstrate the presence of tubercle bacilli in this form of ulceration, and inoculation of a fragment of the diseased tissue into a guinea-pig often gives positive evidence of the tuberculous nature of the disease.

The administration of potassium iodide has no curative effect in cases of lupoid and tuberculous inflammation, whilst in syphilis there is a permanent improvement. In cancer the ulceration is relieved for a few days by a diminution in the number of inflammatory cells associated with the cancerous process when iodide of potassium is given, but the cancerous process continues with unabated malignancy.

Syphilitic ulceration of the palate is of common occurrence as a result of inherited syphilis, for Prof. Fournier observed it in thirty cases out of 212 patients. It is most usually seen between the ages of ten and seventeen, though it may occur at any time between five and twenty-five years old. Syphilitic ulceration of the palate is often overlooked in cases of inherited syphilis, or it is attributed to other causes than the true one, because the patient is free from other signs of syphilis. The teeth in such patients may be excellent, and the facial appearance good, yet the palate may present all the signs of syphilitic inflammation, and may become perforated. The error in diagnosis is the more important because it prevents the administration of potassium iodide, the only drug which is of use to prevent the ulceration spreading. So far as I have seen this manifestation of hereditary syphilis, it has begun more often as a rarefying osteitis of the hard palate, but in reality

it involves the soft palate more frequently, and runs the same course as the inflammation produced by the acquired disease.

The palate is sometimes affected by syphilitic inflammation which shows no tendency to ulcerate. The whole palate or limited parts of it may be covered with numerous warty granulations, which, by their fusion, give it the appearance of being covered with a reddish-brown layer raised above the level of the healthy mucous membrane. This condition—known as a dry tubercular syphilide—resembles very closely lupus of the palate. The diagnosis between the two conditions is made partly by finding traces of lupus or syphilis in other parts of the body, and partly by the curative effects of potassium iodide upon the syphilitic form. The dry tubercular syphilide of the palate runs its course without producing pain or constitutional disturbance of any kind, so that the patient may remain in ignorance of the condition of the roof of his mouth.

Prof. Fournier describes a syphilitic hypertrophy of the palate, which shows no tendency to ulcerate. The condition is chronic, and the thickening produces well-marked deformity of the palate, the tissues feeling harder than usual. The mucous membrane remains smooth, and shows no signs of ulceration. The increased thickness of the soft palate leads to a little difficulty in speaking and swallowing, but there are no other symptoms. The administration of potassium iodide reduces the hypertrophy, but the cases are so rare that the complete course of the disease is unknown.

Syphilitic Disease of the Tongue

Chancre. Syphilis is readily spread during the earlier stages by contamination from mucous patches in the mouth and on the lips. Primary sores occur, therefore, on the tongue both in men and in women, but rather more often in men, because the disease is transmitted by means of pipes, spoons, and drinking vessels, and sometimes as a trade disease in connexion with glass-blowing. Young women may inoculate themselves by kissing babies with sore mouths who have inherited syphilis.

A chancre of the tongue is situated on the back or near the

tip, less commonly on the sides or under surface. It appears as a slight erosion, circular or oval in outline, the base smooth, regular, and covered with a greyish muco-pus. There is also an ulcerating form which involves the tissues more deeply than the erosion. The chancre is sometimes fissured, and its full extent cannot be seen until the sides of the fissure are separated; lastly, the primary sore may show itself as a widely-spread induration of the tissues of the tongue, which makes it difficult to distinguish from malignant disease. The deep lymphatic glands beneath the chin and the deep cervical glands opposite the thyroid cartilage are always enlarged at an early period, and usually only on one side of the neck. The glands on both sides of the neck occasionally become involved, even when the sore is not situated near the middle line of the tongue.

Differential Diagnosis. The primary syphilide of the tongue has to be distinguished from an ulceration due to injury, tubercle, and malignant disease. The age of the patient, the rapid appearance and extension of the ulceration, the induration, and the early enlargement of the glands, as well as the subsequent appearance of a rash and of mucous patches, are sufficient to identify syphilitic ulceration.

Tuberculous ulceration of the tongue is more extensive than primary syphilitic erosion, and is usually situated far back on the dorsum. It is associated with other tuberculous lesions, and the inflammation may spread upwards from the larynx. Scrapings from the ulcerated surface should be stained for tubercle bacilli, and a guinea-pig should be inoculated in every doubtful case.

Treatment. The treatment of a primary syphilitic sore on the tongue does not differ essentially from the treatment of a chancre elsewhere. The inflamed surface must be kept clean and as free as possible from irritation, and the patient should be placed at once upon a mercurial course.

Early Leukoplakia or Mucous Patches. The tongue is subject to at least two forms of inflammation during the period of secondary syphilis, mucous patches and a condition which is analogous to syphilitic warts.

The mucous patches do not differ in their appearance, course,

and treatment from the other syphilides of the mouth which have been already described (pp. 89–93). They occur on any part of the tongue, but are more common on the dorsum and sides than on the under surface. They are usually associated with other signs of syphilitic inflammation inside the mouth, and they sometimes occur as some of the earliest indications of constitutional syphilis, though they are most often seen during the middle and later periods of secondary syphilis.

Differential Diagnosis. Mucous patches on the tongue may be mistaken for the *leukomata* or persistent smooth and white patches so often seen on the tongues of inveterate smokers. But, as has already been explained (p. 87), there is considerable doubt whether the leukoplasia of a smoker's tongue will not eventually prove to have a syphilitic element in it, though it may be removed by a generation or two. Assuming, however, for the present, that leukomata are merely the result of the irritation of the tongue caused by hot tobacco smoke, they may be separated from mucous patches by their pearly-white appearance, whilst mucous patches are greyish-white in colour. Mucous patches occur more often on the borders of the tongue, whilst leukomata are usually seen on the dorsum. Mucous patches may be much more deeply ulcerated than leukomata. Leukomata are most likely to be mistaken for mucous patches, which are thicker, whiter, and more raised than usual, but they are usually too hard and too dry for the mucous patches of secondary syphilis. A smoker's tongue is much more chronic than the inflammation of secondary syphilis, and the patches spread much more slowly than true mucous patches. There are other signs of syphilis when the tongue is affected with mucous patches, but when it is leukomatous there is not necessarily any evidence of active syphilis, and it may be extremely difficult or even impossible to obtain any history of the disease.

Patches on the tongue and cheeks are sometimes seen in patients who are suffering from *psoriasis*, and from *lichen planus*, though the coexistence of these affections on the skin should enable a correct diagnosis to be made in most cases. The spots sometimes appear in the mouth before they are seen on the skin, and the danger of mistaking them for mucous syphilides is then considerable.

The two conditions may be the more easily distinguished if it be borne in mind that in *lichen* the patches occur on the inner side of the cheeks and on the back of the tongue as well as upon the soft palate and the pillars of the fauces, whilst mucous patches are more common on the front part of the tongue, and are very rarely seen upon the soft palate and pillars of the fauces. Mucous patches, too, are much more opalescent in appearance, whilst the lichen spots are of a more dead white without any glistening look. In lichen the surface of the patches is roughened like shagreen ; the mucous syphilides have a smooth surface. Lichen improves when arsenic is given, mucous patches show no such improvement.

Warts of the Tongue. Mucous warts occur in the middle of the back of the tongue with considerable frequency during the earlier stages of syphilis. They are analogous to the condylomata seen in other parts of the body, and are interesting in the history of the disease because it is usual for syphilis to produce an inflammatory effusion at this period, whereas these outgrowths are instances of an overgrowth of the tissue. The mucous warts of the tongue are usually associated with a skin eruption, and they can be cured by the administration of mercury internally, and by painting them with a solution of chromic acid of the strength of ten grains to the ounce.

Baldness of the Tongue. Syphilitic inflammation of the tongue during the earlier stages of the disease sometimes shows itself by the complete removal of the filiform papillae over the anterior part of the dorsum. The margin of the bald patch is sometimes as abruptly defined as if there had been ulceration. The fungiform papillae remain on the affected area, but they are atrophied. The condition is unattended by any soreness of the tongue, and disappears when mercury is given, for the filiform papillae grow again. In other cases the filiform papillae become hypertrophied instead of withering.[1]

[1] See Mr. Jonathan Hutchinson's 'Smaller Atlas', Plate 105; 'Illustrations of Clinical Surgery,' vol. ii, Plate 55, Glossitis and Hypertrophy.

Late Gummatous Inflammation

Gummatous inflammation attacks the tongue with great frequency, in a variety of forms and at any time during the later periods of syphilis, whether it be acquired or inherited. Professor Fournier states that 71 per cent. of the cases occur during the first ten years and 22 per cent. during the second decade, whilst every-day experience shows that the later syphilitic manifestations are very much commoner in men than in women, because many more men than women smoke until the tongue is irritated. But the numerical disproportion fails in syphilitic inflammation of the tongue due to inherited syphilis, for I have seen as many young women as men affected with this form of disease.

The tongue is the seat of an inflammatory process which corresponds with syphilitic inflammation in other parts of the body. It is either diffuse and infiltrating or localised. The usual changes take place after a time either in the direction of cicatrization owing to the shrinking of the newly formed and widely distributed connective tissue or to the softening and discharge of the gummatous products. The two conditions usually exist together, but for the sake of convenience and description it is better to describe them under the separate headings of sclerosing leukoplakia, or glossitis, and gummatous inflammation of the tongue, according to the predominance of the one or the other characteristic.

Sclerosing Leukoplakia, or Glossitis

Sclerosing inflammation is the commonest form in which tertiary syphilis attacks the tongue, and it occurs as a superficial inflammation not extending deeper than the mucous membrane, or as a parenchymatous inflammation of the connective tissue throughout the substance of the tongue.

Superficial Glossitis of Late Syphilis

The superficial glossitis sometimes begins acutely in a man who has smoked a great deal and confesses that many years ago

he had an attack of syphilis, for which he was treated and of which he was apparently cured, for he has long been married, and has had a healthy family. Such a man comes complaining that his whole tongue is inflamed, and is so painful that he eats with difficulty and can hardly speak. He attributes the inflammation to some trivial cause which would be wholly insufficient to produce the result in a healthy person, and as he speaks his lips are seen to be covered with a bluish-white pellicle in place of healthy mucous membrane. Examination of the tongue shows it to be freely movable, and it can be protruded to a normal extent. The tongue is swollen, is bright red in colour, and is often indented at the edges where it has rested against the teeth. The dorsal surface is devoid of fur, and the papillae have disappeared over large surfaces, so that it looks raw and intensely inflamed. The irritation leads to an increased flow of saliva from all the buccal glands. The surface of the tongue, therefore, is unduly moist, and there is some salivation. The patient flinches when the tongue is touched, and gentle pressure shows that it is flabby and feels uniformly thickened without any localised induration. The lymphatic glands are not enlarged. The diagnosis in these cases depends almost entirely upon the appearances and the results of treatment, for it is often inadvisable to inquire too closely into long bygone illnesses about which it is probable that the patient will not be quite candid.

The treatment consists in the local applications of mild caustics applied in the manner described on page 112; of a course of potassium iodide and mercury for a week in full doses; and of the subsequent administration of grey powder without the iodides. If the condition is allowed to continue it ends in true sclerosing glossitis, to be described subsequently.

The superficial inflammation is more chronic in other cases, and occurs as isolated patches on the surface of the tongue, which are often multiple and separated from each other at first, though they afterwards fuse to form indurated masses of considerable size. The masses on their first appearance are round or oval, of a deeper cherry red than the natural surface of the tongue. They are uniform in outline, devoid of papillae, and are frequently level

with the rest of the mucous membrane. They feel like rounded or oval discs of parchment, run a very chronic course, and leave milk-white patches if they heal without ulceration. They are painless throughout their course. More usually the inflammatory products which give rise to these appearances soften and disintegrate. The patches are then converted into fissures, erosions, and ulcers which become irritated and painful.

Treatment. The treatment should be adopted as soon as possible, for a syphilitic tongue can be cured in the earlier stages, but is most rebellious to treatment when ulceration has commenced. Each patch should be painted separately with chromic acid of the strength of ten grains to the ounce twice a week, and the patient should be placed upon a short course of potassium iodide in full doses of fifteen to twenty grains three times a day. When the inflamed patches have been cured a prolonged course of mercury should be ordered, with the administration occasionally of potassium iodide, for the glossitis shows a remarkable tendency to recur unless an attempt be made to cure the syphilis which produces it.

Sclerosing Glossitis of Late Syphilis

Deep or parenchymatous sclerosis is characterized by swelling, which is most marked on the dorsal aspect of the tongue. The central part is often affected, but the borders may be attacked. The mucous membrane covering the affected parts of the tongue is smooth because the papillae have disappeared. It is of a deep red colour owing to congestion, and there is well-marked induration. The newly formed fibrous tissue contracts after a time, until the surface of the tongue is knobbed and lobulated like the liver in a state of cirrhosis. The central longitudinal fissure, which corresponds with the median raphé of the tongue, is nearly always greatly exaggerated. Fissures and ulcers are produced, as in the case of superficial sclerosis, and by the same process. In some cases the tongue becomes hard and swollen, giving rise to a form of syphilitic macroglossia, in other cases the process ends in atrophy of the organ.

Course. The course of the disease is very chronic, and the lymphatic glands do not become enlarged unless ulceration occurs.

Gummatous Glossitis

Gummata occur either superficially or deep in the substance of the tongue, usually about four or five years after infection, and more often in men than in women.

The superficial gummata are situated on the dorsum of the tongue near the tip or borders. They are small and numerous, projecting into the mucous and submucous tissue, where they may be felt as hard bodies not always well defined, and often so continuous with the tissues of the tongue that they cannot be moved separately. The mucous membrane covering them is unaltered at first, but it becomes smoother and redder than natural, and after a few weeks or months the nodules soften and ulcers are produced. Deep or parenchymatous gummata occur at any age, for they are sometimes seen in children, but they are most common in middle-aged men. They vary greatly in size, and although they are small individually they often fuse to form large masses. They may lie at any depth in the tongue, and it often happens that deeply-placed gummata can be felt more easily than they can be seen as rounded or oval bodies with rather ill-defined outlines. They form painless, indolent swellings, with unaltered mucous membrane covering them, and they are not usually tender. Sooner or later gummata ulcerate, and in doing so they enlarge, approach the surface, and soften until they give the sense of fluctuation. The mucous membrane becomes smoother and redder and eventually gives way (Plate XXIV). The lymphatics and ranine veins may be so compressed that the tongue becomes swollen, and a condition of macroglossia is produced.

Symptoms. The symptoms are of the slightest until ulceration occurs. The patient only complains that his tongue is swollen, and that his speech and swallowing are a little awkward.

Differential Diagnosis. It is important to arrive at a correct diagnosis, as a gumma of the tongue may be mistaken for fatty or fibrous tumours, or for an early stage of cancer, and gummata

of the tongue are curable without operation. Mr. Butlin gives the following excellent summary of the distinguishing features : ' The innocent tumours are very often polypoid ; gummata are never so. Innocent tumours are almost always clearly defined, elastic, separate from the natural structures of the tongue ; gummata are usually less sharply defined, are indolent and inelastic, and are not separate from the surrounding tissues. Innocent tumours are more often single, gummata more often multiple. Innocent tumours are sometimes lobulated ; gummata are never lobulated, although a false aspect of lobulation may be given to a gumma by the close proximity of two or more of them.

' A cancerous lump may be distinguished from an unbroken gumma by the fact that the cancerous lump is almost invariably single, the gumma more often multiple. The cancer very often forms opposite, and as a result of the irritation of, a carious tooth ; the gumma has no connexion with bad teeth. The cancer more often occurs at the borders of the tongue ; the gumma as often affects the middle parts. The cancer usually is a disease of persons more than forty years of age ; the gumma is frequently observed in persons between twenty-five and thirty-five years old. In all doubtful cases the presence of other signs of syphilis, past or present, must be carefully sought, and the history of syphilis inquired for.' The tongue is freely movable when it is affected with gummatous inflammation, whilst a cancerous ulcer is usually associated with impaired mobility.

It is advisable, too, to submit a portion of the edge of the swelling to microscopic examination, and this can be done readily by removing the piece under local anaesthesia. It should be remembered that a piece of reasonable size must be removed, because many mistakes have been made by only cutting a small piece from the edge. When the ulcer is really cancerous, such a small piece may only show the small-celled infiltration which precedes the cancerous growth, and as this infiltration also occurs in syphilis, no conclusion can be arrived at, whereas, if a fair sample of the ulcer be obtained, the epithelial downgrowth will be easily recognized in a case of cancer of the tongue.

A gumma may also be mistaken for a chronic abscess of the

tongue, but an abscess is better defined than a gumma, and has a more distinctly rounded shape.

A foreign body may also be mistaken for a gumma if it has been driven into the substance of the tongue and has been forgotten. I have more than once seen pieces of pipe-stem thus lodged, and only discovered by accident when an incision was made into the swelling. The history of an accident, and the long continuance of the tumour unaltered, may give a clue to the diagnosis if a doubt enters the mind of the surgeon. But as there is no perceptible scar in the tongue, and the patients are careless or stupid, the history is generally inaccurate or is not volunteered.

Fissures and Ulcers of the Tongue

Fissures and ulcers of the tongue occur both in the secondary and in the later stages of syphilis, as a result of the irritation and infection of patches of leukoplakia. During the earlier stages of the disease the fissures are nearly always situated upon the borders of the tongue, whilst those formed during the later periods occur as often on the dorsum as elsewhere. In the earlier stages a mucous patch is developed. It ulcerates owing to the pressure exercised by the teeth, and the ulcer which is at first linear and shallow gradually deepens until it becomes a foul-smelling sore with an unhealthy base. In other cases the ulceration occurs spontaneously without the formation of any mucous patch, and it seems to be caused by the teeth rubbing against the mucous membrane of the tongue, which is chronically inflamed. These secondary fissures and ulcers are generally associated with sores at the corners of the mouth. They do not look inflamed, but they are generally very sensitive, and give rise to much irritation owing to the constant movements of the tongue. When they heal, smooth, shining marks are left in the tongue of a leaden hue and slightly depressed. These scars follow the line of the furrows and fissures, so that the margins of the tongue remain permanently roughened, puckered, and changed in colour (Plate XXIII) to tell their own tale to those who afterwards look for evidence of past syphilis. Although the scars are usually depressed, it happens

sometimes that they are raised as milk-white lines and patches, but whether they are raised or depressed they often form the starting-point of fresh sores and ulcers at a later period of the disease.

Tertiary syphilitic ulceration of the tongue is caused either by the softening of gummata, or by further degenerative changes in patches of leukoplakic inflammation. When the gummata are deeply placed a small hole first appears, and this quickly enlarges by the melting away of the infiltrated tissues immediately surrounding it. A cavity is thus formed with sharply-cut ragged borders, which are often slightly undermined (Plate XXIV). The base may be ragged and covered with a wash-leather-like slough. The surrounding tissue remains for a long time thickened and indurated. The shape of the ulcer varies, for it may be angular, the two sides being so approximated as to form a mere cleft which is often long and sinuous. Its extent and character are only apparent when the edges of the fissure are separated. The sloughy and ragged appearance of the ulcer when it is newly formed gives place after a time to a smooth surface covered with some small granulations.

Such ulcers may heal spontaneously, more often they remain indefinitely, becoming inflamed from time to time, and then relapsing into indolence, occasionally they become phagedaenic and destroy a considerable part of the tongue.

Symptoms. The symptoms attending the early condition of sclerosing glossitis associated with the formation of fissures and ulcers are singularly slight. The patient complains very little of his tongue, and he therefore neglects to seek advice. He may have some thickness in speaking, and his tongue feels more tender than usual, but his attention is not specially drawn to it until a crack or an erosion begins to give pain. The pain at first is of no great severity, and it is troublesome rather on account of its persistence than of its sharpness. But presently it becomes more acute, and is made worse by talking and eating. The salivary glands share in the irritation, and the patient is further troubled by a constant salivation. The ulcerated surfaces begin to bleed a little, and small abscesses form at different parts of the tongue. Only too frequently the edges of one of the fissures or ulcers become

indurated and everted, and a microscopical section shows that it is a squamous-celled epithelioma.

Prognosis. The prognosis in the early stages of sclerosing and gummatous inflammation of the tongue is satisfactory because there is a marked diminution of the swelling and inflammation under a course of mercury and iodide. In the later stages, when the tongue has undergone much cicatrization, very little good can be expected from treatment, though the condition of the patient can be greatly improved.

Treatment of Syphilitic Inflammation of the Tongue

The fact that chronic inflammation of the tongue occurs much more often in men than in women, and in smokers more commonly than in those who do not smoke, points out that local irritation of the mucous membrane is an important cause of the inflammation. The patient should be forbidden therefore to smoke or to chew tobacco. He should carefully avoid spirits, and the use of all food and condiments which make his tongue tingle, and for this reason extremely hot and extremely cold substances are alike injurious. A skilled dentist should examine the teeth, which must have all deposits of tartar and all irregularities removed, whilst any roughness on artificial plates must be remedied.

The administration of mercury either by injections or by the mouth is of the utmost importance in the cure of the inflammation of the tongue during the earlier stages of syphilis. Greater advantage will be obtained in the later stages by the use of potassium iodide in doses of twenty or thirty grains three times a day. The local application of a lotion of chromic acid of the strength of ten grains to the ounce is useful in the treatment of the mucous patches, but its action should be watched carefully, and it should be discontinued in favour of less irritating applications if pain or increased salivation show that it is too stimulating.

When the tongue is fissured and ulcerated much relief will be obtained by a thorough and deliberate treatment of the inflamed patches. The patient should be seated in a good light opposite

the doctor. He should protrude his tongue as far as possible, and it should be carefully cleansed by a stream of warm Condy's fluid (a drachm to a pint). The lotion is allowed to trickle over the tongue from a small wash-bottle, the margins of each fissure being separated by means of a probe. The whole tongue is then dried, even to the very bottom of the fissures, by light applications of absorbent cotton-wool. The more inflamed parts are then painted with the following modification of Mandl's paint applied to the fissures and ulcers by means of a fragment of wool wrapped round a fine probe.

R

Iodi	grs. vj = grm. 0·41
Potass. iodidi. . .	grs. xx = grm. 1·37
Tinct. opii . . .	m. v = grm. 0·31
Ol. menth. pip. . .	m. v = grm. 0·31
Glycerini	ad ℥j = c.c. 30

Solve et Misce.

If this application and that of chromic acid be found to be too irritating, a solution of nitrate of silver may be employed, beginning with a strength of a quarter of a grain, and gradually increased at successive sittings to a half and to one grain to the ounce of distilled water.

The local application of bicyanide of mercury, grains xv to an ounce, and the use of gargles of black wash, either pure or diluted with lime-water, may also be recommended. I have lately been using with good results a decoction of marsh-mallow, *Althaea officinalis*, inspissated until it is of the consistency of thick mucilage or treacle. It is soothing, and is therefore a better application in many cases than the stimulating lotions which are usually employed. But care should be taken that it does not undergo an acid fermentation, and this is best prevented by adding half a grain of thymol to each ounce of the decoction. The patient is told to hold a drachm in his mouth for five or six minutes at a time and afterwards to spit it out, the application being repeated as often as is convenient in the course of the day. Lactate of mercury is also said to be serviceable in the treatment of syphilitic glossitis.

It is ordered in the form of tabloids, each containing one twelfth of a grain of the drug. One tabloid is allowed to dissolve in the mouth after each meal, and six tabloids a day may be used. This method of treatment is said to be highly effective, but it has the disadvantage of blackening the tongue.

It is clear from the number of remedies employed that the relief to be obtained in cases of advanced cicatrization of the tongue due to syphilis is only temporary, though there is no doubt that local applications judiciously selected and skilfully applied render the inflamed tongue much less painful and irritable. And although very little is to be expected from the administration of either mercury or potassium iodide, these remedies should be tried, at any rate when the case is seen early, and before the sclerosing changes have advanced to any great extent.

Leukoplakia associated with Inherited Syphilis

The tongues of patients who have inherited syphilis or have acquired the disease at birth or soon afterwards are sometimes affected with leukoplakia, which may easily be mistaken for the more common form which is due to the acquired disease. The inflammation may be either of the sclerosing or of the gummatous type. It occurs so far as I have seen it in young adults—men as often as women—and usually in well developed and attractive people, who show but little indication of the taint which they have inherited. The condition has lasted for long periods of time and it is not amenable to treatment. In two cases which I have seen lately a tuberculous infection was grafted upon the syphilitic inflammation, whilst in another case the patient developed cancer, and a fourth remains in his original condition although he smokes. The following notes of two cases will be sufficient to indicate the main features of a condition to which very little attention has been paid hitherto :—

An unmarried woman, aged 39, was admitted into St. Bartholomew's Hospital under my care on February 16, 1907, suffering from a sore tongue. She said that nine months ago she first noticed a small and hard lump on the left side of her tongue. The swelling was soon surrounded by a number of white spots which

slowly increased in size and discharged thick white matter. An ulcer formed over the sore part of the tongue and shrank until it became a mere crack, which was painful and bled from time to time. She thought that the original swelling might have been caused by bad teeth, and she accordingly had all the teeth removed from the upper and lower jaws on the left side of her mouth. A second nodule formed on the right side of her tongue about a week before she was admitted to the hospital. It ulcerated very quickly and left a soft and rounded nodule from which blood-stained pus could easily be squeezed. The pus was submitted to microscopical examination as well as to bacteriological tests, but no characteristic growth or micro-organism could be detected.

The patient was an anaemic woman with a very scanty growth of hair on her head. She was deaf from a sclerosing catarrh of both tympanic membranes, and she complained of a constant pain shooting from her tongue towards the left ear, which led to continual dribbling of saliva from the mouth.

The patient came fourth in a family of nine. Her brothers and sisters appeared to be healthy, with the exception of one brother who was under treatment for melancholia. The mother had not miscarried, the father was dead of an enlarged prostate complicated with aortic valvular disease, which it is thought might have been syphilitic in origin. The patient herself had always been delicate; she had suffered from some painful affection of her eyes when she was a child, and she became deaf about the time of puberty.

Examination of the patient showed that her tongue was capable of free movement, though she usually kept it as still as possible because talking and eating increased the pain. A fungating ulcer was situated upon the left side of the dorsum, and rather on the under surface. Its margin was indurated, and the surrounding part of the tongue was deprived of papillae and was fissured exactly like a tongue affected with chronic syphilitic glossitis. Pressure upon the left side of the tongue caused pus to exude from a number of small holes, whilst on the right side there was only a single aperture from which pus could be squeezed. There was an enlarged lymphatic gland beneath the chin, and numerous

shotty glands at the back of the neck, but the anterior cervical glands were not increased in size.

I made a diagnosis that the patient was suffering from a chronic inflammation of the tongue, due in all probability to inherited syphilis, though it closely simulated tubercle and cancer. A piece of the edge of the ulcer was removed from the left side of the tongue, and was submitted to the pathological department, a report being received in due course stating that it presented no evidence of malignant disease. The patient did not react to injections of tuberculin, and I therefore ordered her fifteen grains of potassium iodide to be taken three times a day with two grains of grey powder twice a day, her mouth being kept clean by the frequent use of a dilute solution of Condy's fluid. The pain and salivation quickly disappeared under this treatment and the ulcer on the right side of the tongue soon healed. In the course of a month the anterior third of the tongue underwent a process of sclerosis until it was crossed transversely by a deep fissure, which threatened to separate the tip from the middle third throughout its entire thickness.

The patient went home after a prolonged stay in the hospital, and her doctor kindly told me that she died of exhaustion on September 11, 1907. The gland beneath her jaw first softened, and then became ulcerated, whilst the ulcer on the floor of the mouth gradually deepened and extended, in spite of a weekly injection of one grain of mercury given in the form of Lambkin's cream (p. 292).

A somewhat similar case came under my notice in 1902, when an unmarried lady, aged 24, was sent to me on account of a sore tongue from which she had suffered for the preceding five years. Examination of the tongue showed that it was in the ordinary condition of a tongue affected with leukoplakia, the patches being more marked in front than behind. The papillae between the patches were hypertrophied, and the ulceration extended not only to the tip of the tongue but also along its under surface. The fauces were slightly congested, but were not ulcerated. The glands in front of the left sterno-mastoid muscle were enlarged, but those on the right side could not be felt. The glandulae concatenatae on both sides of the neck were numerous and shotty.

The patient was a well nourished and attractive-looking young woman without other evidence of inherited syphilis. She said that her tongue began to get sore and inflamed after an attack of pneumonia. The condition was not materially improved by local applications or by the administration of mercury and potassium iodide, for the puckering and scarring remained until she died of pulmonary phthisis in 1905, eight years after she had first begun to complain of her tongue.

Both these cases seem to be examples of the manner in which inherited syphilis modifies chronic inflammations due to other infective agents. The peculiar characteristics of a leukoplakia would not have been impressed upon the tuberculous inflammation of the tongue from which these patients suffered if they had not inherited syphilis; indeed the tissues might have been sufficiently resistant to withstand the invasion of the tubercle bacillus, for it is by no means usual to find primary tuberculous glossitis unless there is some definite exciting cause, whilst there is plenty of evidence to show that syphilis prepares the tissues for the growth of the tubercle bacillus (see also page 12).

Erythema Migrans

Wandering rash or circinate eruption of the tongue, which is sometimes miscalled ringworm of the tongue, is said to occur more often in children who have inherited syphilis than in those with a family history which is clear of the disease. It is probable, however, that syphilis is only one of several predisposing causes, and that wandering rash may occur in any delicate child. The rash consists of one or several round, raised, and whitish patches, which enlarge peripherally and spread towards the centre and root of the tongue. The patches soon become converted into rings with three zones, an outer ring of yellowish white desquamating epithelium, an intermediate red zone from which the epithelium has separated, and a red glazed centre where the epithelium is being reformed. The essential feature of each patch is an atrophy of the filiform papillae, which leaves the fungiform papillae unduly prominent. Each ring undergoes a constant change of shape and position, for

the margins soon get broken up into curved or wavy raised white lines, which intersect each other to form patterns on the tongue. They are usually symmetrical, and the edge of the ring advances from the side of the tongue towards the middle of the dorsum. Each ring lasts in some part for five or six days, and before it has completely disappeared another develops. The rash is most commonly seen on the tongues of children between two and six years of age, and only exceptionally in adults. Relapses or rather recurrences of the rash are frequent. It gives rise to no constitutional disturbance, and there do not seem to be any subjective symptoms, except a little itching and some dyspepsia. The treatment, therefore, consists in the use of such simple mouth-washes as the glycerine of borax or a solution of chlorate of potash, whilst mercury is given in the form of grey powder, if there is reason to suspect that the child is suffering from inherited syphilis.

BIBLIOGRAPHY

Dr. Milian, La Leucoplasie. Proceedings of the XVth International Congress of Medicine; Lisbon, 1906. Sect. viii, Dermatologie et Syphiligraphie, p. 101.

Zambaco-Pacha. Proceedings of the XIIIth International Congress of Medicine; Paris, 1900. Section de Dermatologie et de Syphiligraphie, p. 491.

Nicholas Massa, De Morbo Gallico Liber, Caput vii.

Gaucher et Émile Sergent, Anatomie Pathologique, nature et traitement de la Leucoplasie Buccale. Archives de Méd. expérimentale et d'Anatomie pathologique. Tome xii, 1900, p. 465.

Colcott Fox, 'On the Circinate eruption of the Tongue called "État Lichénoïde" by Gubler, and "La Syphilis desquamative de la Langue," by Parrot.' The Lancet, 1884, vol. i, p. 842 et auct. ibi citat.

Butlin. Diseases of the Tongue, Lond., 1900.

CHAPTER VII

THE RECTUM

Primary Syphilis

Frequency. The rectum is affected by syphilis in several ways and at all stages of the disease. Chancres occur both at the anus and at some distance up the rectum in men, women, and children. In Paris the latest statistics compiled by Professor Fournier in 1897 shows that in 10,000 cases of chancre fifty-two only occurred at the anus and in the rectum, thirty-seven being in women and fifteen in men. Professor Von Düring of Constantinople states that out of forty-two extragenital chancres occurring in his practice no less than thirty-one were situated near the anus or within the rectum. Twenty-six of the thirty-one patients were children, five were men, and one was a woman. In Austria Professor Neumann found eight chancres of the anus occurring in 282 cases of extra-genital syphilis, and all the patients were women. Professor Tuttle of New York says that only three cases of true chancre of the anus were seen in more than 3,000 patients who presented themselves for treatment of disease of the rectum at the Polyclinic Hospital. Two of the patients were boys and the third was a woman. Women are naturally more liable to primary infection with syphilis in the neighbourhood of the anus, either as a result of discharges from the vagina or from accidental local infection at the time of intercourse.

Symptoms. Primary syphilitic sores are very rare in the rectum itself, although they are not uncommon at the margin and on the mucous membrane of the anus, or they may be situated upon an external pile. They are often associated with soft sores and may then become phagedaenic. The chancre does not differ in appearance or in its course from primary lesions in

other parts of the body (vol. i, pp. 173–273). It soon ulcerates and the inguinal glands on both sides are rapidly and extensively affected; indeed it is this early infection of the glands which helps to distinguish a chancre from a fissure, an inflamed pile, or tuberculous ulceration; the glands being much more extensively involved if the chancre be associated with soft sores than if the infection be purely syphilitic. The symptoms of a simple chancre at or near the anus are not characteristic and do not differ greatly from those caused by an ordinary fissure or an inflamed pile. The patient complains of pain when the bowels are moved, and there may then be a muco-purulent discharge which is sometimes blood-stained, but beyond this the patient is hardly conscious of the lesion.

An examination of the rectum shows the presence of an ulcer at a varying distance from the anus. The ulcer is sometimes situated just inside the bowel or it may be as high as two inches above the anus. The ulcer feels superficial and seems to have a slightly depressed centre with a sharply defined border and an indurated base, the amount of induration being due rather to the attendant inflammation than to the syphilitic nature of the sore. When the sore is near the anus its edges are drawn together by the action of the sphincter, and its full extent is only seen if the sphincter be stretched.

Examination with the speculum shows that the ulcer is well circumscribed and of no great size, for it usually measures less than half an inch across. It is generally rounded or oval in shape, red or dark brown in colour with the surface eroded. The sacral glands may be affected if the chancre has existed for some length of time.

Prognosis. The prognosis is good, for the chancre runs an indolent course towards spontaneous disappearance in about two months, unless it becomes ulcerated, when it is more troublesome and may last for a much longer time. So far as is known a chancre heals and disappears, as it does in other parts of the body, without leaving any worse trouble than a small depressed scar in the rectum. There is no reason to suppose that it causes a stricture of the rectum, for the in-

flammation leading to this condition is much more extensive and occurs at a later period of the disease.

Treatment. The treatment consists in the administration of mercury (p. 186) whilst the rectum is kept as clean and free from discharge as possible. A speculum must always be used, therefore, in the treatment of rectal chancre; the mucous membrane should be thoroughly cleaned at least twice a day. The bowels are opened by means of a large enema of warm olive oil, and the rectum is afterwards washed out with a solution of lysol or sanitas—an ounce to the pint of water at 100° F. The anus is then carefully dried and dusted with a powder consisting of equal parts of calomel and oxide of zinc. A small pledget of gauze or absorbent cotton wool is placed between the folds of the buttocks and the margins of the anus to prevent friction and consequent abrasion.

Chancres of the rectum are very rarely seen in practice. They do not cause much discomfort, and the patient is careful to conceal the condition when there is reason to suspect its nature.

The following case recorded by Dr. Hartley shows the difficulties, the course, and the treatment of this form of inflammation :—

J. McG., 32, male, an organist, was admitted into the Roosevelt Hospital, September 20, 1890.

Family history. No tubercular, renal or cardiac ailments. No rheumatic history.

Personal history. No tubercular, renal or cardiac disease. Denies all previous venereal diseases. Had dysentery some years ago.

Present condition. About three weeks ago the patient noticed severe pain at defecation and a small lump just within the anus; pain now continuous; tenesmus after each passage; blood has sometimes been present at stool. He has suffered from constipation for a long time.

An ulcer is found just one inch from the anal margin. It is about the size of a quarter of a dollar. The base is indurated and the ulceration is very superficial. Sacral glands are felt to be enlarged. There is no evidence of any other lesion.

Operation. September 20. Usual antisepsis. Bichloride and boric-acid irrigation of the rectum ; sphincter dilated. Bivalve speculum used. The ulcer is seen just one inch within the rectum ; it is superficially eroded with a distinct but not cartilaginous base.

Excision of the Ulcer. Cauterization with Paquelin's cautery. Iodoform powder. Suppository of opium, grs. ij ; opium pill, gr. j. t. i. d. Patient ordered to wards to be watched for any evidence of syphilis. September 25, movement of bowels ; daily irrigation. September 30, ulcers healing rapidly. October 1, Roseola over the surface of the chest and abdomen. October 5, discharged from the hospital improved. October 20, patient applied to-day for treatment in the out-patients' department, stating that his medicine had been used up and that he desired more. Patient presents a papular syphilide involving the face, forearm, trunk and portions of the extremities. The ulcer of the rectum is healed. Patient is put upon anti-syphilitic treatment. Careful inquiry was instituted as to the mode of infection, and for the first time during his treatment here the patient admits that three weeks before his admission to the hospital he was the victim of another man. He was lost sight of after this confession.

Secondary Manifestations

The secondary syphilitic manifestations near the anus are described in the article on the Skin by Dr. Phineas S. Abraham in a future volume of this System. They consist, as is well known, of mucous patches and condylomata. Mucous patches also occur in the rectum, but they are often overlooked because they cause so little inconvenience.

Professor E. Lang of Innsbruck examined forty-five men and sixty-five women in the eruptive stage of syphilis, to ascertain the existence of secondary lesions in the rectum. He discovered evidence of syphilitic erosion, hardly amounting to ulceration, in sixteen of these one hundred and ten cases. The lesions were generally situated upon the posterior wall, though they were occasionally at the sides, and in three cases the whole circumference of the bowel was affected.

The symptoms were extremely slight, for in only three instances was there pain on defecation or any loss of blood. One patient suffered from tenesmus, and in his case there was ulceration high up in the rectum.

It seems clear from these observations that the majority of the inflammatory processes occurring during secondary syphilis disappear without treatment because the symptoms are not sufficiently severe to cause the patient much trouble. But it is quite possible that they may sometimes prove the starting points of that unhealthy condition of the rectum which predisposes it at a later period in the disease to the very serious results of gummatous inflammation.

Tertiary Lesions

The chief types of rectal inflammation during the later stages of syphilis are (1) a proliferating proctitis; (2) a condition of diffuse interstitial inflammation known as 'ano-rectal syphiloma'; (3) gummatous inflammation.

Proliferating Proctitis

Dr. Paul Hamonic has described a condition to which he gives the name proliferating proctitis, because the mucous membrane of the rectum develops fragile processes and villous processes which are easily torn away. The processes may be so numerous as to fill the rectum. In the cases he watched the inflammation in the submucous tissue was not sufficient to cause any stricture, but in other cases it is said that a stricture has followed upon their growth.

Ano-rectal Syphiloma

Professor Fournier groups together a series of interesting cases under the heading of 'ano-rectal syphiloma'. In these cases there is an infiltration of fibro-plastic tissue into the submucous tissue which gradually invades all the coats of the bowel. The process is limited to the lowest part of the rectum immediately above the sphincter, and it produces a stricture by the gradual

shrinking of the inflammatory products. This induration, Professor Fournier thinks, is formed without ulceration of the mucous membrane, and it gives rise to so little inconvenience in its earlier stages that it often passes unnoticed. In the later stages it is associated with the formation of abscesses, fistulae, and ulcers.

It is better, on the whole, not to look upon this condition as one of a peculiar nature, but rather to regard it as a result of the ordinary pathological processes starting in diffuse syphilitic inflammation. A careful examination of many of the cases shows that the patients have suffered from syphilitic ulceration of the rectum at some time previously, for they present the characteristic bluish-white scars on the rectal mucous membrane just within the anus, and they are usually able to give a history of having suffered from irritation of the rectum and a discharge of mucus and pus some time before. The ulceration healed and the discharge ceased. They soon discontinued treatment and only come back for further advice because the symptoms returned.

An examination of the rectum in these cases shows that the wall is rigid and thickened either in its whole circumference, as is usual, or in parts only. The wall of the bowel has lost its resiliency and contractility. It feels thickened, and although the mucous membrane is smooth the wall of the rectum is often irregular and may be traversed by ridges of thickened tissue running longitudinally. The anus itself may share in these changes, which in process of time are very likely to be followed by the formation of a stricture of the rectum.

Gummatous Inflammation

Syphilitic inflammation occurs in the rectum in two forms, the one local and gummatous, the other diffuse.

Localised gummata are rare at the anus, though they have been seen in that situation by Verneuil and others; they are rather more frequent in the rectum, where they occur as round, elastic, and painless swellings, situated in the submucous tissue. They vary in size from a hempseed to a small orange and may

be single or multiple. They are freely movable at first and tend to caseate rather than to suppurate. If they soften and discharge their contents, the bowels may perforate, and when the perforation occurs on the anterior wall in a woman, a recto-vaginal fistula is often produced. There is no evidence to show that localised gummata lead to stricture of the rectum.

Diffuse gummatous inflammation of the rectum usually begins just inside the anus. The ulceration is deeper than that occurring in the earlier stage of the disease, and the ulcers are shaped like craters. They have yellow and indurated bases with sharply defined borders, whilst the wall of the rectum in their immediate neighbourhood is thickened, stiff, and inelastic (Plate XXXII), so that a stricture is easily produced if any considerable portion of the circumference of the bowel should be involved and the ulceration is allowed to become chronic.

The inflammation begins three or four years after the patient has contracted syphilis, and more often in women than in men. Pain and weight in the region of the sacrum are first complained of, with tenesmus of the bowels and frequent passage of stools which contain stinking and sanious pus. The sphincters become relaxed after a time, and the discharge which was at first under control then becomes involuntary.

The constant passage of the discharge from the rectum leads to much irritation and to some inflammation of the skin in the neighbourhood of the anus.

The condition lasts indefinitely even under the most careful treatment, and when the ulceration heals a ragged condition of the anal folds is left which has been compared to the wattles of a cock's comb, though they are not so red. Sir James Paget used to teach of this condition, 'I will not venture to assert that these cutaneous growths are never found except in syphilitic disease of the rectum, but they are very common in association with it and are so rare without it that I have not seen a case in which they existed either alone or with any other disease than syphilis.'

An examination of the rectum in these distressing cases shows that the mucous membrane is extensively ulcerated, the ulcerated

surfaces being covered with an abundant secretion of foul-smelling pus (Plate XXXIII). The glands in the hollow of the sacrum are soon enlarged, and, if the process of the ulceration be watched, the individual ulcers are seen to spread and coalesce until the whole circumference of the bowel is involved for a distance of three or four inches from the anus.

The ulceration tends to become chronic and the lower part heals, forming a band of cicatricial tissue just within the anus (Plate XXXIII). The ulceration in all forms of syphilitic inflammation extends along the lines of the blood-vessels and lymphatics, and as these run vertically in the rectum the process extends steadily upwards.

So far as I have seen cases of chronic syphilitic inflammation of the rectum, it has always occurred in young women who have borne children in the course of the disease, and who have also shown evidence of tuberculous infection. I believe, therefore, that the original syphilitic inflammation is aggravated by inflammatory processes taking place in the connective tissues as well as by the tuberculous processes.

The following cases, clearly recorded by Sir James Paget and by Dr. Dowse, give excellent pictures of the condition :—

Case 1. The specimen from which Plate XXXII is drawn consists of the rectum and adjacent portion of the colon showing syphilitic ulceration of the mucous membrane. The whole mucous membrane of the rectum is destroyed, except one small patch, which is thickened and opaque. The exposed submucous surface is uneven, nodular, and thickened by infiltration. On the mucous membrane of the colon there are ulcers round or oval in shape, regular in outline, and measuring from one-sixth to two-thirds of an inch in diameter. The edges are clean, sharply cut and scarcely thickened. They are surrounded by mucous membrane, which is either healthy or slightly congested. Their bases are for the most part level, flat, or covered with low granulations which rest upon the submucous tissue. The muscular coat of the bowel is not affected and there is no marked thickening or hardening below or around them. Branching blood-vessels are seen on some of the ulcers, whilst in others a small island of

mucous membrane still remains at the centre of the base. At some places two or more of the ulcers have extended and united to form a large ulcer of irregular shape, and by such coalescence some of the ulcers in the lower part of the colon are continuous with the ulcerated surface of the rectum. No ulcers were found in the caecum nor in the small intestine, except a very small one of doubtful character in the ileum.

The specimen was obtained from the body of a woman aged 28, with the following history :—She had suffered at the age of 21 from syphilitic sores which were shortly followed by a scaly cutaneous eruption. About a year later she became subject to an itching at the anus, and a growth of skin appeared reaching a short distance into the rectum. Two years after this a large ulcer formed in the neighbourhood of the anus and she was received into University College Hospital. The ulcer was destroyed by the application of some corrosive fluid. The growth at the anus was removed and rectal bougies were passed to dilate a stricture which was already in process of formation. At the end of a fortnight, being much relieved and her general health having improved, she was made an out-patient, but soon becoming pregnant she ceased to attend; it was ascertained afterwards that her child was born dead.

She was admitted into St. George's Hospital at the age of 25 on account of a recto-vesical fistula. The sphincter was divided; bougies smeared with unguentum hydrargyri were frequently passed, and she was placed under the influence of mercury by means of a calomel vapour bath (p. 218). She again improved rapidly and was soon discharged. At the age of 26, having in the interval borne another child, she applied at King's College Hospital on account of a relapse into her previous condition, and having received relief from the same kind of treatment as that before employed, she soon left the hospital.

At the age of 27 she became a second time an in-patient at St. George's Hospital. The canal of the rectum was then found to be so greatly narrowed that only a catheter could be passed through the stricture; her general health, which up to this period had been tolerably good, was beginning to fail,

and, suffering from sickness and diarrhoea for some days, she lost flesh rapidly. After her discharge she remained for a few weeks at home with her friends and was then brought to St. Bartholomew's Hospital. At this time she was in a state of extreme emaciation and misery and was evidently suffering from pulmonary phthisis, so that any expectation of affording her permanent relief seemed hopeless. She continued to decline and died on March 1.

At the post-mortem examination the lungs presented the ordinary appearances of extensive ulceration around tuberculous deposits, numerous cavities existed in the upper lobes, but no syphilitic affection could be discovered; the heart was normal, the liver was rather large, pale, and tough, but it gave no reaction with solution of iodine and exhibited no specific syphilitic alteration; the spleen and kidneys were normal.

The patient was under the care of Sir James Paget, who said, in commenting upon it :—

The chief points of interest are in the characters of the disease found in the rectum and colon, which may be studied as an example of syphilitic disease of those parts.

The anus did not present more than remnants and traces of the cutaneous growths which are generally significant of syphilis. They had existed in her but had been cut away. They are growths of skin grouped round the anus, in texture pinkish, soft, fleshy, and glistening; moist and thinly secreting; in shape irregular, flattened as if by mutual pressure, or pressure between the nates, sharp-edged or conical. If they must be compared with something they may be likened to cocks' combs. They are not warts and they are not condylomata, and although their presence is not absolutely distinctive of syphilis they are very often found in association with syphilitic disease of the rectum, and very rarely, if ever, as a result of other forms of rectal inflammation.

The character of the ulcers in this case is worthy of careful study, for they must be distinguished from the allied condition due to tubercle, since they are very different from any form of catarrhal, follicular, typhoid, dysenteric, or cancerous ulceration of the bowel.

The ulcers are limited to the large intestine and decrease in size and number from the rectum upwards, conditions which are rarely observed in tuberculous conditions of the intestine. There is no trace of tubercle in the submucous or other tissues of the intestine; none in a Peyer's patch or at the base or edge of any ulcer or in the subperitoneal tissue below an ulcer.

The shape and other characters of the ulcer are quite unlike those of intestinal tuberculosis; they are regular with sharp, even, and well-defined edges with level bases; they are not excavated; they do not extend through the submucous tissues; their edges are nowhere eroded or undermined, sinuous, thickened, brawny or infiltrated; the subjacent and intervening structures appear healthy, except at the rectum.

The ulcers are not grouped, and where by extension or coalescence they have lost their first shape, they have acquired one altogether irregular and have in no instance even tended towards that girdle-like shape, encircling the canal of the intestine, which is so characteristic in the large coalesced tuberculous ulcers.

Thus, by negative as well as by positive characters, these ulcers are clearly distinct from the tuberculous, and as they have not even a remote resemblance to any other form of intestinal ulceration, and as they occurred in a patient who showed abundant evidence of syphilitic infection, they may fairly be looked upon as being themselves caused by syphilis.

Case 2. Dr. Dowse gives the following interesting account of a case which he watched for some months. Elizabeth B——, aged 27, of dark complexion and phthisical history, was admitted into the Central London Sick Asylum on September 17, 1874, and died on December 16 in the same year. Before she began to lead an irregular life six years ago she enjoyed excellent health. From this time until she first came under my care in 1873 her habits were of the most immoral kind. In the year 1870 she first contracted syphilis, and the secondary rash was in a short time followed by rupial sores (Plate XXVIII). (It has been my experience that, in connexion with the history of syphilitic disease of the rectum, one does not as a rule find chronic periosteal disease with necrosis and caries of bone, but rather a determination to the skin, connective tissues and mucous membranes. Haemorrhages from the lungs and albuminuria are associations by no means uncommon. Psoriasis of the tongue and of the palms of the feet and hands, condylomatous thickenings around the anus and diffuse cicatrizations of the skin from previous ulceration.) It was not until the winter of 1873 (three years after she contracted syphilis) that she first experienced any discomfort in the rectum. At this date, when I first saw her, there was extensive ulceration of the vagina, with chronic and irregular thickening of the submucous tissue, producing a rigid and unyielding

state of the walls. There was an opening in the posterior wall communicating with the rectum through which faecal matter passed; and it may be noted that this aperture was as much under control of the will as the sphincter itself. There was commencing ulceration of the rectum, but it did not extend apparently above the internal sphincter. The primary ulcers in these cases are peculiar and typical and spread very rapidly. They resemble to some extent superficial lupus.

The sphincters were divided and the parts kept as clean as possible. Calomel paste was applied to the ulcerated surfaces night and morning. In a few weeks the parts healed and she left the asylum in fairly good health. On September 17 she was readmitted very ill. She was thin and coughing up frothy purulent matter with blood. The apex of the right lung was undergoing consolidation. The bowels were acting very irregularly; there was usually persistent diarrhoea and discharge of blood and pus (but haemorrhage is not a frequent condition in the last stage of this disease). The urine was highly albuminous although there was no anasarca. Upon examining the rectum I found a tight stricture about two inches up the gut, which encircled the forefinger like a cord; it yielded slightly to pressure so as to admit a Number 3 bougie. The ulceration extended beyond the stricture and gave evidence to the touch of an irregular hardened surface. It was evident that the submucous tissue had undergone hyperplastic inflammation with great puckering of the gut from cicatrization. There was an irritable condition of the bladder with frequent desire to micturate. The tormina and cramps of the bowel gave her unceasing discomfort. At this time it is well to state that the motions, when passed solid, were flattened and of the size of one's little finger; but about a fortnight before her death the motions were passed of normal size and the stricture had disappeared. The cough now became more severe; the urine was loaded with albumin, and waxy casts were seen by the aid of the microscope. Pseudo-paraplegia of the lower limbs set in and she soon died from exhaustive diarrhoea with involuntary action of the sphincters.

Post mortem. The brain and its membranes were anaemic.

The right lung was consolidated at its upper third, but it did not present the common grey granular appearance of miliary tubercle. There were several small cavities surrounded by a condensed and apparently fibroid change of lung parenchyma. The heart's structure was healthy.

The abdomen contained some serous fluid. The liver was waxy and fatty, its capsule was opaque and in places very much thickened. The kidneys were pale and waxy. The cortices were atrophied.

The intestine was examined from the duodenum to the anus, and no sign of ulceration or congestion was discovered until one came to the sigmoid flexure of the colon; here the mucous membrane was highly congested and the muscular coat hypertrophied. The rectum was abnormally adherent to the posterior wall of the pelvis by fibroid thickening of the connective tissue. When it was slit up it presented through its entire course an irregular surface of a greyish-green colour, with here and there somewhat pendulous-looking masses of almost vermilion redness. The remains of the stricture were seen about two inches above the anus. The hypertrophied muscular tissue did not stand out so prominently as it does sometimes, nor were there many burrowing sinuses.

A microscopical examination of the wall of the rectum in these cases of chronic syphilitic ulceration shows extensive destruction of the mucous membrane with infiltration of the submucous tissue. The muscular coat is thickened and the individual fibres are separated by inflammatory cells and imperfectly formed fibrous tissue. The external coat of the bowel, also, is thickened and infiltrated by the products of chronic inflammation.

It is clear from the details of the cases just quoted that syphilis causes extensive changes in the tissues of the rectum as a result of the inflammatory processes which it sets up. The chronic inflammation may end in ulceration and the formation of sinuses which are often associated with a stricture of the rectum; or the ulceration may be comparatively inconspicuous and the changes may then be most marked in the submucous and muscular layers. The newly formed scar tissue afterwards

contracts and the rectum with the surrounding connective tissue becomes sclerosed—the condition to which Professor Fournier has given the name 'ano-rectal syphiloma' (p. 122). This condition usually occurs later in acquired syphilis, although a case has been described in a boy of 10 years old who had inherited the disease.

The following case was recently under my care at St. Bartholomew's Hospital. In the absence of a syphilitic history it must be looked upon as a case of *Colitis polyposa* or ulcerative colitis, which is distinct from dysentery, rather than as an example of syphilitic inflammation of the bowel.

The patient, a married woman, aged 24 years, was admitted into St. Bartholomew's Hospital under my care on April 26, 1908, complaining that she passed blood and mucus by the bowel, and had lost all power of controlling her motions. She had been confined on January 28, the labour was easy, and she was up and doing her household duties on the tenth day. She began to suffer from diarrhoea early in March, and she passed blood and mucus in her stools. The symptoms gradually became worse, and for a month before her admission to the hospital she had lost all control over her bowels. Examination under an anaesthetic on April 30 showed that the anus was patulous, and that the skin round it was marked by numerous radiating scars, whilst the skin between the posterior margin of the anus and the tip of the sacrum was ulcerated. Several drachms of clear mucus escaped as soon as the anus was stretched, and the whole circumference of the rectum was then seen to be ulcerated. The ulceration extended beyond the reach of the finger, and the bowel bled easily. The rectum was narrowed at a point three inches above the anus, but the constriction could be dilated to allow of the passage of two fingers through it. The sacral glands were felt to be enlarged. Some pedunculated masses of mucous membrane were felt, and their existence was further determined by introducing a rectal speculum. There were two small ulcers on either side of the introitus vaginae, but there was no anal or recto-vaginal fistula.

The patient got steadily worse in spite of all treatment, and on May 7 I opened the colon in the left inguinal region. The

bowel proved to be extremely rotten, and the sutures repeatedly cut their way out of the tissues. The patient died on the following day, and the post-mortem examination revealed the appearances seen in Plate XXXII. The whole of the large intestine was uniformly ulcerated, with polypoid tags of mucous membrane between the denuded patches. Some of the tags had coalesced in the rectum to form bridges of mucous membrane which were sufficiently strong to support a glass rod.

A few weeks later a similar case came under my care which ended equally unfortunately. The patient was a married woman, aged 46. She was admitted into St. Bartholomew's Hospital for a fistula in ano and chronic inflammation of the rectum. She said that she had been operated upon for an anal fistula five years previously, and that for two years afterwards she had remained well. She then noticed blood in her motions, and the symptoms gradually increased in severity until she lost control over her bowels. She had been married 15 years, and had one child, aged 4 years. She had never been out of England, lived at Walthamstow, and drank the water supplied by the town. Her mother died at the age of 78 of softening of the brain; her father at the age of 78 from an ulcerated throat. She had three sisters and one brother, one of her sisters had fits. Examination of the rectum under an anaesthetic on June 3, 1908, showed the presence of two anal fistulae, whilst the rectum was found to be ulcerated, and to contain polypoid growths. The fistulae were laid open in their whole extent.

The patient was treated from June 16 to July 6 with copious irrigations of bismuth, chlorodyne, boracic lotion, and nitrate of silver, whilst tannigen, chlorodyne, and bismuth were given by the mouth. She grew steadily worse in spite of all that could be done for her, and on July 6 I brought up the transverse colon and sutured it to the abdominal wall in the left inguinal region. I did not, however, open the bowel, and the patient died three days later. The post-mortem examination showed that the large intestine was extensively ulcerated, and that its mucous membrane was in a polypoid condition. The

ulceration was most marked in the rectum, the caecum being comparatively healthy. The liver was enlarged and fatty, both kidneys showed interstitial changes.

It is difficult to determine whether there was any element of syphilis in either of these cases or whether they were merely cases of ulcerative colitis. By doing a colotomy I had hoped to put the bowel at rest, and when the ulceration had healed I had intended to ascertain the effect of mercury, for it is well known that many cases of dysentery are remarkably amenable to large doses of calomel.

Phagedaenic Inflammation

Ulceration of the rectum is sometimes associated with extensive phagedaenic inflammation which destroys the perinaeum in patients who are worn out by tubercle, Bright's disease, diabetes, and the bad hygiene too often associated with drunken habits. Such a case was admitted under my care at St. Bartholomew's Hospital on January 28, 1907.

The patient was a sawyer by occupation and he had suffered from syphilis five years previously. He had no stricture of the urethra, but a fortnight before his admission to the hospital he began to suffer from pain in the rectum and perinaeum, which gradually got worse until he became too ill to continue his work. Examination showed that he was suffering from extravasation of urine limited to the left side of the perinaeum and not extending over the abdomen. The tissues quickly became gangrenous, and within a week the whole perinaeum perished including three inches of the urethra. The phagedaenic process was stopped by the application of fuming nitric acid whilst the patient was under an anaesthetic. Some weeks afterwards I tried to repair the perinaeum and make a new urethra where it was missing. The operation was wholly unsuccessful and the patient left the hospital with a perinaeal fistula through which he passed his water.

Stricture of the Rectum

Richerand as early as 1812 taught that ' condylomes internes ' were a cause of stricture of the rectum, but it has only come to be recognized very recently that a large proportion of the patients affected with non-cancerous stricture of the rectum have suffered previously from syphilis. We owe it to the work of Messrs. Cornil, Panas and Valtat, Hartmann and Toupet, amongst others, that the pathology of the condition is now clear.

The researches of these observers have shown that syphilitic stricture is the result of a chronic inflammation affecting all the coats of the rectum. The mucous membrane is thickened by inflammatory deposits in the submucous layers, whilst the columnar cells are replaced by a lower type and form of cell which has no mucin-secreting function, for amongst them are no goblet cells. The circular layer of muscle is infiltrated with small round cells which caseate in some parts, whilst in others they become transformed into bundles of ill-developed fibrous tissue. The circular muscle is generally more affected than the longitudinal layer of muscle fibres, and a layer of scar tissue may separate the two coats. The new scar tissue has everywhere an insufficient supply of blood, because the arteries and the veins in the affected area show signs of inflammation in the internal coat, and they may be so greatly compressed by nodules of gummatous tissue as to be almost obliterated. The stricture consists, therefore, of a central fibrous portion where the narrowing is most marked and of a peripheral zone of congestion and hypertrophy above and below it. The congested zone often shows signs of active ulceration, with the formation of granulation tissue even when the stricture is of very long standing. The bowel above the stricture is thinned and dilated, whilst the part near the anus is often scarred and thickened by the inflammatory processes. Fistulous tracks are occasionally found beneath the mucous membrane and they may burrow for considerable distances or may open internally. The general pathology of stricture of the rectum, there-

fore, is identical with that of stricture of the urethra, viz., changes in the submucous tissue ending in cicatrization, ulceration, and interference with the function of the tube owing to its narrowing.

But it is remarkable that women suffer much more often than men from non-malignant stricture of the rectum, just as men suffer more often than women from urethral stricture. In 313 cases of non-malignant stricture of the rectum 215 occurred in women, and it is certain therefore that the anatomical relationships of the rectum in the female and of the urethra in the male must play important parts in determining or in maintaining the chronic inflammatory condition which is necessary to produce a fibrous stricture in either tube.

In a large number of cases of non-malignant stricture occurring in women a careful examination will show the existence at the time, or at some previous period, of pelvic cellulitis or of some chronic inflammatory changes in the pelvic organs. But it must not be thought that every case of non-malignant stricture of the rectum is the result of syphilis, any more than it can be assumed that every case of urethral stricture is necessarily gonorrhoeal. In a certain proportion of cases syphilis causes such changes in the submucous and mucous coats of the intestine as to render chronic any simple or infective inflammation which may afterwards attack them, so that where a healthy bowel would recover itself the syphilitic one undergoes stenosis.

Symptoms. The symptoms of a stricture of the rectum do not become troublesome until the lumen of the bowel is greatly narrowed either as a result of the stricture itself or, as happens more frequently, because the tissues immediately above it become congested and hypertrophied. The patient then complains of constipation which varies from mere costiveness to an attack of acute intestinal obstruction. The obstruction often ends in profuse diarrhoea, and the history of such an attack should lead the surgeon to make a thorough examination of the rectum not only with his finger but also by means of the sigmoidoscope. When the bowel is ulcerated large quantities of pus tinged with blood are discharged on first getting out of bed in the morning, and the patient has a natural action of the bowels an hour or

two later. In the course of the day the patient has further calls to stool and passes more foul-smelling pus.

Examination of the rectum in these cases shows the existence of a stricture at a distance of three or four inches above the anus. It is tubular and often narrows so gradually as to be funnel-shaped. The mucous membrane below the stricture shows evidence of ulceration either active or healed.

Differential diagnosis. The diagnosis of syphilitic stricture of the rectum has to be made from the tuberculous, the fibrous, and the cancerous forms.

The inflammatory condition spreads more widely beyond the zone of ulceration in tuberculous than in syphilitic stricture and the whole strictured surface may itself be ulcerated in tubercle. The ulcerated surface is irregular in shape, with a slightly grey and sloping base, the edges being thickened and undermined, whilst the ulcers feel soft and granulating with a firm base surrounded by irregular and slightly thickened edges. The general condition of the patient suffering from tuberculous ulceration of the rectum gives a clue to the correct diagnosis, which may be still further verified by a bacteriological and microscopical examination if tubercle bacilli and giant cells are discovered.

It is often difficult to distinguish a fibrous stricture of the rectum from one which is caused by syphilis, because the two conditions are so often allied. But in a fibrous stricture due to injury the constriction often begins abruptly and is limited to one side of the bowel. It is generally smooth, covered with epithelium, and is situated nearer to the anus. A history of the injury will sometimes afford a useful clue to the correct diagnosis in a doubtful case.

A cancerous stricture usually occurs in patients beyond middle life. It runs its course within a year or two of the first symptoms and it is soon associated with loss of flesh and cachexia. The stricture feels hard and nodular. It does not extend round the whole circumference of the bowel as a rule, and it is usually attached to the surrounding parts either to the sacrum behind, or to the bladder, vagina, or uterus in front. The sacral glands are affected early, whilst the rectum in the neighbourhood

is often thickened. The ulcer is deeply excavated with sharp edges and a fungating surface. The diagnosis is confirmed by removing a portion of the growth for microscopical examination, care being taken to obtain a piece from the very centre of the mass.

Treatment of Ulceration of the Rectum

The early treatment of syphilitic ulceration and syphilitic stricture of the rectum is important, because much can be done in the earlier stages to cure, or at any rate to afford the patient a large measure of relief, whilst in the later stages palliative means can alone be adopted for a condition which renders life well nigh unbearable. The local treatment of syphilitic ulceration consists of rest in bed, the proper regulation of the bowels, repeated irrigation of the bowel, and the application of cauterizing agents when the ulceration tends to become sluggish. The pain, the profuse discharge from the ulcerated surface of the mucous membrane, and the diarrhoea caused by the irritation are the most troublesome features of these miserable cases. A mixture containing tannigen, grains x ; chlorodyne, grains x ; oxycarbonate of bismuth, grains xx ; and chloroform water to an ounce, is sometimes useful in relieving the tenesmus.

The best irrigations are those which are least irritating. Saline solution, nitrate of silver, 10 grains to a pint, boric lotion, sanitas of the strength of one ounce to the pint or a weak solution of Condy's fluid are all excellent. They should be given at a temperature of 105° F. and in quantities of two or three quarts at a time, the solution being afterwards allowed to run out before the tube is withdrawn. The patient should lie on his left side with his knees drawn up and a macintosh protecting the bed. The douche need not be placed at a greater height than two feet as the irrigation should be made under a low pressure, and it must be repeated at least twice a day.

When there is profuse discharge from extensive ulceration the anus may first be stretched until the resistance of the sphincter is overcome, or the tissues may be divided from the anus

to the tip of the coccyx, taking care to keep the bistoury exactly in the middle line. A better view of the ulcerated surface can then be obtained and it is easier to make local applications of chromic or lactic acid. When the ulceration occurs during the earlier stages of the disease mercury must be administered, whilst in the later stages potassium iodide is the more serviceable, given with due regard to the recommendations contained in Chapter XV.

When the ulceration resists these more simple methods, it is generally taught that it is better to perform an inguinal colotomy on the left side. The inflamed and irritated bowel is thus put at rest and can be kept both clean and dry, whilst freedom from pain enables the general condition of the patient to be maintained at a higher level than would otherwise be the case. The colotomy wound need only be temporary and can be readily closed when the ulceration has ceased. But if the operation is to be of any service it must be done early. Too often it has been adopted as a last resource when the rectum is riddled with sinuses and its walls have been converted into scar tissue, whilst the general health of the patient has been reduced to the lowest ebb by pain and by the mental distress attending the condition.

The two cases of which details are given on pp. 131 and 132 show how impossible it may be to perform a colotomy in cases of chronic ulceration of the rectum and large intestine. The post-mortem examination in the first case proved that an attempt to open the ascending or transverse colon would have met with no better success than the left inguinal colotomy which I performed. The softness of the inflamed walls of the bowel prevent the sutures holding, whilst any disturbance of the gut to bring it into the wound is, for the same reason, likely to end in its rupture.

The treatment of the stricture depends upon its position. The use of bougies is only serviceable in the very slightest cases. Linear proctotomy, described above as the carrying of an incision from the tip of the coccyx through the tissues into the rectum, gives better results. When the wound has healed the rectum is kept dilated by the occasional passage of bougies, just as the

urethra is dilated after an external urethrotomy for the cure of a stricture. The improvement in both conditions depends upon a knowledge of the fact that newly formed scar tissue is more easily stretched than that which has existed for a considerable length of time.

Syphilitic strictures are occasionally multiple, so that when the patient is under an anaesthetic for the operation of linear proctotomy a careful examination of the bowel should be made both with the finger and with the sigmoidoscope.

The stricture can be excised by the perinaeal route and without any removal of the coccyx or sacrum in inveterate cases of stricture when the constriction lies within four inches of the anus or by a modification of Kraske's operation, the coccyx alone being removed when it lies within two and a half inches of the end of the bowel.

Inherited syphilis. The rectum and colon are occasionally the seat of syphilitic inflammation in children. Alezais describes a diffuse fibrosis of the colon in newly born children leading to a great thickening of the superficial part of the submucous coat, the thickening being especially marked round the blood-vessels. The changes therefore resemble those found by Hirschsprung in megalocolon.

Diffuse gummatous masses have been observed in the rectal walls of a child of fifteen months old and a general inelastic leathery condition of the rectum in a child of two years old. Both these children showed other signs of inherited syphilis. Ball, too, has described a case of ano-rectal syphiloma in a child of ten years old. But as a general rule syphilitic ulceration of the rectum and anus in children does not involve any extensive area, nor is it accompanied by great destruction of tissue, for the inflammation limits itself to the tissues in which it begins and does not show the marked tendency to spread which is so characteristic a feature of syphilitic inflammation of the mucous membranes in the adult. Syphilitic disease of the rectum in children lends itself more readily to treatment on the lines which have been already recommended for the less severe cases, and it is hardly ever necessary to resort to any operative measures.

BIBLIOGRAPHY

Prof. Fournier, Les Chancres Extra-génitaux, 1897, p. 485.
Prof. Von Düring, Ueber Extragenitalschanker. Monatshefte für Praktische Dermatologie, 1891, Band xiii, p. 471.
Prof. Neumann, Ueber extragenitale Sklerosen. Wiener Med. Wochensch., 1890, p. 151.
Prof. Tuttle, Diseases of the Anus and Rectum, 1903, pp. 229 and 255.
Dr. Hartley, Journ. of Cutaneous and Genito-Urinary Diseases, 1891, p. 218.
Prof. E. Lang, Vorlesungen über d. Path. und Therapie der Syphilis, Theil i, p. 240.
Paget [Sir] James, Notes of a Clinical Lecture on Syphilitic Disease of the Rectum and Colon. The Medical Times and Gazette, 1865, vol. i, p. 279.
Dr. Dowse, Syphilitic Disease of the Rectum. Pathological Society's Transactions, vol. xxvi, p. 112.
Dr. Paul Hamonic on Proliferating Proctitis. Ann. Méd. Chir. France et Étranger, 1866, tome ii, p. 3.
Prof. Richerand, Nosographie chirurgicale, 1812, tome iii, p. 423.
Prof. Cornil, Leçons sur la Syphilis, p. 412.
Drs. Panas and Valtat, Bull. de la Soc. de Chir., 1872, pp. 537 and 572.
Drs. Hartmann and Toupet, Semaine Médicale, 1895, p. 129.
Dr. Alezais, Arch. gén. de méd., September 12, 1905, p. 2353.
Sir Charles B. Ball, The Rectum and Anus, their diseases and treatment, Lond., 1887, p. 184.

CHAPTER VIII

THE URETHRA AND PROSTATE

The Urethra

Syphilis affects the urethra at all stages, but not very commonly. The disease may be inoculated at the meatus, or more rarely in the fossa navicularis, the inoculation being followed in due course by the formation of a chancre. The chancres in this situation have been described by Colonel Lambkin (vol. i, pp. 183–4).

Mucous patches are sometimes developed in the urethra during the secondary period of syphilis, and may be seen through the urethroscope as infiltrated areas situated on the mucous membrane of the penile portion of the urethra, and covered with a grey film of exudation.

The main symptoms connected with urethral mucous patches are a gleet and difficulty in the passage of urine. These symptoms may be looked upon as the results of the gonorrhoea from which the patient has usually suffered, but the coexistence of other signs of secondary syphilis should lead to a differentiation of the two conditions by means of the endoscope. If the mucous patches are treated as gonorrhoeal in origin they may remain inflamed until the submucous tissues are so irritated as to cause a stricture, whilst if they be treated as manifestations of syphilis they can be quickly cured.

Gummatous inflammation occasionally takes place in the urethra during the later stages of syphilis. It is rare in the form of gummata, but is by no means uncommon as a diffuse inflammation often associated with phagedaena. The condition may be mistaken for primary cancer of the urethra, which is equally rare, and for tuberculous inflammation, which is also uncommon.

The Prostate

Nothing is known at present of the frequency with which the prostate is affected in syphilis, though the structure of the gland leads to the supposition that it may be affected by syphilitic inflammation, either localised as gummata or in a diffuse and sclerosing form.

One or two cases have been recorded in which the prostate has been affected in young men who have suffered from syphilis, and I have seen the following case in which I found it extremely difficult to enucleate the prostate in a man who had signs of syphilis, owing to the sclerosis which the gland had undergone.

Case 1. The patient was an engineer, aged 54, who was admitted under my care at St. Bartholomew's Hospital on November 4, 1902, and was discharged on January 22, 1903.

He said that in January, 1902, he began to have difficulty in micturition, and soon had to get up many times a night to pass his water. He felt severe pain in the right testicle and in his perinaeum. He had gonorrhoea at the age of 20.

The patient was found on admission to be a healthy man physically, but his mental faculties were distinctly impaired, for he was garrulous and full of high-flown ideas as to his future prospects. He passed natural urine which was free from albumin. There was no record of residual urine.

The prostate was found by rectal examination to be uniformly and greatly enlarged; it was very hard and from its midpoint a hard and firm band extended upwards towards the right side.

A suprapubic prostatectomy was performed on November 11. The prostate was removed piecemeal and with very great difficulty, owing to the density of the adhesions by which it was attached to the capsule. The operation was a long one, and there was a good deal of haemorrhage. The patient micturated naturally on November 27.

He suffered from an attack of cystitis between November 16 and 27, and passed sloughs of prostatic tissue in the urine. The wound was healed on December 1, but it broke down again on December 5, probably because the patient strained very much

owing to pain in both testicles. He then had an attack of double orchitis, which ended in the formation of a gumma of the right testicle. The gumma softened and an abscess was opened on January 5. Both testicles cleared up rapidly when iodide of potassium was given. The patient left the hospital much relieved, without pain and with no frequency of micturition.

The pathological report of the prostate states that ' the microscopical sections show no malignant growth and no adenoma. It is probably a simple hypertrophy of all the constituents of the gland '.

A few weeks after the patient left the hospital he applied again for the relief of a gummatous periostitis of the forearm, which was also quickly cured by iodide of potassium. I saw him frequently during the next three years. His bladder symptoms were relieved and he passed water infrequently.

The industry of Prof. Fournier has been rewarded with the discovery of a few cases in literature of syphilitic inflammation of the prostate. He states, however, that he does not feel quite satisfied as to the syphilitic character of the inflamed prostate.

Case 2. Dr. Emile Reliquet (1837–94) treated a syphilitic man, aged 24, for a chronic urethral discharge which had lasted several years. The patient passed small white clots when he made water; the clots were uniform in consistency and often had a yellow centre. He had attacks of haematuria, preceded by pain, and he had suffered from orchitis more than once. The testicles were swollen, the epididymis on each side was hard, and the spermatic cords were thickened as high as the inguinal rings. The prostate was increased in size, was softer than usual, and had a mass projecting from the right side. There was no stricture of the urethra.

The patient presented an affection of the skin, which was diagnosed as syphilitic by Prof. Bazin (1807–72), the well-known dermatologist at Paris. Dr. Reliquet considered his patient to be suffering from syphilitic inflammation of the prostate, and adds, ' treatment confirmed the diagnosis, for the patient was cured '.

Prof. Fournier adds to this record, ' The case presents several weak points. In the first place mercurial treatment was not the

only method employed, for injections of nitrate of silver were used in the manner recommended by Mercier, which acts very effectually in the cure of chronic discharges from the urethra, and at a later period the patient was twice sent to Luchon. Moreover, when Reliquet speaks of cure he makes no mention of the condition of the prostate at the end of treatment. It is uncertain, therefore, whether he was cured of the urethral discharge or of the prostatic enlargement, or of both conditions.

The second case is recorded by Grosglick.

Case 3. The patient was a man aged 43, who had formerly suffered from syphilis and from gonorrhoea, but he was free from any urethral discharge when he sought advice. He complained of pain in the perinaeum, difficulty in passing water, frequent and painful micturition. He also had the sensation of a foreign body in the rectum.

Rectal examination revealed the presence of a very large tumour lying on the anterior wall of the rectum and corresponding in position to the prostate; the swelling was as large as the fist, fixed, hard, irregular in outline, and very painful when touched; its upper limit was beyond the reach of the finger. No fluctuation could be obtained.

There was no narrowing of the urethra and a Nélaton's No. 19 sound passed readily into the bladder. A few drops of thick and bloodstained fluid escaped at the instant when the end of the sound was withdrawn from the prostatic urethra.

The prostate quickly diminished in size under the influence of mercury and iodides, and it had regained its natural size at the end of a month. The patient suffered a relapse a few months afterwards, but the symptoms again yielded to the same treatment.

Case 4. Dr. Divaris quotes the following case under the heading of 'Syphilis of the Prostate simulating Tuberculosis'.

A patient, aged 34, complained of frequent micturition, chiefly at night, leading to broken sleep, much pain, urethral discharge, difficulty in passing water, and at the end of micturition the passage of urine tinged with blood. Rectal examination showed the existence of an enlarged prostate which did not present any nodules. A diagnosis of tuberculous disease of the prostate was

made and the patient was ordered to take cod-liver oil and was treated with instillations of corrosive sublimate and injection of nitrate of silver. No improvement occurred and, although the patient denied syphilis, he was put upon an antisyphilitic course consisting of injections of biniodide of mercury and iodide of potassium. A month later he was quite well.

These cases make it clear that it is worth while to consider the possibility of any given enlargement of the prostate being syphilitic when it occurs in a patient who is too young to be the subject of senile hypertrophy, who is free from manifestations of genito-urinary tuberculosis, and in whom the wound refuses to close or reopens with sloughs after the prostate has been removed. The increasing frequency with which the prostate is now being removed when it is a source of annoyance to the patient makes it especially desirable to eliminate the enlargement which is due to syphilis, both because it may be curable by the use of antisyphilitic remedies in the early stages, and because it may be very difficult to remove a gland which is the seat of a sclerosing inflammation.

No trustworthy evidence is yet forthcoming to show that the vesiculae seminales are ever the seat of syphilitic inflammation.

BIBLIOGRAPHY

Prof. Alfred Fournier, Traité de la Syphilis. Paris, 1906, vol. ii, p. 667.
Dr. Reliquet, Œuvres Complets. Paris, 1895, vol. iii, p. 287.

CHAPTER IX

THE TESTICLES

History

It is somewhat remarkable that syphilitic enlargement of the testicle should have been overlooked or denied for so long a time after the appearance of syphilis. But those who have had much clinical experience know that a painless swelling increasing slowly is often unnoticed for a very long time when it occurs in a woman's breast or in a man's scrotum.

Mr. Benjamin Bell, Surgeon to the Royal Infirmary at Edinburgh (1749–1806), seems to deserve the honour of first clearly recognizing the occurrence of syphilitic orchitis. He says in his treatise on gonorrhoea virulenta and lues venerea, published in 1793 :—

'Inflammation communicated along the urethra in gonorrhoea is the most frequent cause of swelling of the testes. This has led many to suppose, and some to assert that this symptom is never induced by lues venerea (syphilis); that it is always a local infection and is never produced by any disease of the constitution.

'That this is very generally the case I will admit, for in a great proportion of the cases we can early trace the disease to a local cause and it is most easily removed by local applications, but this is not always the case, for I have met with various well-marked instances of the testes swelling from disease of the system alone. Those who doubt the fact will ask in what manner can this be ascertained? By the swelling coming on without any external injury; by no gonorrhoea having preceded; by the patient being known to be affected with lues venerea at the time; and by the swelling being with ease and certainty removed by mercury, while it had daily become worse so long as those remedies were employed which usually prove effectual in swelling of the testes arising from gonorrhoea.

'With me these circumstances afford complete satisfaction, and as I have repeatedly met with them I judge the fact to be clearly established.'

Acquired syphilis affects the testicle in several forms and at any stage. The stress of the disease falls either upon the epididymis or upon the body of the testicle. Inflammation of the epididymis is the less usual form, but it is sometimes seen three or four months after infection though it may be a little earlier or somewhat later. The inflammation begins insidiously and with such slight pain that the enlargement is only discovered accidentally, although the onset and progress are occasionally acute.

Epididymitis

Examination of the testicle shows the presence of one or more nodules in the upper part of the epididymis. The nodules vary in size, they are not tender, and they undergo so little change that they rarely extend to the rest of the epididymis. It is unusual to find a hydrocele, and the body of the testicle is either normal or but slightly enlarged.

This early syphilitic epididymitis is easily distinguished from the gonorrhoeal form by the absence of pain and by the localisation of the swelling to the head of the epididymis, whilst in gonorrhoea the inflammation begins in the tail of the epididymis, spreads quickly over the whole epididymis, and is associated with great pain and constitutional disturbance. Syphilitic epididymitis more nearly resembles the earlier stages of tuberculous inflammation, from which it is soon distinguished by the greater tendency to soften which is shown by the tuberculous nodules; the whole epididymis, too, is quickly involved in the tuberculous process, whilst the vas becomes thickened and the vesiculae seminales are affected. Sarcomatous nodules occurring in the head of the epididymis in young people may be mistaken for syphilitic epididymitis, but they are harder, they grow more rapidly, and there is usually only a single mass.

Cysts are occasionally seen in the head or immediate neighbourhood of the epididymis, but they ought not to be mistaken for syphilitic nodules, because they are more circumscribed, tense and elastic.

The prognosis of syphilitic epididymitis is good. The inflam-

mation cures itself whether the patient be treated or not, though the nodules disappear more quickly under the influence of mercury than when the case is left to nature.

Orchitis

For purposes of classification, but for purposes of classification only, syphilis affects the testicle in a diffuse and in a localised form. The smooth, oval testicle resulting from diffuse inflammation is seen in Plate XXV; the smaller craggy or gummatous organ in Plate XXXIV. The two conditions generally coexist, though one or the other character may predominate.

The testicles are most often affected about the age of thirty in men who have contracted syphilis a few years previously, though I have seen it in its diffuse form as late as eighty in a man who must have had syphilis at least sixty years before.

The gland enlarges slowly and painlessly, but the onset is sometimes sudden, and it is then accompanied by pain with redness of the scrotum. Both testicles are often affected, but the onset is not necessarily simultaneous. In sixty-two cases observed post mortem by Dr. Goodhart at Guy's Hospital, thirty-six had both testicles affected, whilst in twenty-four only one gland was inflamed.

Examination of the testicle in a typical case of interstitial inflammation shows the organ to be enlarged, smooth in outline, heavy, and with its natural sensibility somewhat dulled, though the patient says that he has no loss of sexual appetite. The skin moves freely over the enlarged testicle, and the epididymis is indistinguishable because it is flattened out over the back of the organ. The spermatic cord is thickened, as a whole, no doubt on account of the extra weight it has been called upon to support, but the vas deferens is not especially thickened as is usual in cases of tuberculous disease. A hydrocele of the tunica vaginalis is not uncommon.

These points are well brought out in the case from which the specimen drawn in Plate XX was obtained. It is preserved in the Museum of the Royal College of Surgeons of England (No. 4199)

and is an enlarged and indurated testicle from a patient who acquired syphilis seven years before his death. The testicle is heavier and harder than natural, though it is not altered in shape. It measures two and a half inches by one inch and a half. The epididymis is much wasted and hardened. The greater part of the cut surface now appears of a yellowish colour, though it was pink when the organ was fresh. It is uniformly and finely fibrillated with a few patches of gummatous material. A microscopic examination shows that the main part of the gland is converted into fibrous tissue from which all trace of the tubuli seminiferi has disappeared. The gummatous patches are masses of granules, oil globules, and cholesterin.

The patient from whom this testicle was obtained was under the care of Mr. T. Blizard Curling, in the London Hospital, where he died in April, 1868, at the age of 32. He contracted syphilis in 1861 and was treated with mercury to salivation, which cured him of a sore throat and a rash. He remained well until 1866, when he again began to complain of his throat. He was admitted into the London Hospital in October, 1867, with ulceration of the face and scalp, necrosis of the cranial bones and of the roof of the mouth, with ulceration of the fauces and larynx. It was then discovered that he had a symmetrical enlargement of the testicles, which he said had begun in one testicle six months previously and in the other two months later. The enlargement had been gradual and continuous, but caused him no inconvenience except from the size and weight. Both testicles were ovoid in shape, uniformly smooth, and regular in outline. They did not fluctuate and were rather heavy ; each was about the size of an adult fist. The spermatic cord was natural.

The patient was treated with ten-grain doses of iodide of potassium given three times a day and the testicles soon became reduced to the size of a hen's egg. He died in April, 1868, of capillary bronchitis and syphilitic disease of the larynx.

The gummatous or craggy testicle is smaller than that affected by interstitial inflammation. The gummata are easily felt when they are situated on the surface of the gland, but if they are deeply placed the testicle only feels firmer than usual. This form,

especially in the later stages, is often associated with a hydrocele of the tunica vaginalis, as well as with smaller cystic projections of the tunica albuginea, known as ' spermatoceles ', or spermatic hydroceles. The larger hydrocele is due to the inflammatory processes involving the tunica vaginalis, which is often found to be puckered and thickened, whilst the spermatoceles are the result of sclerosing changes taking place in the testicle owing to the contraction of the newly formed cicatricial tissue. The craggy testicle as a rule occurs later in the disease than the interstitial form previously described.

Section of a testicle affected with syphilitic inflammation shows that even when the greater part of the infiltration is diffuse there are nearly always some denser masses which are characteristically gummatous. These appearances are well seen in Plates XXV and XXXIV. The specimen from which Plate XXXIV is taken came from a patient who was under the care of Sir George Murray Humphry at Addenbrooke's Hospital, Cambridge. The man was 54 years of age and he had suffered from syphilis for many years. He complained of periosteal pains in various bones at the time of the operation. The tunica albuginea is greatly thickened and the testis is slightly enlarged ; its body is occupied by white irregular masses which entirely replace the normal tissues. The testicle has been injected from the spermatic artery, but the injection mass has not penetrated into the gummatous patches, which are therefore left unstained and white. The tunica vaginalis is much distended by a large hydrocele. The specimen is preserved in the Museum of St. Bartholomew's Hospital (No. 2771A).

In the first specimen, Plate XXV, the gummatous mass is single. The testicle was removed from a boot finisher, aged 31, who said that he felt something give way in his scrotum whilst he was lifting a heavy pigeon trap. He then found that his left testicle was larger than the right, though he had never felt anything wrong with it previously. He contracted gonorrhoea and syphilis at the age of 25 and he had been treated subsequently for a sore throat and a rash. Examination showed him to be an emaciated man, sodden with drink. The scrotum was red and shiny, fluctuating at one spot. The testicle was large, oval, and

heavy. It felt firm except at one place, where there was definite fluctuation. The epididymis was enlarged and tender; the spermatic cord thickened, and there was an enlarged lymphatic gland in the left groin. A few days after the admission of the patient to the hospital the skin over the fluctuating spot in the scrotum and testicle gave way and there was a considerable discharge of pus. The general condition of the patient made it desirable to remove the inflamed testicle, and with it the diseased skin of the scrotum.

A microscopical examination of the gumma showed that it consisted of a non-vascular, amorphous and granular tissue, in which neither cells nor fibres were distinguishable. The gummatous patches were surrounded by a vascular layer of delicate, reticular fibrous tissue, in which were contained large numbers of small round cells. The tissue of the testicle between the gummatous nodules was composed of very vascular fibrous tissue arranged in a coarse reticulum enclosing at wide intervals glandular elements which contained a caseating material. These glandular elements were evidently the remains of the seminiferous tubules.

The microscopic appearances just described give a just idea of the results of the histological examination of a syphilitic testicle. The naked-eye appearances differ according to the extent of the disease, for the gummatous patches vary somewhat in colour and consistence according to their age. At first, they are reddish-grey, soft and juicy, with patches of congestion here and there; in the later stages they become denser, more hard, tougher and fibrous. There is no definite outline between the healthy and the diseased tissues, and the gummatous masses cannot, therefore, be enucleated from the gland, and they are too tough to be broken down by pressure like the caseating masses found in a tuberculous testicle.

The gummata often form conical masses with their apices directed towards the mediastinum testis, whilst the bases are continuous with the thickened tunica albuginea.

If sections of syphilitic testicles be examined at different periods of inflammation the earliest changes will be found to consist of a slight thickening of the connective tissue lying between

the seminiferous tubules. The connective tissue gradually increases in quantity, compresses the seminiferous tubules by cicatrization, and eventually causes their obliteration. The walls of the tubules themselves sometimes show a similar process of fibrosis. The external and middle coats of the larger blood-vessels are thickened, but the internal coat is rarely affected. Newly-formed fibrous tissue is often developed in the sub-endothelial layers of the capillaries.

Differential Diagnosis. It is probable that every surgeon attached to a public institution, where he sees many cases of swollen testicle, has at some time or another diagnosed a case of syphilitic orchitis to be either tuberculous or sarcomatous.

The epididymis and the vas deferens are used as touchstones to distinguish between syphilitic and tuberculous orchitis, and it is further said that syphilitic inflammation is much less likely to end in an abscess and ulceration than the tuberculous form.

The epididymis is not nearly so prominently involved in syphilitic disease of the testicle as in the tuberculous form, in which it is usually felt as an enlarged nodular mass upon which the stress of the disease has fallen, the testicle being only affected in a minor degree. In syphilis, on the other hand, the testicle is affected chiefly, whilst the epididymis is either flattened by pressure and thus rendered inconspicuous or is made cystic by the sclerosing changes which it has undergone.

In syphilitic inflammation of the testicle all the constituents of the spermatic cord are thickened, partly by a general infiltration of the connective tissues which enter so largely into its composition, and partly, as has been said already, by a compensatory hypertrophy of the cremaster muscle, which has been called upon to support a much heavier testicle than the normal whilst the patient has been going about his everyday work, because the absence of pain causes him to overlook the swelling. Tuberculous inflammation, on the other hand, creeps up the vas deferens in the earlier stages of the disease, and the other constituents of the spermatic cord do not become inflamed until pyogenic inflammation takes place; in tubercle, therefore, the vas can readily be felt as an isolated and thickened cord. In tubercle,

too, the vesiculae seminales and the prostate are frequently diseased at an early period, whilst in syphilis, though an examination by the rectum may show some enlargement of the prostate, there is no change in the vesiculae seminales.

The products of tuberculous inflammation soften early and the disease is markedly progressive, so that an abscess followed by a sinus is much more frequent in tubercle than in syphilis. But in tubercle the abscess may be placed so deeply in the centre of the testicle, and it may be surrounded by so much inflamed tissue, as to resemble very closely a large gummatous mass. The products of inflammation in syphilis, on the other hand, may suppurate, the coverings of the testicle and scrotum then become adherent and the skin is infiltrated. It becomes red, oedematous, and finally ulcerates leaving a raw surface with thin and undermined edges. The overhanging skin is of a bluish-violet colour and the base of the ulcer, when the inflammatory products have escaped, is covered with a slough which looks and feels like wet wash-leather. This slough separates after a time, the edges of the skin becoming depressed and adherent to the base and a sinus is formed.

A hernia testis is sometimes produced by granulation tissue springing either from the tunica vaginalis or from the substance of the testicle. These suppurative changes often begin after a slight injury, and they are much more usual in tuberculous and sickly men who have acquired syphilis than in those who are otherwise healthy. The lesions are remarkable on account of the very slight amount of pain and constitutional disturbance with which they are associated.

It is, I think, very doubtful whether there is such a condition as chronic traumatic orchitis, though it is often described. It appears to me that in all the cases I have seen, and they have been many in the course of a long hospital experience, there has been a basis of tuberculous or syphilitic inflammation, the syphilis being more often inherited than acquired. If this be really the case it explains why chronic orchitis so nearly resembles syphilitic disease of the testicle and why the use of mercurial applications is so beneficial.

Malignant disease is only likely to be mistaken for syphilitic disease of the testicle when it is sarcomatous, because carcinoma occurs under very different conditions. Sarcomatous inflammation hardly ever involves both testicles. It increases rapidly in size or at any rate progressively. The spermatic cord is quickly involved, and if the progress of the disease be watched for a short time the invasion of the cord from below upwards can be easily detected. Most of the cases of sarcoma of the testicle are cystic, and the varying consistency of the swelling owing to the presence of the cysts is often useful in making a diagnosis of the condition. The veins of the scrotum are sometimes greatly congested in cases of sarcoma of the testicle, an appearance which is uncommon either in tuberculous or syphilitic inflammation. The lymphatic glands may or may not be affected.

The difficulty of distinguishing between syphilitic and sarcomatous orchitis is well shown in the following interesting and instructive case which is reported by Mr. Jonathan Hutchinson.

A gentleman had complete syphilis at the age of 25. He married at the age of 31, having been free from symptoms for five years, and his wife bore him four healthy children. He remained in good health until he was 41, when he had an enlarged liver, and soon after this he had a cough with expectoration and became very thin. He continued in weak health during the next year, and was thought to be suffering from chronic phthisis. He was sent to Algiers when he was 44, and on his return home he was so ill that he was expected to die. One testicle now began to swell suddenly, and when Mr. Hutchinson first saw him it was as big as the two fists. He was recommended to have it removed, partly because the disorganization was so complete and partly because it was large enough to be a serious encumbrance. Mr. Hutchinson says that he was further influenced in his decision by the fact that the patient had taken much iodide of potassium and was in very feeble health. The iodide had improved his general condition but had not materially reduced his enormous testicle. Whilst waiting for the decision the patient was ordered mercury, and under this remedy he began to improve immediately,

and in a few months his testicle had returned to its original size and all his chest symptoms had vanished.

This cure was effected in 1882, and five years later the patient remained in good health. It is noteworthy that whilst the patient was undergoing the mercurial treatment, and when the testicle first involved was rapidly getting smaller, the opposite gland began to increase in size; it became moderately swollen and then subsided.

In the commentary on this case Mr. Hutchinson observes that he had never before witnessed the subsidence of so large a gumma, for the testicle was so big that he certainly thought at first its cure was almost impossible. The case serves as a good example of what is not infrequently seen in syphilis, viz. an outbreak of tertiary symptoms after a long period of good health. Nearly twenty years had elapsed in this case, and a healthy family had been born in the interval. The disease then attacked several viscera in succession, the liver, the lungs, and the testis without affecting any superficial part. The cure carries with it the clear lesson that in all obscure diseases of the viscera mercury should invariably be administered to those who have suffered from syphilis at some former time, before any operative measures are recommended.

Prognosis. The prognosis in syphilitic disease of the testicle is better than that of syphilitic inflammation in any other part of the body, provided that the swelling is due entirely to syphilis and is not part of a more complex infection. The inflammatory products often undergo complete resolution when the case is seen, recognized, and treated early. Considerable improvement can be effected even in the later stages which at first sight seem to be nearly hopeless, and such testicles afterwards appear to resume their natural functions.

The inflammatory enlargement sometimes undergoes a rapid and spontaneous diminution in size, the atrophy being so complete that the testicle is reduced to a mass of fibrous tissue which feels hard and knotty and may be no larger than a haricot bean. Nothing, of course, can be done in such cases, and when both testicles are mere masses of fibrous tissue attached to a shrivelled

epididymis and a wasted spermatic cord the man is necessarily sterile though he is not impotent.

Treatment. The patient should be placed upon a short course of potassium iodide. Ten grains three times a day for two days, fifteen grains three times a day for two days and twenty grains three times a day for three days is generally sufficient. He is then ordered a thorough course of mercury (p. 186) any hydrocele which may remain after treatment for a month being emptied by tapping. The treatment should be continued for two or three months after the patient seems to be cured and he should be warned at the beginning that the opposite testicle may become enlarged for a short time even whilst he is taking mercury. If the testicle is heavy it can be supported by a suspensory bandage, and if the scrotum be ulcerated the patient should be kept in bed and the part should be dressed with black wash or with fomentations of boric acid or sanitas.

Removal of the testicle is necessary when the ordinary means of cure prove ineffectual and when it is clear that the organ is either converted into a mass of gummatous material or is extensively destroyed by suppuration. The museums of the London hospitals contain very few specimens of syphilitic disease of the testicle, so that it is evident the operation of removal is not often necessary.

Inherited Syphilis

It is difficult to distinguish between syphilitic and tuberculous inflammation of the testicle in very young children. The two conditions are often combined, for the tuberculous infection may be grafted upon tissues which have been prepared to receive it by the action of inherited syphilis. But alterations in the testicles and their coverings take place in a considerable proportion of children born with inherited syphilis and it is therefore correct to describe a congenital syphilitic inflammation of the testicle. The changes are most common within the first two years of life, but they may occur as late as the twenty-fourth year.

Syphilitic inflammation of the testicle is often associated with

a hydrocele of the tunica vaginalis or ot the process vaginalis, indeed when a double hydrocele occurs in a very young child the testicles should be carefully examined after the fluid has been drawn off to ascertain whether there is not some form of chronic inflammation to account for the effusion. Syphilitic inflammation attacks the body of the testicle more often than the epididymis, though the epididymis alone may be inflamed or the stress of the disease may fall upon the tunica vaginalis to the exclusion of the testicle. In typical cases in young children there is always abundant evidence of syphilis to render the diagnosis easy.

The affected testicle is more or less enlarged, hard, and firm, and the inflammation is often symmetrical. The enlargement is generally uniform as the inflammation is rather diffuse than gummatous. The hardness is excessive, for the testicles of little children are naturally harder than those of adults. Dr. Carpenter has well described it in the language familiar to ophthalmic surgeons by saying that if the normal testicle is represented by the symbol *Tn*, the testicle of a healthy child is $T+2$. The size varies considerably, and if the normal testicle of a baby is taken to be as big as a large lemon pip and that of a child two years old as large as a hazel nut, the testicles of a syphilitic infant may be as large as a chestnut. The swelling is painless and the gland feels as hard as a scirrhus of the breast. If the case be left untreated there is a tendency for the inflammatory products to pass into a condition of fibrosis which may end in atrophy; more rarely it fungates and a hernia testis is then the result, but the majority of these cases appear to be tuberculous as well as syphilitic. The cord in the purely syphilitic inflammation remains unaffected, but when it is conjoined with tubercle the vas may be greatly thickened and enlarged.

A microscopical examination of syphilitic testicles shows that the inflammation presents no special characters. It is simple in form and passes on to the development of fibrous tissue with subsequent destruction of the gland. Dr. Carpenter gives the very necessary warning that conclusions as to the syphilitic nature of the appearances seen in microscopical sections of a child's testicle should not be drawn without confirmatory

evidence from the clinical signs, for, he says, that normally, 'The difference between the adult testicle and that of the infant is such that on examining sections of the latter one could, at first, believe in the existence of an interstitial inflammation, so much is the connective tissue still embryonic, thick, and loose, so rich is it in round and fusiform cells, and so large are the spaces between the gland tubes.'

Differential Diagnosis. Syphilitic disease of the testicle in a child has to be distinguished from tubercle, from sarcoma, and from teratoma. The syphilitic alterations show themselves earlier in children than those due to tubercle. Both testicles are usually affected and often at the same time, whilst tuberculous inflammation is limited to one gland. Syphilitic inflammation gives rise to no symptoms and transforms the testicles into hard, uniform, and painless masses. The epididymis is not so often affected as it is in tuberculous infection. The vas deferens and the vesiculae seminales escape in syphilitic inflammation, but even in children they may be affected by tubercle, though less frequently than in adults. Finally the syphilitic signs in other parts of the body and the effects of antisyphilitic remedies afford conclusive proof of the character of the inflammation when it is due only to syphilis, though in the commoner mixed type of tubercle and syphilis they are less to be relied upon.

Sarcoma of the testicle in very young children is more rare than either syphilitic or tuberculous inflammation. It is limited to one testicle and it increases much more rapidly. The spermatic cord is quickly involved.

Teratomata of the testicle are usually dermoid tumours. They are rarer even than sarcomata and they extend upwards from the testicle, so that they are more likely to be mistaken for hydroceles of the cord or for epiploceles than for inflamed testicles.

Prognosis. The prognosis in the case of early syphilitic inflammation in children is as good as in adults, but if the inflammation is allowed to continue untreated, because it is unnoticed, the symmetrical atrophy ends in sterility and impotence. There is a remarkable delay in the advent of puberty in many children who have inherited syphilis, but it is difficult to say whether

this is not due to a general want of development which is mental as well as physical rather than to any special influence of the ovaries and testicles on the general metabolism of the tissues. It occurs in girls as often as in boys.

Treatment. The treatment consists of the treatment for syphilis generally. Careful feeding, the best possible hygienic conditions, the administration of mercury in the form of grey powder, and the inunction of some form of mercurial ointment.

BIBLIOGRAPHY

Mr. Jonathan Hutchinson, Syphilis, Commentary No. 122.

Dr. George Carpenter, Affections of the Testicle in Hereditary Syphilis. The Practitioner, vol. xlix, 1892, p. 187 et auct. ibi cit.

CHAPTER X

BREAST

Syphilis affects the nipple, areola, or skin covering the mammary gland as a chancre, or the mammary gland itself in the form of localised or diffuse gummatous inflammation in the later stages.

Chancres of the breast occur both in men and in women, but more often in women because, whilst acting as a wet nurse, the infection is derived from the infant. In a total of 9,058 cases of extra-genital chancres Bulkley states that 1,148 occurred on the breast and nipple, numbers only surpassed in his table by 1,863 cases traceable to vaccination, and 1,810 chancres of the lip due in most cases to kissing.

The most common type of chancre is a shallow, circular, and painful ulcer situated near the base of the nipple and extending a little way upon it. The surface of the ulcer is glazed and smooth, and there is more or less induration at the base. The axillary glands are enlarged, hard, and bullet-like. The chancres may be numerous, and both breasts may be affected. Fournier relates a case of twenty-three chancres, seven upon one breast, and sixteen upon the other. The rapid appearance of other signs of syphilis usually sets at rest the diagnosis, even in doubtful cases.

Mr. Marmaduke Sheild quotes the following interesting case which came under his own notice :—

'A respectable married woman, aged 30, was seen at St. George's Hospital in August, 1896. She had been married for six years, and had borne one healthy child. Three weeks before I saw her, the left nipple became slightly sore on one side. On examination there was a shallow excavated ulcer at the base of the left nipple. It was indolent, not suppurating, and had a glazed surface of gelatinous aspect. The edges were not hard, and there were two enlarged glands in the axilla. There was no history of having suckled

a strange child, and indeed, the woman could give no cause for the malady. The case was watched, and in about a week after I first saw her the symptoms were more evident. The swelling and induration were more marked, and the nipple became very painful. The glandular affection in the axilla, too, became more extensive. I asked permission to examine the husband, and this was done on August 26. He had contracted syphilis four years before, and though he had regular intercourse, he had never infected his wife in the ordinary way. On the left side of the tongue was a mucous plaque, and a similar condition existed at the angle of the mouth. The case is a most interesting one as showing the mode of syphilitic infection from a local manifestation. The further progress of this case was typical of severe syphilis. The history of late infection by the husband is very unusual, but I ascertained the facts with care.'

The characteristic ulcer is not always present as the initial manifestation of syphilis in the mammary region, for it may be replaced by a shallow erosion, by a crack, or by a fissure. Sometimes the ulcer is large and excavated, or it may present a phagedaenic type.

If the patient be suckling when the chancre appears the child must be weaned, and the sore should be protected from irritation and dressed with black wash or some mercurial preparation whilst mercury is given in a suitable form (Chapters XII–XIX).

Gummatous Inflammation of the Mammary Gland

François Boissier Sauvages (1706–67), Regius Professor of Medicine at the University of Montpellier, seems to deserve the credit of recognizing for the first time 'venereal cancer of the breast'. He says in his 'Nosologia methodica sistens morborum classes juxta Sydenhami mentem et botanicorum ordinem', published at Leyden in 1763:

'Puella 30 annos nata, a pluribus mensibus extracto hyoscyami albi usa, patiebatur tumorem in utraque successive mamma ovi gallinacei magnitudine, durum, tuberosum, immersum, cum doloribus lancinantibus ab axilla ad mammam per intervalla accedentibus. Cum autem simul acciperem ulcuscula oris et vaginae adesse, quae syphilidis decennis erant vestigia, nec liceret uti hydrargyrosi, ad trageas Keiserianas more consueto confugi, iisque per mensem et semissem usurpatis tumor et dolor mammarum, atque omnia syphilidis symptomata, evanuerunt, neque usque reversa sunt.'

[I saw . . . an unmarried woman aged 30, who had been using the extract of hyoscyamus for several months. She presented a tumour in each breast the size of a hen's egg. Dense and knobby, these tumours caused a lancinating pain which extended at times as far as the axilla. But when I discovered that little ulcers were also present in the mouth and in the vagina resulting from syphilis ten years before, I ordered as usual Keyser's 'sugar plums' because mercury could not be used. The pain and the swelling in the breast disappeared with every other sign of syphilis in six weeks, and there has never been any recurrence.]

Keyser's 'sugar-plums' were largely used in France as an anti-syphilitic remedy. They consisted of proto-acetate of mercury, 0·6 gramme, manna in tears, 12 grammes, mixed intimately and divided into 72 pills made into drages. The original formula, which is probably the one used by Sauvages, was made by heating pure quicksilver to a red calx, dissolving it in eight parts of vinegar, and mixing two pounds of manna to each pint of the solution. The mass was then dried and rolled into pills.

Syphilitic inflammation of the breast affects the subcutaneous tissue, the gland itself, and the tissue lying between the gland and the ribs or sternum. Very little attention has been drawn to it, and as it usually occurs as one of the later manifestations of syphilis it either passes unrecognized as some unusual form of chronic inflammation of the breast, or it is diagnosed as a cancer.

The superficial and deeper forms of inflammation, so far as I have seen them, have presented the ordinary characters of localised gummatous inflammation with enlargement of the axillary glands on the affected side. The gummata have been multiple, and have run the course with which surgeons are familiar in syphilitic disease of the testicle. The skin, at first freely movable over the swelling, becomes adherent as the tumour increases, and a deep circular ulcer is formed, which heals readily under the action of potassium iodide followed by a course of mercury.

Mr. Bryant describes the condition in the following words :—

'As the disease progresses, the tumour will enlarge, and the skin over it will become involved, but as in a chronic inflammation and not in a scirrhus; it will become glued first to the parts beneath, then become of a dusky colour, later on red, and last of all ulcerated; not first dimpled, then puckered, and subsequently infiltrated, as in a case of cancer. The tumour also as these super-

ficial changes appear will become more fleshy, softer, and at last give rise to the feeling of fluctuation. In this, its last stage, the disease has either partially or wholly broken down, and may discharge itself as an abscess, or the whole tumour may die as a mass and be sloughed out. The progressive softening of a gumma in whatever gland or tissue it may be found is a characteristic symptom of the affection; for diagnostic purposes it consequently requires emphasis.'

Mr. Bryant quotes the following case of gummatous infiltration of the breast, which was followed by sloughing of the whole gland:—

Martha C., a married woman aged 46, who has had no children or miscarriages, applied for relief on August 12, 1869, with an infiltration of the upper lobe of her left breast, which had been noticed for eight or ten months. The skin over the swelling was natural. She had, with this, enlargement of the axillary glands, and a suppurating node over the left frontal bone, which had been observed for six months. There was no pain in the tumour. Tonics with iodide of potassium in increasing and full doses were given with benefit.

On October 25, 1869, the breast tumour had become bossy, and presented the external features of inflammation, such as heat and redness with fluctuation. On March 31, the breast had greatly enlarged, and was as large as a coco-nut. The skin over it was ulcerating, and the gland tissue through the opening looked dead, and presented the yellow wash-leather aspect so characteristic of syphilitic deposit. In September, 1870, the whole mass sloughed out, and fell as a putrid mass into a basin, leaving a clean granulating surface. On November 10 the woman was well.

Mr. Marmaduke Sheild quotes the following case, which is equally instructive:—

A spare married woman aged 30, of very dark complexion, came to the Waterloo Bridge Hospital on May 27, 1895. There was a hard and slightly tender lump the size of a tangerine orange, close to the axillary side of the right nipple. The nipple was a little retracted; the skin was not adherent. There were no enlarged axillary glands. The woman stated that the swelling had existed for about two months, but it may have been longer. The tumour was not movable, and the skin over the centre of it was a little

dusky in colour and inflamed. The centre of the tumour was elastic and tender on pressure. There were no similar swellings elsewhere. The woman had been married for six years, and has had one child, now five years old. No miscarriages.

The tongue was fissured, with suspicious spots of white and thickened epithelium at the sides. There were some plaques and fissures on the lips.

The lump in the breast disappeared completely after a fortnight's course of potassium iodide and mercury, without the adoption of any local measures. One can hardly doubt that it was a gumma, and six months later the patient reported herself as remaining perfectly well.

No history of syphilis could be obtained, but the case was doubtless a true gummatous infiltration of the breast, as supported by the presence of the suppurating frontal node.

The treatment in the earlier stages consists in the administration of antisyphilitic remedies, whilst the affected breast is supported and protected from injury. Large gummatous masses which do not prove themselves amenable to this treatment may be removed locally, and this should be done before they begin to soften.

Diffuse Gummatous Inflammation

If localised gummata of the breast are rare, diffuse syphilitic inflammation is still more rare, and yet there are numbers of cases of chronic mastitis on record which can only be explained on the supposition that they are syphilitic.

Ambrosoli's cases are perhaps the best known :—

Case 1. A woman aged 19 was admitted into hospital with a primary syphilitic sore and enlarged inguinal glands on May 20, 1860. Local treatment only was resorted to and the patient went out after fifteen days. She returned on June 26 with syphilitic erythema, for which mercury was prescribed. The patient then drew attention to her left breast which she noticed had been getting larger for some days. On examination the breast was found to be uniformly enlarged and hard, and about one-third larger than the right. There was slight pain on pressure. The in-

teguments were normal. The swelling disappeared under iodide of potassium. A few days afterwards the right breast became swollen in a similar manner, but also subsided under the iodide. Osteocopic pains, from which the patient suffered, also disappeared.

Case 2. A woman aged 24 came under treatment in January, 1864, for a papulo-pustular syphilide, mucous patches of the lips, and iritis, for which mercury was given. The right mamma became uniformly enlarged and hard about three months later. The swelling was smooth and painful on pressure. The skin was unaffected. The patient was cured when iodide of potassium had been given for forty-seven days.

So little is known at present of the causes of chronic interstitial mastitis that it is only possible to record the cases carefully, and to leave others in the future to draw the necessary conclusions. It would be a matter of especial interest to determine whether chronic mastitis associated with syphilis is likely to be followed by cancer of the breast with the same frequency as is known to occur in other cases. In all probability the prognosis in this respect will be better than in the more ordinary forms, since the effect of treatment is very satisfactory in restoring the gland to its natural condition.

BIBLIOGRAPHY

Dr. Lucius Duncan Bulkley, Syphilis Insontium, article in Dr. Prince Morrow's System of Genito-Urinary Diseases, vol. ii, part i, p. 69.

Mr. Marmaduke Sheild, A Clinical Treatise on Diseases of the Breast, p. 137.

François Boissier Sauvages, Nosologia Methodica, Amsterdam, 1768, vol. i, p. 149.

Mr. Thomas Bryant, The Diseases of the Breast, p. 71.

Dr. Carlo Ambrosoli, Gazzetta Med. Italiana. Lombardia, 1864, p. 312.

CHAPTER XI

THE THYROID GLAND

Syphilitic inflammation affects the thyroid gland early in its course in the form of a transient enlargement, or during the later stages as a localised or diffuse gummatous inflammation.

Mr. C. B. Lockwood quotes the following cases in which there was a distinct enlargement of the thyroid gland during the height of syphilis, and says that 'since we have learnt to look for this symptom, it has been frequently observed. I have no doubt but that it is of the same nature as the enlargement of the lymphatic glands.'

Case 1. A woman aged 21 came with a roseolous and papular syphilide upon the chest and neck, condylomata upon the tonsils and vulva, alopecia, general lymphatic engorgement, and slight angina. Her thyroid body was enlarged about a quarter beyond its usual size.

Case 2. A woman aged 20 had had two indurated sores upon the vulva for two months. These were followed by local and general enlargement of the lymphatic glands, anaemia, cephalalgia, general roseola, angina, and condylomata ani. At this time, when the disease was at its height, the thyroid gland was distinctly enlarged.

Case 3. A woman aged 21 was admitted with a sore upon the right labium minus, ulceration about the anus extending into the rectum, a papular and roseolous eruption, anaemia, and cephalalgia. She left the hospital on May 4 because she was pregnant. All her symptoms were much improved. She returned in June with a relapse of the local eruption, much roseolous and papular eruption, condylomata about the fauces and tonsils, and general lymphatic enlargement. At the same time the thyroid gland was enlarged, together with the liver and spleen.

Case 4. A girl aged 16 also had a considerable enlargement of the thyroid gland during the period of general eruption. She had had a sore upon the vulva three months before admission. We found the whole body covered with roseola, and she also had anaemia, alopecia, angina, and general lymphatic engorgement. The thyroid was uniformly enlarged, but quite soft. Nothing of the kind had ever been noticed before. Her family was free from goître.

All her symptoms abated after a month's treatment with pil. hydrarg, and the thyroid body returned to its usual size. This rapid subsidence is a point of difference betwixt the enlargement of the thyroid and of the lymphatic glands. The general lymphatic enlargement in syphilis does not depart for about nine to twelve months after the beginning of the disease.

Case 5. A woman aged 23 had an enlargement of the thyroid body. It was accompanied by a papular and roseolous eruption, angina, anaemia, and alopecia. The sore was at the anterior commissure, and had not healed when the enlargement of the thyroid was seen by us. General lymphatic engorgement was present, but not in an unusual degree. The coexistence of gonorrhoea and papillomata with the above lesions seemed to have no bearing upon the enlargement of the thyroid.

Mr. James Berry confirms Mr. C. B. Lockwood's observations, and adds that Engel Reimers observed a similar condition eighty-six times among one hundred and fifty-two women, and forty-four times among ninety-eight men in the early stages of syphilis. The swelling was always soft and painless. It was never a source of trouble.

Localised Gumma of the Thyroid Gland

The following case recently came under my care at St. Bartholomew's Hospital :—

T. B., a waiter aged 53, was seen on November 4, 1907, complaining of a lump in his neck. He had first noticed the swelling one month previously. The patient contracted syphilis about thirty years ago, and was treated for six months at the Lock Hospital. He has since had various tertiary manifestations, which

have been cured by potassium iodide, a drug to which he is peculiarly susceptible, as he quickly shows signs of iodism when it is administered. He has had repeated attacks of gonorrhoea. He suffered from influenza last September, and since then his voice has been hoarse. His father died of asthma; his mother committed suicide.

The patient was a sickly looking man, with an oval swelling on the right side of his neck. The swelling measured two inches by one, and the long axis pointed obliquely outwards and upwards. The lower and inner end of the tumour lay in the episternal notch, whilst the outer and upper extremity was situated about an inch above the clavicle, but behind the anterior border of the sterno-mastoid muscle. The carotid artery lay behind it and to the outer side. The skin over the tumour was natural. There was no difference in temperature on the two sides of the neck. The tumour felt hard and solid, with a smooth surface and a rounded margin. It was painless and did not pulsate. It was neither adherent to the skin, nor to the sterno-mastoid muscle, but moved freely on swallowing, and was clearly a part of the right lobe of the thyroid gland. The outer end of the swelling felt so stonily hard that it was thought to be calcified. A radiograph was taken of the neck and the negative showed a distinct shadow in the position of the swelling.

The patient was ordered a mixture containing potassium iodide and ammonium carbonate. In a fortnight the swelling was only half its original size, and in a month it could no longer be felt; but in spite of this the patient was put upon a course of mercury, as it was pointed out that the existence of such a gumma proved him to be still suffering from syphilis.

Mr. James Berry quotes the following case, which was admitted into St. Bartholomew's Hospital under the care of Mr. W. Bruce Clarke on December 28, 1896:—

The patient was a married woman, aged 38, who was suffering from dyspnoea and a swelling of the neck. She had been married thirteen years, but had never been pregnant. She had been under treatment for gummata of the face and arm for the last four years, and had noticed the swelling in her neck for about six weeks.

There was no history of any pre-existing goître. The middle line of the neck from the hyoid to the sternum was occupied by a prominent hard mass which moved slightly with the larynx on deglutition. The skin over it was of a dull red colour, and at the upper part was a deep, circular ulcer at the bottom of which was a hard, yellowish mass, evidently the isthmus of the thyroid gland. The dyspnoea became so bad on the fourth day after admission that a laryngo-tracheotomy had to be performed hurriedly. The operation was difficult owing to the thickness of the tissue which had to be divided before the cricoid was reached. The incision was made through a thick mass of gummatous thyroid, most of which afterwards sloughed away. The patient made a good recovery, and left the hospital six weeks after admission. The wound had practically healed, but there was still a little oedema of the larynx, and the left vocal cord did not move quite freely. It seemed probable that in this case there was some necrosis of the larynx as well as syphilitic disease of the thyroid gland.

The Museum of the Royal College of Surgeons of England contains a specimen (No. 2,906 *G*) of gummatous inflammation of the thyroid gland which is described in the catalogue in the following words :—

'Base of the tongue, larynx, and thyroid gland, showing gummatous infiltration of the thyroid. The sterno-thyroid muscle is matted to the left lobe of the thyroid, which on section has a white fibrous appearance towards the periphery, while the centre more nearly resembles normal thyroid tissue. The upper end of the trachea is distinctly stenosed, and it, as well as the base of the tongue, shows the effects of past ulceration. Microscopic sections showed a fibrous tissue richly studded with nuclei. From a woman, about 60, who was brought into Guy's Hospital dead. There were gummata in the liver.'

Inherited Syphilis

Inherited syphilis affects the thyroid either in the form of localised gummata or as a diffuse inflammation leading to goître.

Demme mentions three cases seen by him at Berne in which children with congenital syphilis had gummatous nodules in the

thyroid. In all three cases the liver and skin also presented signs of syphilis.

Dr. Moritz Fürst of Hamburg has published the case of a child born with a goître of considerable size, which he thought was undoubtedly due to syphilis. The father had suffered from this disease, and the mother underwent a course of mercurial treatment during her pregnancy, as she had already given birth to a still-born syphilitic child. Each lobe of the goître was as large as a walnut. The swelling almost entirely disappeared spontaneously within six weeks of birth. No treatment was adopted.

BIBLIOGRAPHY

Mr. James Berry, Diseases of the Thyroid Gland and their Surgical Treatment, p. 148 et auct. ibi cit.

Mr. C. B. Lockwood, St. Bartholomew's Hospital Reports, vol. xxxi, p. 232.

Mr. D'Arcy Power, The British Medical Journal, vol. i, 1908, p. 147.

Demme, in Gerhardt's Handbuch der Kinderkrankheiten, Tübingen, 1878, vol. iii, part ii, p. 413.

Dr. Moritz Fürst, Berlin. klin. Wochenschrift, 1898, vol. xxxv, p. 1016.

CHAPTER XII

THE TREATMENT OF SYPHILIS

The treatment of syphilis is important to the community as well as to the individual. Untreated or badly treated the disease becomes a scourge. It may be transmitted by the most innocent means, and spreading thus from person to person whole households and even families may become subject to its ravages. The effects of the disease are transmitted directly to the children of infected parents, and it is more than probable that the vitality of the third and fourth generations are also affected. The general health of a nation therefore, is soon impaired when syphilis is allowed to pursue its course unchecked, and the disease should be attacked on every side.

Prophylaxis. In the first place, and before all things, syphilis should be prevented. In the agricultural parts of Great Britain it is for the most part of uncommon occurrence, and even in our large towns the growth of athletics and the diminution in the consumption of alcohol have done much within the last twenty years to lessen the amount of venereal disease in general and consequently of syphilis in particular. Primary syphilis is certainly less common in the outpatient rooms of our large hospitals than it used to be, whilst in better class civil practice for one case of infection in London certainly two or three have been caught in garrison towns, Paris, or the Mediterranean Ports. As the disease is not very common the patients are usually ignorant of the risks which they run, and of the danger of infecting others.

The first step in the successful treatment of syphilis is to clear the mind of any idea that the disease differs essentially from other affections due to infective agents. It is not necessarily

venereal in origin, and no more moral turpitude therefore attaches to it than to scabies or to leprosy. Pathology indeed has no ethical side, and syphilis must be considered wholly from the standpoint of pathology if it is to be treated successfully.

The moral aspect of syphilis does not concern us in our capacity as the curers of disease, though we can and should do much to promote the living of clean lives by those with whom we are associated. Example as well as precept enables many of us to influence for good a large and ever widening circle. We should cultivate these opportunities quietly and unobtrusively, less by speech than by our bearing and conduct through life. When a patient who has contracted syphilis seeks advice we should remember that in the light of our present knowledge the disease is due to an infective agent, which is only now beginning to become known, incident to man but inoculable also on the anthropoid apes, and to a less extent upon the lower primates. This agent can only be transmitted by direct infection, but it is so highly contagious that every unprotected person becomes infected when he is exposed to it under suitable conditions.

The suitable conditions appear to be identical with those leading to an ordinary poisoned wound if the personal factor be eliminated. In a poisoned wound the general state of health of the person is an important factor in the liability to infection. A person who is overworked mentally or bodily, or one whose tissues are not accustomed to contact with septic products is readily infected at a post-mortem examination or by a dissection wound. This is not true of syphilis, because so far as is known at present no one is immune, and exposure to infection is always followed by the disease when the syphilitic virus as represented at present by the *Spirochaete pallida* has gained admission to the lymphatic system of a body which has not yet suffered from syphilis. It follows, therefore, that syphilis is more easily communicated in the earlier than in the later stages of the disease. The primary syphilitic lesion, whether it be a hard sore or merely an erosion, is acutely contagious; in the secondary stage syphilitic inflammations of the skin

and mucous membranes are very infectious, the mucous patches and condylomata seeming to be more liable to spread the disease than the papules and tubercles. The blood, and especially the lymph, is capable of transmitting syphilis both in the primary and secondary stages. The tertiary manifestations are not generally contagious, but every now and then cases of infection are recorded which are clearly due to the inoculation of the products of gummatous inflammation. Infants with syphilis, whilst they have mucous patches and condylomata, are as capable of infecting others as those who have acquired the disease later in life. But infants with inherited syphilis as shown by skin eruptions, snuffles, and marasmus, seem to be somewhat less likely to transmit the disease than those who have acquired it just after birth, although the tissues of children with inherited syphilis are said to teem with spirochaetes.

So far as is known from clinical experience the syphilitic poison is only inoculated when there is a transference of diseased cells, or of the débris of these cells, from the affected person to an abraded surface on the recipient. The inoculation of a fluid free from cells, or containing only healthy cells, is not sufficient to produce the disease. It would appear, therefore, as though the spirochaete bore a very intimate relation to the cells of the tissues injured by its presence. The urine, milk, and sweat, are innocuous unless the glands from which they are derived are the seat of active syphilitic inflammation, but the saliva may transmit the disease because it is contaminated from the mucous patches which are so often present in the mouth. This statement, however, finds an exception in the semen, which may be inoculated with impunity, although it has the power of transmitting syphilis to the ovum fertilized by it. But impregnation differs widely from inoculation.

Syphilis can only be caused by inoculation with the syphilitic poison obtained from a pre-existing case of syphilis, but the poison is of great potency, and has some power of withstanding external influences. It is usually acquired during sexual intercourse, and the seat of inoculation is situated at or near the genital organs in about ninety per cent. of all cases. Indeed

the overwhelming proportion of patients with syphilis due to venereal infection has somewhat masked the pathological fact that syphilis is a chronic infective granuloma, starting from a local lesion, and due to a definite infective agent, the *Spirochaete pallida*. The disease must therefore be placed in any system of classification midway between leprosy and cancer.

As has already been said, inoculation with the syphilitic poison at any point is always successful in an unprotected person, and may lead to the disease in all its forms. It is not uncommon, therefore, for persons to contract syphilis accidentally and without venereal intercourse. Syphilis obtained in this manner is sometimes called 'Syphilis insontium' or 'Syphilis of the Innocent', a thoroughly unscientific expression, for ethics have no place in pathology. Women, from their habit of kissing babies and casual acquaintances, surgeons, accoucheurs, and midwives, from the nature of their callings are especially likely to acquire syphilis. Certain occupations, too, have been fruitful in the spread of syphilis, notably glass-blowing, where the blowing-tube is passed from mouth to mouth. Outbreaks of syphilis have been traced to arm-to-arm vaccination, and some years ago I saw several Jewish children who had been inoculated during the performance of ritual circumcision.

The resistance of syphilitic poison to external influences is shown by the fact that there are many authentic instances of the disease being communicated by contaminated pipes, cups, spoons, forks, towels, sponges, and articles of underclothing, as well as by unclean surgical and dental instruments, and by razors. The risk of infection with syphilis is so real, and people affected with the disease are so careless and so ignorant (for they often believe that they can only infect by sexual intercourse), that every individual should be warned of his liability to spread the disease, and he should be definitely instructed in the precautions necessary to prevent him from so doing.

It is customary to think of syphilis as a disease beginning with a well-marked lesion—the primary sore—yet in a large

number of cases even observant people suffer from syphilis without being able to afford any history of a chancre. This ignorance is genuine in many instances, and is accounted for in several different ways. In women the initial manifestation may be so situated as to be invisible, and if there is but little pain and inflammation it may easily pass unnoticed, whilst the earlier signs in the skin and on the mucous membranes may be incorrectly diagnosed. Both in men and in women a chancre may be mistaken for a boil, a carbuncle, or a poisoned wound by those who are not in the habit of seeing syphilis very often, or who are misled by the surroundings and condition of the patient when the disease has been contracted accidentally. I saw a good example of such a mistake in the autumn of 1906. A young lady was sent to me with a characteristic chancre upon her cheek, a great amount of inflammation in the cervical glands and mucous patches in her mouth. The sore had been treated for many days as a boil. A careful inquiry as to the mode of infection showed that it was probably contracted at some public swimming baths which the patient was in the habit of using. The sore quickly disappeared and the glands subsided when mercury was given, but they increased in size when the medicine was discontinued. The signs of syphilis might have disappeared spontaneously in this healthy young lady and there would then have been very little probability of connecting her poisoned wound with any syphilitic symptoms which she may develop presently. In other cases again the chancre may be nothing more than an erosion with slight signs of induration, and this may easily escape notice if the patient is unaware of the fact that he has run any risk of infection. I have seen this both in nurses and in medical students who have been very unwilling to believe that a sore place on their fingers close to the nail could really be the manifestation of so serious a disease as syphilis.

The appearances presented by such a sore are well seen in Plate XXXV, which is made from a wax model in the Pathological Museum of Guy's Hospital. The plate represents the flexor aspect of the right hand and forearm. There is an ulcer over the interphalangeal joint of the thumb. The ulcer has an

exuberant and granulating base, which looks dry, and is covered with a yellow exudation. The edge is somewhat thickened and the surrounding skin is peeling. The true nature of the sore is disclosed by the scattered macular rash on the forearm which is clearly a papular syphilide such as commonly appears as the earliest and mildest manifestation of cutaneous syphilis. The model was made from a woman aged 52, who was nursing a syphilitic baby with sore buttocks. She cut her thumb and inoculated the wound from the infant's sores. She suffered from a sore throat, in addition to the signs of syphilis seen in the Plate. She was under the care of Mr. John Birkett, in February, 1868.

But when all these possibilities of error have been excluded there remains yet another. The fact that syphilis is inherited is acknowledged by every one, but far too much stress is laid upon the manifestations occurring in early life to the exclusion of those occurring later. The French school, led by Professor Fournier, recognize the later signs of inherited syphilis, but there are very few surgeons in England who hold clear views on the matter. It is usually taught that inherited syphilis ceases to be troublesome after puberty, or at least about five-and-twenty, yet patients come every week who are living examples of the falsity of this teaching. Gummatous inflammation of the bones (p. 36) sometimes occurs in men of thirty and upwards, the subjects of inherited syphilis; both in men and in women gummatous sclerosis (Plate XXIII and p. 113) of the tongue, which is indistinguishable from that caused by acquired syphilis, is also not very uncommon. It will be found in all probability that there are many more cases of this kind than is usually supposed, but much further work on this aspect of syphilis is required before any dogmatic statements can be made. Very little is yet known as to the influence of injury, irritation, and commencing senile changes in causing syphilitic manifestations in those who have inherited or have acquired syphilis as infants but have long been free from any signs of the disease. The influence, too, of other diseases, such as tubercle and cancer, acting upon tissues contaminated by syphilis also requires further study.

There are still some other aspects of syphilis which must be clearly recognized before the disease can be treated adequately.

The incubation is long and somewhat variable in man, although experimentally in apes it is twenty-six days. The first manifestation is always at the seat of inoculation, and is so often single that a multiple lesion is a pathological curiosity. Syphilis is a progressive disease, but it is not regularly progressive because periods of activity alternate with times of rest, and this peculiarity is one of the greatest stumbling-blocks to cure. As long as a patient is suffering from signs of active syphilis so long will he and his medical attendant persevere in treatment, but as soon as these signs have disappeared the patient is too often left without treatment until the onset of fresh symptoms make it necessary to begin afresh. The proper method of effecting a cure is to tell the patient at the very beginning of an attack of syphilis that he must submit to a continuous and well-regulated course even though the signs and symptoms are not present. If this is done the chances of serious disease of the nervous and vascular systems at a later period will be materially lessened, for it is well known that the worst sequelae often follow upon syphilis which has produced such slight signs in the earlier stages as to have been considered unworthy of efficient treatment.

The general health of the body and the physiological changes in the tissues appear to determine the virulence of the attack in the earlier stages, so that a young and healthy adult living an open air life free from care is but little incommoded by the disease; whilst a drunkard or one whose tissues are degenerating, whether from age or such general disease as tuberculosis or malaria, always suffers badly from the onset. The stress of the disease falls mainly upon those tissues and organs which are physiologically overworked or are already vitiated or rendered unsound by inflammatory processes. The most remote manifestations of syphilis may thus remain in abeyance so long as all the tissues are healthy and vigorous, though they may become manifest when ill health or a local injury leads to a departure from normal processes.

Syphilis is characterized by a chronic inflammation of the mesoblastic tissues, although the structures developed from the

epiblast and hypoblast do not wholly escape. The inflammation leads to the production of a number of small round cells which show a marked tendency to undergo disintegration in the earlier stages, whilst at a later period in the disease the tendency to disintegrate is associated with conservative changes producing imperfectly formed fibrous tissue. The disintegration and absorption of the inflammatory cells is controlled in a very marked manner by the presence of even small quantities of mercury, whilst the removal of the imperfectly formed fibrous tissue occurs more rapidly and completely if the body contains an unusual quantity of iodides than if mercury alone is present.

We have as yet no clear perception of the manner in which these drugs act. The experimental work of Professors Metchnikoff and Roux goes far to prove that syphilis is associated with the presence of the *Spirochaete pallida*, and if this organism be accepted as the cause of the disease the action of mercury is readily explained. The drug destroys the micro-organisms whose action causes the tissues to produce the small round-celled infiltration. The influence of potassium iodide upon newly formed fibrous tissue is well known, and it is not limited to the results of syphilitic inflammation, for it is equally well seen, though to a slighter extent, in cancer and in chronic inflammations due to injury.

There are certain axioms in the treatment of syphilis upon which it is impossible to lay too much importance. First and foremost the disease is curable by mercury and by mercury alone. When it is cured there will be no further sign of syphilis in the patient, and it will not be transmitted to the offspring. 'Nothing,' says John Hunter (1728–93), in his treatise of the Lues Venerea, 'can show more the ungrateful or unsettled mind of man than his treatment of mercury. If there is such a thing as a specific, mercury is one for the venereal disease in two of its forms; yet mankind are in pursuit of other specifics for the disease, as if specifics were more common than diseases; while at the same time they are too often contented with the common mode of treating many other diseases for which they have no specific; and these prejudices are supported by the public, who have in their minds a dread of this medicine, arising from the want of knowledge

of our predecessors in administering it, and many of the present age, who are equally ignorant, take advantage of this weakness.' Hunter's observations are as true now as when they were written, if the word syphilis be substituted for 'the venereal disease in two of its forms'.

The disappearance of the signs and symptoms of syphilis does not necessarily mean that the patient is cured, because the course of syphilis is only marked intermittently by external signs. During the earlier stages of syphilis the signs disappear spontaneously and may remain absent for long periods of time, yet the progress of the disease has continued as is shown by its subsequent reappearance. Mercury, therefore, must be given in sufficient doses and for long periods of time, as it only cures slowly by attenuating the poison, and the disease may show signs of life even during the administration of the antidote. It is certain, too, that mercury does not prevent infection when it is circulating in the body, since there are many cases on record where persons have contracted syphilis just after the completion of a mercurial course, and those who work in mercury mines are by no means exempt from the disease. But there is some evidence to show that applied locally and in a form which can be made to penetrate the epithelial cells it may destroy the poison before it is absorbed. Mercury in the prolonged doses which are needed to cure syphilis is only borne by those who can be brought into a state of physiological equilibrium as regards health. Each patient, therefore, must be considered individually if the best possible results are to be obtained. His peculiarities must be studied, and he must be treated not by a routine method or a cast-iron system, but by the administration of that form of mercury which he can assimilate most readily, and by the method best suited to his peculiar requirements. When this is done the patient is cured slowly of his disease and is left increased in weight, of a ruddy complexion, and in good spirits, conditions which form the antithesis of the popular picture of one who has been subjected to a long course of mercury.

The attempt to cut short the progress of syphilis by excising the primary sore has been tried sufficiently often to show that

it is useless, even when the chancre is situated on a long prepuce where it can be removed completely. It is evident, therefore, that syphilis is a constitutional disease with the chancre as a local sign, like the bubo in bubonic plague, rather than a local condition leading to constitutional infection like cancer in the earliest stage.

Syphilis in its course follows somewhat the lines pursued by the virus of rabies; a point of local inoculation, a long incubation period, and appearance of the first signs at the seat of inoculation; but in rabies the poison works chiefly on the central nervous system, whilst in syphilis the mesoblastic tissues generally are affected.

Prophylaxis. The experimental work of Professors Roux and Metchnikoff, at the Institut Pasteur in Paris, has given us the first scientific information about the poison of syphilis. Their results show it to be unstable, for it is easily destroyed in the laboratory by drying, by cooling it to a point below 50° F., and by heating it for half an hour to a temperature of 122° F. Thorough inunction with a mercurial preparation made at the site of an experimental inoculation with a virus which control experiments have shown to be active, will prevent infection if it be made within eighteen and a half hours of the time of inoculation. Later than this inunction is useless in preventing infection.

Those who had followed the results of the preventive treatment of syphilis felt sufficiently assured to allow Dr. Paul Maisonneuve, the grandson of J. G. Maisonneuve the great French surgeon, to be inoculated with an active virus of syphilis on February 1, 1906. The details of the experiment are as follows :—

'Examination by Drs. Sabouraud and Salmon on January 23, 1906. M. Maisonneuve states that he has never had syphilis himself, and that he is free from any taint of inherited syphilis. Examination shows that the buccal mucous membrane, the tongue, and the tonsils are normal. The lymphatic glands of the neck behind the ear and above the elbow are not enlarged; the axillary glands on both sides are swollen. There is a small lymphatic gland in the right groin which is enlarged and tender as result of an herpetic eruption on the penis.

'On February 1, 1906, the herpes was cured and the swelling in the right groin had disappeared. Professor Metchnikoff inoculated M. Maisonneuve in the presence of MM. Roux, Queyrat, Sabouraud, and Salmon.

'He made three parallel scratches with a Vidal's scarifier on the left side of the balano-preputial fold. The scarifier was charged with matter from the chancre of M. D——, a patient under the care of M. Humbert. He was twenty years old and had suffered for two months from an indurated chancre of the fraenum preputii. He also had a suppurating balanitis, two enlarged glands in both groins, but no skin eruption. He had been treated locally with nitrate of silver.

'Immediately afterwards Professor Metchnikoff made a similar inoculation on the right side of the balano-preputial fold of M. Maisonneuve, the instrument being charged with virus obtained from M. O. L——.

'M. O. L—— was under the care of M. Queyrat for an indurated chancre of the penis of ten days' duration. His inguinal glands were enlarged, but he had no roseola. He had not been treated either locally or generally.

'An hour after the inoculation of the poison obtained from these two sources M. Maisonneuve's penis was rubbed for five minutes with an ointment consisting of 10 grammes of calomel and 30 grammes of lanoline.

'Apes were used for control experiments :—

'Chimpanzee No. 46 was inoculated on the left eyebrow with matter taken from M. D——, and on the right eyebrow with virus obtained from M. O. L—— ; some minutes after the inoculation of M. Maisonneuve. The chimpanzee died of pneumonia on February 10, before the incubation period of the disease was completed.

'Macacus cynomolgus (vol. i, Plate XVII) No. 61 was inoculated on the left eyebrow with matter obtained from M. D——, and on the right eyebrow with virus from M. O. L——. On February 18 the initial manifestation of syphilis appeared on the right eyebrow. On February 28 this sore began to get well, and on March 12 it was completely healed.

'Macacus cynomolgus No. 62 was inoculated in the same manner as monkey No. 61. A typical sore appeared on the right eyebrow eighteen days later; the sore increased until March 12, and it was still visible on May 3.

'Control experiments with the preventive ointment. Macacus cynomolgus No. 63 was inoculated in the same manner as the monkeys Nos. 61 and 62, and an hour later the two eyebrows were rubbed for five minutes with the same mercurial ointment as had been used for M. Maisonneuve. The animal showed no signs of disease on February 17, but on the 28th it seemed to have rubbed its right eyebrow against the cage. On March 14 the scars of this excoriation could still be seen, but they did not appear in the least like syphilitic sores.

'Macacus cynomolgus No. 64 was inoculated in the same manner as the monkeys Nos. 61, 62, and 63. The monkey was allowed to remain for twenty hours before the eyebrows at the point of inoculation were rubbed with some of the same mercurial ointment which had been employed for M. Maisonneuve and for

monkey No. 63. The animal remained healthy when it was examined on February 17 and 28, but on March 12 there were some slight and doubtful sores on the right eyebrow. On March 14 these sores had increased considerably. They were rose-red and had the appearance of primary sores. The monkey was found dead on the 17th, and the appearance of the sores left no doubt as to their specific nature.

'The notes about M. Maisonneuve state that on February 3 there was no inflammation of the balano-preputial region. Examination with a lens showed traces of the scarifications invisible to the naked eye. The wounds were not at all inflamed. The remains of the calomel ointment was washed away with soap and water. The parts were left without any treatment either by powder or otherwise. On February 5 the small scarifications were completely healed. On February 7 the seat of inoculation continued healthy, but two small suppurating vesicles appeared on the mucous surface of the prepuce on the dorsal aspect of the penis. These vesicles had disappeared on February 9, and the prepuce remained healthy until the 15th. Examination on the 19th showed four small suppurating vesicles upon the mucous membrane of the prepuce which had disappeared on the 21st, leaving only a red mark. All went well from this date, and the note of April 12—the seventieth day after inoculation—states that M. Maisonneuve presents no trace of any syphilitic disease of the skin ; examination of the inguinal region shows also that there is no enlargement of the lymphatic glands. There are, however, six small ulcers on the prepuce but they are not situated near the seats of inoculation and they are clearly due to an attack of herpes.

'M. Maisonneuve submitted to examination by MM. Sabouraud and Salmon on May 6, 1906. They reported that on this, the ninety-fourth day after inoculation, M. Maisonneuve was found to be free from any trace of recent syphilis. The skin of his body only showed signs of acne. The lymphatic glands of every part were unaffected and natural. The mucous membranes of the mouth and anus showed no lesion. There was a small group of typical herpetic lesions on the dorsum of the glans penis.

'M. Maisonneuve was examined again on May 8 at the suggestion of M. Metchnikoff, and Dr. Queyrat reports that "I can find no trace of syphilis, although I have examined him with the utmost care. There is nothing on the body except a little acne ; the mucous membranes of the mouth, tongue, and throat are free from any lesion, and so also is that of the anus. The inguinal, cervical, and epitrochlear lymphatic glands are normal. The hairs are solidly implanted and do not come out even when they are pulled forcibly. There is no sign of syphilis in the palms of the hands. The inoculations at the balano-preputial fold have left no trace of their existence, nor is there any induration. There are two small erosions which are healing on the mucous surface of the prepuce, but they are clearly herpetic, and M. Maisonneuve is liable to herpes. They have succeeded some vesicles

which existed there three or four days ago. In conclusion I believe that M. Paul Maisonneuve is free from syphilis at the present time.

'"(Signed) QUEYRAT.

'"Paris, *May* 8, 1906."'

The notes of this experiment are given at length because it is not one that is likely to be repeated very often. It shows, so far as a single experiment is concerned, that syphilitic virus, which was inoculated and allowed to remain in contact with the tissues for a definite time, did not affect the body generally in one case, whilst in others it was successfully inoculated. In the unsuccessful case the seat of inoculation was rubbed with an ointment containing mercury, in the other cases no such precaution was adopted. M. Maisonneuve seems to have been especially well fitted to contract the disease. He was subject to herpetic eruptions on the prepuce, and the inguinal lymphatic glands were in a state of, at least, subacute inflammation. Prof. Metchnikoff considered the experiment to be of sufficient importance to warrant him in bringing the matter before a meeting of the Académie de Médecine. But in regard to the local application of mercury Professor Neisser has shown that a chancre obtained by experimental inoculation develops in the same manner in a body which has been already brought under the influence of mercury as in an animal to which mercury has not been given. If injections of mercury are begun on the day syphilis has been inoculated experimentally a hard sore develops at the spot after the usual period of incubation, and the disease becomes generalized in exactly the same manner as in an animal which has not been treated with mercury.

All attempts at producing immunity to syphilis by the use of a serum have hitherto proved useless (vol. i, p. 171). But there is some evidence that the syphilitic virus is attenuated (p. 7) when it is passed from one group of apes to another, or from man to chimpanzee.

It is clear, therefore, that these methods of prophylactic treatment cannot yet be adopted clinically, because they have hardly emerged from the experimental stage. Some modification of a routine system must still be adopted, and in spite of Professor

Neisser's observations on animals I believe that the methodical treatment of syphilis with mercury should be begun as soon as the diagnosis can be made with any degree of certainty. This can sometimes be done before the appearance of the hard sore, as in cases where the patient is inoculated from a known source of syphilis; more often the first manifestation is so characteristic as to leave no doubt of its nature. But in many cases the initial signs and the history are so unsatisfactory that the diagnosis is not assured until signs appear on the skin or the mucous membranes.

A good prognosis may be given in young patients who are otherwise healthy. They may be told that the secondary symptoms can be kept well under control if they will submit to a thorough course of treatment, and that it is improbable they will suffer from any marked tertiary symptoms unless perchance they are subject to some unusual debilitating influences late in life. But these patients should be told in plain words that the worst results often follow the mildest attacks, because the very slightness of the symptoms leads a patient to be careless of cure, and so long as he is free from symptoms he thinks but little of the disease. It is this carelessness in regard to mild attacks that fills our infirmaries with tabetics and our asylums with general paralytics.

The intemperate, the tuberculous, the rheumatic, the gouty, the malarious, those who suffer from any wasting or debilitating disease, and above all those who contract syphilis late in life bear the disease badly. Such patients must be warned at the beginning that their cure will be harder, that it will take proportionately longer, and that tertiary signs are very likely to be troublesome.

Mercury is given for the cure of syphilis by the mouth, by inunction, by fumigation, and by injection into the tissues. These methods may be used singly, alternately, or in combination. But so far as is known at present there is no true cure of syphilis without the use of mercury. The great end of its administration is to obtain the absorption by the tissues of so much mercury that the syphilitic poison is destroyed and the inflammatory products are absorbed. The method by which mercury acts in

syphilis is not yet known. The drug may actually destroy the poison or the agent producing it, or it may act indirectly by promoting the formation of alexins. These alexins are said to furnish the organism with the power of defence by neutralizing the pathogenic agent. At any rate it appears certain that the leucocytes play an important part in the process, and a diminution in their number during a mercurial course is an unfavourable sign. Experience teaches that every patient suffering from syphilis can take an adequate quantity of mercury in one form or another, but what suits one patient is improper for another, and it is the first duty of the medical man to ascertain the most appropriate method for each patient.

Mercury is eliminated by most of the secretions of the body, and though the amount excreted is usually measured in the urine (pp. 213–17) as the most convenient medium, yet the amount excreted by the bowel must also be noted should it be desirable to keep an accurate record. After an injection of calomel mercury appears in the urine in the course of a few hours, and attains its maximum on the fifth day. Excretion is slower after ingestion and inunction than after the administration of mercury by injection, for the maximum excretion is not reached until between the fifteenth and the twenty-fifth days. A mercurial course given to patients with chronic renal disease must therefore be associated with means to render the skin more active than usual, and at the same time smaller doses of mercury should be administered. Indeed there is some evidence to show that extremely small quantities of mercury are necessary to cure syphilis, and that it is rather the constant presence of the drug in the tissues than the amount which is efficacious.

Colonel Lambkin states that some years ago Wing, the chemist at Aachen, published the results of an analysis which he had made to determine the exact amount of mercury absorbed into the system as a result of such a course of inunction as is prescribed and used in the town for the treatment of syphilis. He found that the amount of mercury absorbed was infinitesimal, being no more than 0·06 of a grain. This of course is only an approximate figure, but a series of cases gave substantially the same results.

The general moral and hygienic treatment is of great importance in enabling a patient to go through his complete course with success. The patient should be encouraged from the beginning, and he should be taught to believe that the condition is curable if proper precautions be taken. The general health of the patient must be improved and maintained at the highest possible level. Daily exercise ought, therefore, to be insisted upon, and outdoor pursuits should be encouraged. Shooting, hunting, golf, or tennis are all good if they be not carried to excess, but their concomitants smoking, drinking, and late hours to talk over the events of the day must be rigidly eschewed.

It is useless to launch a bald prohibition against smoking and drinking without giving any adequate explanation. Smoking is bad because syphilis is especially liable to attack the mucous membrane of the mouth, and syphilitic manifestations always develop as a result of irritation. The smoking of cigarettes and cigars is especially irritating to the mucous membrane of the tongue and the lips, and the habit should be wholly abandoned, because in the later stages irritation of the tongue is painful, chronic, and very likely to end in cancer. Women suffering from syphilis are almost exempt from this form of irritation which is very common in men (p. 87). In like manner the drinking of spirits is bad, though there is no objection to a glass of good wine occasionally, if it be taken at or after dinner.

During a course of mercury the skin should be kept active, and the patient may be recommended to take a Turkish bath once or twice a week and a hot bath daily. He should be warned, too, of the additional risk he runs of taking cold, and he should therefore be advised to take a little extra care of himself by wearing silk or flannel undergarments and to avoid as far as possible sudden and violent changes in the temperature of his environment.

The Internal Administration of Mercury

Mercury is usually given by the mouth in this country, and the essence of successful treatment is so to give it that the digestive organs remain unaffected throughout a course extending over

many months. But at the present time the method is being close-run by that of intramuscular injection (pp. 222 and 279), which is well suited for many cases in skilled hands, but is ill suited for those who are not used to appreciate the value of minute detail, whether it be the medical man or the patient. The internal administration of mercury is the most usually adopted on account of its ease and cleanliness, but it requires a certain amount of intelligent co-operation on the part of the patient if the course is to be carried to a successful issue. It is not sufficient merely to order an appropriate preparation to be taken in a just dose, but definite instructions must be given with the prescription. No drug has been so grossly abused in the past as mercury, and none has fallen consequently into such complete disrepute, but well and skilfully given none is so adequate in the treatment of syphilis.

Precautions. The mouth suffers first during the administration of mercury in doses which do not affect the bowels. The hygiene of the mouth therefore is of the utmost importance. The patient should be directed to obtain the services of a dentist, who should stop all carious teeth, remove any excess of tartar, and treat any inflammation of the gums which may be present. Smoking, as has been said already, should be absolutely prohibited, because in the early stages the irritation tends to promote the formation of mucous patches in the mouth, and these mucous patches may lead to the infection of others immediately by kissing, mediately by the infection of drinking vessels or other objects which may be used promiscuously, passing from mouth to mouth, like pipes, penholders, pencils, pins, and coins. The surgeon must not be content with seeing that these instructions are carried out once and for all at the beginning of the treatment, but he must examine the patient's mouth from time to time. The inflammation of the mucous membrane, known as stomatitis, due to mercury always begins locally, though the patient may not complain until it has become widely spread, and it is much easier to cure it at once than when it is generalized. Persons who are in a weakly condition often suffer from a partial detachment of the mucous membrane of the gum just behind the last molar teeth, and mercurial stomatitis often begins at this spot.

The administration of mercury should be suspended as soon as there are any signs of inflammation of the mouth, and should only be recommenced in small doses when the stomatitis has subsided. The patient should be told to brush his teeth after each meal during the whole time that he is taking mercury, and he may be ordered to use a mouth wash two or three times a day. A solution made by putting a teaspoonful of chlorate of potash into a tumblerful of water is sufficient, or more elaborate gargles may be made according to the following formulae :—

(1) ℞

Borax, grs. 24 ; Glycerin. m. 24 ; Tincture of myrrh, m. 24 ; water to one ounce.

Dissolve and mix.

(2) ℞

Tinct. of Krameria, m. 10 ; Tincture of myrrh, m. 10 ; Compound Tinct. of Lavender, m. 3 ; Glycerin of Borax, m. 40 ; water one ounce.

Mercury also causes disturbances of the digestive function owing to the irritant effect which it exercises upon the alimentary canal. The patient complains of stomach-ache, indigestion, loss of appetite, and he may also suffer from diarrhoea. Few patients altogether escape these symptoms at some stage of their treatment. It affects some early, others later, and a few when mercury is given by other means than the mouth. Persistence in treatment is generally sufficient to enable the patient to tolerate the drug, and it should not therefore be given up too readily. It is often better to change the preparation or to lessen the dose for a time or even to add some opium or thebain to the prescription. But in every case, as mercury has to be given in the treatment of syphilis, the form must be discovered for which each patient is most tolerant ; and it is found as a matter of experience that fruit, green vegetables, coffee, stimulants and aperients go badly with the drug. It is better therefore to warn the patient not to take them whilst he is undergoing a mercurial course.

It is a popular fallacy that the prolonged administration of mercury necessarily causes anaemia and a state of cachexia.

The belief dates back to the time when such patients were salivated, sweated, dieted and bled. It is quite untrue at the present time when no patient is salivated and the preparation of mercury is carefully chosen to suit the individual case. Indeed, so long as syphilis is active the patient seems to thrive on mercury, and if he be weighed at regular intervals his weight will be found to remain stationary or even to increase. Still, many patients who try to combine a course of mercury with the distractions of the London season find that it has a lowering effect. But if the cure be carried out in a bracing atmosphere where there are regular hours, plain food, and the luxury of a first-rate bathing establishment, much better results are obtainable than when an attempt is made to combine the cure of syphilis with the duties of everyday life. It is for this reason, irrespective of any inherent virtue in the place or mode of treatment, that many watering-places both at home and abroad have obtained a reputation for the cure of syphilis.

Mercury is usually given in this country as grey powder: blue pill or corrosive sublimate—the liquor hydrarg. perchlor.—In France the protiodide, the green iodide of mercury and Van Swieten's (1700–72) liquid, are preferred. Van Swieten's liquid is a more dilute solution of corrosive sublimate than that ordered in the British Pharmacopoeia, and it contains alcohol. Grey powder is but little used abroad, and in the severe cases contracted in the tropics it rarely exercises any beneficial effect, although it is highly esteemed in England.

Grey Powder

In England, therefore, in ordinary practice grey powder—the hyd. cum cret. of the pharmacopoeia—is generally given because it is cleanly and convenient. The drug is made up into compressed masses each containing one grain, which are easily carried about by the patient. But opinions differ widely as to the proper method of administration, though all are agreed that mercury is absolutely necessary for the cure of syphilis, and that it must be continued for a long time. Some give it for definite periods either continuously or with short intervals; others order

it to be taken in larger doses for short periods with longer intervals. The majority are agreed that it ought to be given as soon as a correct diagnosis has been made, and that it should be continued for a sufficient length of time whether or not there are visible signs of syphilis. The course run by syphilis varies so greatly in different individuals that it is better not to fix a limit of time during which mercury is given, but rather to be guided by the signs, with a tendency to err on the side of undue prolongation rather than of shortening the period of administration. Still, as a guide to what should be considered an efficient course of mercury the Royal Army Medical Corps lay down the following plan, assuming that two years is a minimum time during which mercury should be given when it is ordered in the form of pills, each pill containing one grain of grey powder.

	Months.	Pills.
First course		
One month taking six pills a day . .	1	180
Interval of three days without taking pills	–	—
One month taking four pills a day . .	1	120
Interval of seven days	–	—
One month taking three pills a day .	1	90
Interval of one month	1	—
Second course		
Three months taking three pills a day .	3	270
Interval of one month	1	—
Third course		
Three months taking two pills a day .	3	180
Interval of one month	1	—
Fourth course		
Three months taking one pill daily. .	3	90
Interval of three months . . .	3	—
Fifth course		
Three months taking one pill daily. .	3	90
	—	—
	21	1020
	—	—

Patients should be inspected once a week whilst they are under this course of treatment, the mouth and tongue being especially examined on each occasion. A short course of potassium iodide may be ordered advantageously after the third, fourth, and fifth courses of mercury.

It may be necessary to suspend the use of the drug for a day or two occasionally if any symptoms of salivation appear or if the patient should complain of pains in the chest or of gastro-intestinal disturbance. It is better to do this and try to combat the symptoms by a temporary reduction in the dose of mercury, an alteration in the diet and a limitation in the quantity of fluid ingested, rather than to fly at once to opium or Dover's powder. A little essence of ginger, peppermint or other carminative is often sufficient to afford relief. A tonic may be given during the longer intervals when the drug is being discontinued and at other times when circumstances seem to call for it. Virol, or an emulsion of cod-liver oil and maltine for children; citrate of iron and quinine or the liquid extract of coca or coca wine for adults.

It seems to be doubtful whether mercury in moderate doses exercises any great influence upon the haemoglobin of the blood. Justus in 1898 stated that the effect of administering a fairly large dose of mercury, either by inunction or by intramuscular injection, caused a rapid and characteristic sinking of the haemoglobin in patients suffering from syphilis, a change which was not observed in healthy persons (see also vol. i, p. 123). If the administration of mercury was continued the quantity of haemoglobin soon increased and reached a higher level than at first.

Iodide of mercury. The protiodide or green iodide—hydrargyrum iodidum viride—is given during the earlier rather than the later stages of secondary syphilis. The dose is one-quarter to one-third of a grain, the amount being increased gradually during the first fortnight until a grain and a half or two grains are taken three times a day. Protiodide, like other forms of mercury administered by the mouth, should be taken directly after a meal so that it may be absorbed whilst the stomach is full. The principal objection to its use is the irritating effect which it exerts upon the mucous membranes of the mouth, an action which seems

to be more marked in women than in men. It is indeed so active that it sometimes causes salivation in minute doses, and it may produce much tenderness of the teeth. It may also cause a painful dyspepsia, but not so often as corrosive sublimate; on the other hand it more often sets up diarrhoea.

On account of these irritant properties it is often usefully combined with two to four grains of the green extract of hyoscyamus or an eighth of a grain of opium. The following formula for a green iodide and opium pill is serviceable :—

℞

Green iodide of mercury . .	gr. ½
Opium	gr. ⅛
Syrup of glucose . . .	a sufficiency.

Corrosive sublimate. Perchloride of mercury is given in doses of one to two drachms of the liquor hydrarg. perchlor., each drachm of which contains one-sixteenth of a grain of corrosive sublimate. The liquor is administered in an ounce of chloroform water three times a day, or as the perchloride of mercury in the form of a pill containing one-eighth of a grain of corrosive sublimate and one-eighth of a grain of opium. It is more suitable in the later than in the earlier stages of secondary syphilis, and it has the advantage of being readily prescribed with potassium iodide. Indeed mercury thus given is said to be more rapidly eliminated than when it is administered alone, because the iodide of potassium acts as a diuretic.

Corrosive sublimate is a less elegant form of administering mercury than grey powder or many of the other mercurial preparations because it has a nauseous taste. The taste can be concealed by giving it in milk or by using honey or peppermint as the vehicle. It does not cause salivation if it be given carefully, but it is somewhat more liable than grey powder to produce painful dyspepsia. The liquor hyd. perchlor. is very serviceable and is well borne by hospital patients, but it is not so good as grey powder for private patients.

A large number of complex compounds of mercury are in use and new ones are being constantly brought forward, although

they all appear to labour under the same disadvantage. They are not chemical compounds, and preparations made by different chemists or even by the same chemist at different times may vary greatly in composition. But in spite of this there is no reason why they should not be used occasionally when the more stable and standard preparations of mercury have proved unsuitable.

The chief amongst these preparations are the following :—

Tannate of mercury. Tannate of mercury is usually given in half-grain doses three times a day with sugar of milk. Its action needs careful watching because it sometimes sets up considerable gastro-intestinal disturbance with severe salivation and sometimes it seems to be almost inert.

Lustgarten's formula is :—

Tannate of mercury	grs. 16
Tannic acid	grs. 7
Lactose	ʒ j
Powdered opium	gr. j

Make six pills. One to be taken half an hour after meals.

Carbolate of mercury. Carbolate of mercury in doses $\frac{1}{4}$–$\frac{1}{2}$ grain is said to be well borne and not to cause gastro-intestinal disturbance. Schadek's formula is :—

Carbolate of mercury . . .	grs. 8
Powdered lycopodium Balsam of tolu } . . .	ana q.s.

Make thirty pills. Two to four to be taken every day.

Peptonate of mercury. Peptonate of mercury in the form of an ammoniated compound is administered in the form of pills in the Paris hospitals according to the following formula :—

℞

Ammoniated peptonate of mercury .	grs. 30
Powdered opium	grs. 7
Extract of guaiacum . . .	grs. 16
Powdered guaiacum . . .	grs. 16

Make 100 pills and coat with an ethereal solution of tolu. Each pill contains about a quarter of a grain of the ammoniated pep-

tonate of mercury or a thirteenth of a grain of corrosive sublimate combined with the peptone.

Basic Salicylate of mercury. Salicylate and *Salicylarsenate* of mercury are ordered in the form of pills, each pill to contain one-quarter or one-sixth of a grain of the salt. They are said to be fairly stable compounds.

Acetate of mercury. Acetate of mercury is the basis of a celebrated preparation introduced by a German quack under the name of ' Keyser's sugar-plums '. (See page 162.)

Sozoiodolate of mercury. Sozoiodolate of mercury is given in the form of pills containing a quarter of a grain apiece, two being taken three times a day directly after meals. The formula suggested by Schwarz for the pills is :—

℞

Sozoiodolate of mercury . . .	grs. 10
Tincture of opium	m. 20
Extract and powder of liquorice .	q.s.

Make twenty pills.

Sig. Two pills to be taken three times a day directly after meals.

Mergal or Mercuric Cholate. This is a mercurial compound of mercury and cholic acid. It is administered in the form of capsules, each containing three-quarters of a grain of mercuric cholate mixed with one and a half grains of albuminate of tannin. The dose is six capsules a day continued for periods of eight to twelve weeks. Mergal is said to be a mercurial preparation with very slight irritating properties. The corrosive action of mercury depends more or less on the nature of the combined acid ; and as the liver retains more mercury for a longer time than any other organ, the union of mercury with cholic acid, which is a product of the liver cells, forms a compound which is but little irritating to the hepatic tissue. Like all other organic compounds of mercury its use should be reserved for special cases, reliance being placed upon simpler forms of the drug.

Quinine and Arsenic. Quinine and arsenic are much used as adjuvants to mercury in the treatment of syphilis. They appear to be especially serviceable when the syphilitic patient has had

malaria or when the successive manifestations of syphilis are accompanied by fever.

Sarsaparilla

Sarsaparilla, like arsenic (see p. 240) and quinine, has long had a great reputation in the treatment of syphilis, and it often seems to be effective in relieving the cachexia into which some patients fall in the course of the disease. But, like arsenic, quinine, and the more highly complex mercurial substances, sarsaparilla must only be looked upon as a help in treatment, because mercury in small doses for long-continued periods of time alone cures syphilis, so far as is known at present. When sarsaparilla is employed the best results are obtained from the use of the freshly made decoction as a diet drink of a pint or more once or twice a day.

Mercurialism or Salivation

People vary greatly in their susceptibility to mercury. Some can take the drug in considerable quantities and for long periods of time without any ill effect; others are readily affected by small doses which have only been given for a short time. Children as a rule bear mercury better than men, and men better than women. The surgeon is warned that his patient has reached the limits of tolerance when the body weight declines, when there is palpitation, and he becomes anaemic. The patient complains that his saliva is thicker than usual, so that it appears tough, stringy, and increased in quantity. The teeth are tender when the jaws are snapped together, or they may only feel sticky, as if they were set on edge or were longer than they ought to be. The patient becomes pale if the mercury is continued after he complains of these symptoms. He loses his appetite, and may have a headache or feel giddy—in some cases too he suffers from albuminuria (see p. 198). In the more advanced stages transient pains are felt in the limbs, the muscles of the face twitch, the fingers tremble when they are spread out, and the tongue is tremulous when it is protruded. The patient often becomes shy and nervous when he thinks he is being watched, he sleeps badly and may complain of nightmare. A rash sometimes appears upon

the skin either as an erythema, in wheals, or as an ecchymosis, but in any case it runs its course in a few days and completely disappears.

The patient becomes feverish in the more severe cases of salivation, and complains of a coppery taste in his mouth; his breath and stools smell offensively; there is some plastic deposit or even ulceration of the gums, with congestion and oedema of the mucous membrane of the mouth, which may extend backwards until the tonsils and pharynx are involved. The teeth may become loose, and there is an enormous increase in the flow of saliva, with swelling of the parotid and submaxillary glands. The psychical condition changes in these more serious cases from shyness to despondency, and in women menstruation ceases or is diminished.

A course of mercury sometimes produces symptoms which show that the intestinal canal rather than the mouth has suffered. The patient has colicky pains with abdominal rumbling and diarrhoea shortly after taking each dose of medicine, and the diarrhoea may be so severe as to be bloody; more rarely there is constipation. The symptoms of dyspepsia sometimes remain permanently, and there is very good reason to suppose that in former times, when the drug was administered in large and ill-regulated doses, the necrosis of bones so often seen in old museum specimens was caused by mercury.

Treatment of salivation. Commencing salivation is an indication that the amount of mercury taken by a patient must be diminished or stopped. Saline aperients should be given, and plasmon or some form of dried milk is often useful when there is much intestinal irritation, whilst a natural sulphur water taken twice a day, or small doses of the alkaline sulphates, are useful adjuvants. The skin, too, should be made to act as freely as possible by the use of Turkish baths or other diaphoretic agencies. A sufficient vapour bath can be improvised, when other means are wanting, by raising the bedclothes on a cradle and inserting the nozzle of a bronchitis kettle. A temperature of 180° F. for twenty minutes should be employed at least three times a week, each bath being followed by a brisk rub with a hot bath-towel and a change of clothing as soon as the perspiration has ceased.

The teeth should be carefully brushed after each meal with equal parts of tincture of myrrh and tincture of iodine, or with a solution of acetate of lead and sulphate of alum made according to the following formula :—

Dissolve one ounce of alum in five ounces of water and also one ounce of subacetate of lead in five ounces of water. Mix the two solutions and filter. The filtrate contains acetate of alum. Dilute it with ten parts of water and flavour with a few drops of essence of peppermint or of attar of roses.

Alum and chlorate of potash, of each a drachm and a half in twelve ounces of water, also form a good mouth-wash ; and if the breath be foul, a drachm of chlorinated soda may be mixed with one ounce of brandy to serve as a gargle when it is diluted with four ounces of water.

Great care should be taken to prevent any accumulation of particles of food between the teeth, and the patient should be told to wash out his mouth frequently with a saturated solution of boric acid.

Minute doses of atropine or belladonna are serviceable in checking profuse salivation. The drug is best given as a thirty-second of a grain of sulphate of atropine with a drachm of sugar of milk. This quantity is divided into ten powders, one of which is to be taken every four hours until the pupil begins to dilate. The powder should be allowed to dissolve on the tongue if the full local effect of the atropine is to be obtained.

Five or ten grains of Dover's powder (Pulv. ipecac. co.) may be given at night to allay the intestinal symptoms which are often so marked at the beginning of a mercurial course. But opium in this or any other form should not be ordered too quickly, or merely as a routine, because the symptoms usually disappear spontaneously after a few days' discomfort.

A tonic treatment by the administration of quinine and iron, by arsenic, or by coca, either in the form of drachm doses of the liquid extract or as Mariani wine, may be recommended for a short time after the symptoms of salivation have disappeared and before the mercurial course is recommenced.

Mercury is chiefly excreted by the kidneys, the saliva, the bile,

the milk, and the skin. Patients with renal disease, therefore, are bad subjects for a prolonged course of mercury, and although albuminuria does not necessarily contraindicate the use of the drug to cure syphilis, it makes the surgeon more than usually careful in the watch he keeps upon his patient. It is wise, therefore, to ascertain whether there is any albuminuria before a course of mercury is begun, and afterwards to examine the urine for albumin once a week during a prolonged course of mercury. Persons who suffer from tubercle, malaria, advanced anaemia, the haemorrhagic diathesis, from chronic disease of the alimentary tract, and those who contract syphilis late in life, bear mercury badly as a rule, and it is partly for this reason that they are generally reputed to have severe attacks of the disease.

It is an article of faith with many people that when mercury once gets into the system it is never afterwards eliminated, but there is no doubt that even after a prolonged mercurial course the whole of the drug is eliminated from the body within two years of the last dose being taken.

BIBLIOGRAPHY

A Short Exposition of a Sure and Easy Method for Preventing the Communication of the Venereal Distemper, by O. G., M.D.: London, 1759. The author prevents syphilis by the immediate use of an antivenereal pomatum containing mercury.

Justus, Proceedings of the International Congress of Dermatology: London, 1898, p. 756.

Prof. Alfred Fournier, The Treatment of Syphilis, translated by Dr. C. F. Marshall: London, 1907.

Mr. G. Pernet, Remarks on the Treatment of Syphilis. The British Medical Journal, 1907, vol. i, p. 730.

A Manual of Venereal Diseases, by Officers of the Royal Army Medical Corps: London, 1907.

Major H. C. French, R.A.M.C., Syphilis in the Army: London, 1907.

Hallopeau, Bulletin de l'Académie de Médecine, July 9, 1907.

Major K. Ward, A.M.C., Atoxyl and its Value in the Treatment of Syphilis. The Journal of the Royal Army Medical Corps, April, 1908, p. 380.

CHAPTER XIII

TREATMENT BY INUNCTION, MERCURIAL VAPOUR, AND BATHS

Inunction

The method of treating syphilis by the inunction of mercury comes next in efficiency, and in some cases actually surpasses the plan of internal administration. But inunction has its limitations. It is dirty, it requires time, it may lead to undesirable publicity, and it is liable to cause a troublesome eczema unless it be very carefully regulated. On the other hand, it is often serviceable for short periods whilst the patient is resting from the internal administration, so that it may be employed profitably for a fortnight once in three months of the regular mercurial course.

Inunction is almost coeval with the appearance of syphilis in Europe at the end of the fifteenth century, and one of the earliest pictures of the treatment of syphilis (Plate III) shows an ointment being rubbed into the skin of a patient.

History. Mercurial ointments were used in syphilis because they had long been employed for the cure of parasitic skin diseases and in leprosy. We know from Benvenuto Cellini's account of himself that Berengarius da Carpi, the commentator on the anatomy of Mundinus and professor at Bologna from 1502 to 1527, was one of the earliest to employ mercurial inunction for the cure of syphilis. He amassed a large fortune, which he bequeathed to the Duke when he died at Ferrara about 1530. Benvenuto Cellini, the great Italian worker in metals, shows him as a virtuoso of independent character rather than as a surgeon. He says :—

'There arrived in Rome a surgeon of the highest renown, who was called Maestro Giacomo da Carpi. This able man, in the course of his other practice, undertook the most desperate cases of the so-called French disease. In Rome this kind of illness is very partial to the priests, and especially to the richest of them. When, therefore,

Maestro Giacomo had made his talents known, he professed to work miracles in the treatment of such cases by means of certain fumigations ; but he only undertook a cure after stipulating for his fees, which he reckoned not by tens, but by hundreds of crowns. He was a great connoisseur in the arts of design. Chancing to pass one day before my shop, he saw a lot of drawings which I had laid upon the counter, and amongst these were several designs for little vases in a capricious style, which I had sketched for my amusement. These vases were in quite a different fashion from any which had been seen up to that date. He was anxious that I should finish one or two of them for him in silver ; and this I did with the fullest satisfaction, seeing they exactly suited my own fancy. The clever surgeon paid me very well ; and yet the honour which the vases brought me was worth a hundred times as much ; for the best craftsmen in the goldsmith's trade declared they had never seen anything more beautiful or better executed.

'No sooner had I finished them than he showed them to the Pope ; and the next day following he betook himself away from Rome. He was a man of much learning, who used to discourse wonderfully about medicine. The Pope would fain have had him in his service, but he replied that he would not take service with anybody in the world, and that whoso had need of him might come to seek him out. He was a person of great sagacity, and did wisely to get out of Rome ; for not many months afterwards all the patients he had treated grew so ill that they were a hundred times worse off than before he came. He would certainly have been murdered if he had stopped.'

His method consequently fell into disrepute, and, speaking in another part of his autobiography, Cellini says : 'That charlatan Maestro Jacopo, the surgeon from Carpi, came to Rome and spent six months there, during which he bedaubed some scores of noblemen and unfortunate gentlefolk with his dirty salves, extracting many thousands of ducats from their pockets, and at the present moment in Rome all the miserable people who used his ointment are crippled and in a deplorable state of health.'

Yet the real mistake made by the early surgeons was a want of faith in their own methods. They did not continue the applications for a sufficient length of time, and the quantity of mercury contained in the ointments was very small, for in some cases it was not more than eight or ten grains to the ounce, whilst the blue ointment or ungt. hydrargyri of the 'British Pharmacopoeia' contains one part of mercury in two of the ointment.

The patient who was to be treated by inunction was first prepared for a course by the administration of fumitory ; he was then

purged very thoroughly, and afterwards dieted with considerable strictness. He was also bled, and the order was given, 'Let your chamber be close and void of open air, and well rectified with sweet savours and smells.' The chief part of the cure consisted in anointing and sweating.

'The manner therefore to applie the unctions is thus: The chamber being first provided, let the Patient be prepared to bedde, and let there be made a good fire of coales, rather in a pan than in a chimney, and before you anoint him or her, whatsoever they bee, give him to drinke some good caudle, which will comfort and strengthen the stomack, and is a good meane to procure sweat the sooner, then next let him be anointed against a good fire of coles and there they shall rub or chafe it well in with their owne hands if it be possible and the places or parts that is to be anointed is first the soles of the feete and so up to his knees also his thighs, buttockes, loines, and share bones and likewise anoint both the armes and under the arme holes and the shoulder blades; but in anie wise as neere as you can touch not the head, neither come neere anie other principall part with the unction, neither yet may you touch the bellie, for thereby trulie I have seene grievous accidents follow, and oft times death.

'The anointing being thus finished, then let a warme sheete be put round about the patient and a double kerchiefe well warmed and bound about his head and do cover him in his bed with as many clothes as he is well able to beare, but if there-with he cannot sweate orderly, as you would require, then applie to the soles of his feet, legges and thighs and to both his sides verie hot brickes well wrapped in warm double clothes, or else bottles filled with hot water or insteede thereof woodden boxes of twelve inches long and made round, with a lid at one end and hollow like a pipe, and well plated in the inside, wherein you shal put a long round peece of hot yron, so bigge as will easily goe into the boxe and then put on the lid and wrap three or foure of these boxes in hot clothes and applie them to the places afore said and this is a good meanes and waie to procure sweate.

'And note that when the patient beginneth to sweate that then you have in readinesse a clock, watch or houreglasse that you be not deceived of the time in their sweates and then halfe an hour before they have sweat out the full time, be it either two or three hours or more, as the case requireth, abate his clothes by little and little and so let him coole by degrees but not too sodainlie or over hastilie; and if it chance in the time of his sweating hee be greatlie desirous of drinke, then you may admit him to drinke of Ale warmed with a toast or else warme Posset Ale, being put into a glasse which hath a long pipe and let it bee given him by his keeper, for himselfe may not put his hand out of his bed to give himselfe drinke for feare of colde. Moreover if he happen to grow faint in his sweating you may give him now and then of Manus

Christi and likewise let him smell to rose water and vinegar and cast it sodainelie into his face.

'And when his sweates be orderlie finished and done and his shirt well dried and warmed that he sweat in, let him put it on quickly and also a waste coate or warme doublet and about his necke a halfe sheete warmed, and keepe his head also warme and then give him some warm broaths, &c. He must be thus anointed and ordered two or three daies together or more as you see occasion untill ye see the fluxe of flegmatike matter doth begin to flowe from his mouth moderatelie, which doth commonly happen within two, three, or four daies and then cease from anointing, for otherwise it is verie dangerous.

'This being thus done then will the gums, cheekes, tongue and throat rankle, ulcerate and swell, which afterward may safelie be cured, by this manner and order following. First, let there be bounde under his chin a double linnen cloth and pinned up to his kerchiefe, and then let his mouth be washed, gargerised and cooled with new milke wherein ye may seeth a few violet leaves and Columbine leaves and syrup of violets.

'The mouth must be washed and the throat gargerised three or foure times a day or as often as you list untill the paines be ceased, the teeth fastned and the ulcers of the mouth and throat be cleansed and healed.'

These words, quoted from Master William Clowes (1540–1604), surgeon to Queen Elizabeth and to St. Bartholomew's Hospital, give the routine of treatment of syphilis by inunction as it was carried out in Europe from 1500 to 1800 or later. Less cautious practitioners pressed the bleeding, sweating, and salivation to an extreme, and it is no wonder, therefore, that mercury fell into disrepute. Ulrich van Hutten (1488–1523) says that some 'used these anointings once a day, some twice, others three times and four times others; the patient being shut up in a stove with continual and fervent heat some twenty, some thirty whole days. Some lying in bed within the stove were thus anointed and covered with many clothes being compelled to sweat. Part at the second anointing began to faint; yet was the ointment of such strength that whatsoever distemper was in the upper parts it drew into the stomach and thence to the Brain; and so the disease was voided both by the nose and mouth and put the patient to so great pain that except they took good heed their teeth fell out and their throats, their lungs with the roofs of their mouths were full of sores; their jaws did swell their teeth loosened and

a stinking matter continually was voided from these places. What part so ever it touched the same was strait corrupted thereby so that not only their lips but the inside of their cheeks were grievously pained and made the place where they were stink abominably ; which sort of cure was indeed so terrible that many chose rather to die than to be eased thus of their sickness. Howbeit scarce one sick person in a hundred could be cured in this way but quickly after relapsed so that the cure held but for a few days.'

The salivation was in itself a serious matter, for the older physicians regarded as a 'good salivation' the production of five or six pounds of sticky saliva in twenty-four hours ; and Boerhaave (1668–1738), the great Dutch professor of medicine, taught that about 100 pounds of saliva should be expectorated in the thirty days during which the course lasted.

It is not surprising, therefore, if the patients took the matter into their own hands, and demanded treatment by a less dangerous method. Guaiacum and sarsaparilla both came into extended use, although both are inert in curing syphilis. Their administration allowed the disease to run its own course whilst the patient remained in his usual state of health.

Salivation is known now to be wholly unnecessary in the treatment of syphilis, and the greatest care is taken to avoid it, though there are still some who hold that the administration of mercury is insufficient unless 'the gums be touched'. It is the last vestigium of the old beliefs, and will soon vanish as completely as the heroic method of which it once formed so important a part.

Aix Method. The treatment of syphilis by inunction has been reduced to a science at Aix-la-Chapelle (Aachen). It consists of inunction, warm baths, and gentle exercise. The patient is weighed on his arrival, and is told to rise early, walk to the springs, a distance of half a mile, and drink one or two glasses of the waters. He then returns to the hotel, where he has a light breakfast, and an hour or two later goes to one of the baths and remains for twenty minutes in water at a temperature of 86° F. Half an hour later a professional rubber rubs 75 grains of mercurial ointment into his skin, the rubbing being continuous and lasting from twenty

to twenty-five minutes. On the first day the ointment is rubbed into the thighs, and on the subsequent days into the calves of the legs, the arms, forearms, back, chest, and sides, in regular succession, the thigh being reached again on the seventh day.

The patient is warned to pay strict attention to the state of his gums whilst he undergoes this course of treatment, and to clean his teeth after every meal. He is also given a mouth-wash consisting of a saturated solution of acetate of lead and sulphate of alum. No restriction is placed upon his diet, and although spirits are forbidden, beer and light wines are allowed. The patient is encouraged to exercise his body and his mind, and is recommended to live as much as possible in the open air.

He is weighed again at the end of the first week, and is carefully examined by the medical man, when, if all is well, the treatment is continued for six weeks, after which the patient is allowed to go home, with a recommendation to return in a year's time for a second course, which lasts a month.

The patient is thus treated well and easily, but as it is not possible for every one to undergo a course of inunction abroad, it usually has to be carried out at home. The principles of the method are explained, and he is told to provide himself with freshly prepared blue ointment—ung. hydrarg.—put up in gelatin capsules, each containing thirty grains of the ointment. Unguentum cinereum, which is composed of equal parts of mercury and lanoline, with sufficient olive oil to make it soft, is preferred by many persons on the ground that lanoline ointments are the more readily absorbed. Freshly made ointments, and those which have not been exposed to the air, are less liable to irritate the skin than old and rancid applications.

The patient retires early in the evening, takes a warm bath, and thoroughly washes the part to be anointed with soap and water. He then dries himself, and puts on pyjamas and a flannel dressing-gown, the room, of course, being warmed in damp and cold weather.

The most accessible hairless regions of the body are used for the inunction. These are the inner surface of the thighs, the flexor aspects of the arms and forearms, the sides of the chest, the flanks,

the buttocks, the soles and the inner surfaces of the feet. The groins, too, are available in babies and children, both of whom form excellent subjects for the treatment of syphilis by inunction. The different parts of the body are taken in order, so that each region is only rubbed occasionally.

The part to be anointed is sponged over with a solution of biniodide of mercury of the strength of one part in 2,000, and is afterwards dried gently with absorbent wool, for it is important that the skin should be kept aseptic. Twenty grains of the blue ointment, which is two-thirds of the contents of a capsule, are then smeared over the surface of the skin at the selected spot. It is briskly rubbed in with the hand over as large a surface as possible, and for not less than twenty minutes by the clock ; an additional ten grains, forming the remaining third of the contents of the capsule, being added during this time. All the ointment should have disappeared by the time the inunction is complete, and the skin should present a uniform greyish colour where it has been rubbed in, so that the part looks as if it had been black-leaded.

The patient then takes off his dressing-gown and goes to bed, after washing his hands with soap and water to remove any ointment which may be adherent to them. Some practitioners recommend a pint of hot milk to make the patient perspire, but I believe this is merely a relic of the old treatment by sweating, and that it does harm rather than good by washing out the finely divided mercurial ointment from the sweat ducts and sebaceous glands into which it has just been rubbed.

The patient takes a warm bath on the morning after the inunction, to remove any ointment which has not been absorbed or rubbed off during the night. The dose of ointment may be increased gradually from half a drachm to sixty, ninety grains, or more, as may be thought necessary ; but a small quantity well rubbed in gives much better results than a larger quantity imperfectly applied.

The Royal Army Medical Corps has drawn up the following plan of treatment by inunction ; forty grains of blue ointment mixed with twenty grains adipis lanae being used daily. The

ointment is rubbed in for twenty or thirty minutes once a day, with considerable pressure to force the ointment into the skin :—

	Months	Grains Hg.
First Course—		
Forty-two daily inunctions . .	$1\frac{1}{2}$	840
Interval of three months . .	3	—
(Patient to be seen once a fortnight.)		
Second Course—		
Forty-two daily inunctions . .	$1\frac{1}{2}$	840
Interval of three months . .	3	—
(Patient to be seen once a fortnight.)		
Third Course—		
Thirty daily inunctions . . .	1	600
Interval of six months . . .	6	—
(Patient to be seen once a fortnight.)		
Fourth Course—		
Thirty daily inunctions . . .	1	600
Interval of six months . . .	6	—
(Patient to be seen once a month.)		
Fifth Course—		
Twenty daily inunctions . .	$\frac{2}{3}$	400
	$23\frac{2}{3}$	3,280

The results of this method of treatment are often highly satisfactory. A patient who has borne the internal administration of mercury badly, owing to indigestion or diarrhoea, begins to increase in weight when the mercury is administered by inunction. His appetite returns, his digestion improves ; he sleeps well at night and ceases to be listless. In such cases the method of inunction may be continued for a period of six weeks to three months, a careful watch being kept during the second and third weeks, which is the usual time for the appearance of salivation or stomatitis, if the inunction is being carried out too vigorously. The risk of a mercurial dermatitis is reduced to a minimum if the skin be kept aseptic and the ointment be not rubbed into the hairy parts.

The stomatitis following inunction differs from that caused by the ingestion of mercury (p. 195) in the more sudden onset and

in being more generalized and intense, for it is associated with considerable swelling of the salivary glands and with much salivation, whilst the gums may actually be ulcerated. In the rarer cases of gastro-intestinal disturbance following inunction, the symptoms point to inflammatory changes in the large intestine, for the patient complains of abdominal pain, colic, and frequent watery stools.

Patients who are cachectic, broken down in health by debauchery or through renal inadequacy, are more likely to be affected with a stomatitis after inunction than those who are in better condition. Mr. George Pernet states that when stomatitis occurs during a course of inunction amongst hospital patients the surgeon should make sure that the soiled undervest worn during the course has been removed. He states that he has observed cases of stomatitis go from bad to worse owing to this precaution being overlooked, as the patient continued to absorb mercury although the inunction had been stopped.

Some patients show signs of lassitude during inunction, and complain of lumbago, muscular fatigue, and pains in the limbs. These symptoms disappear quickly when the treatment is discontinued.

Mercurial Plasters

The thorough inunction of mercurial ointment is difficult when a considerable portion of the surface of the body is affected with ulcerating syphilides, and in these cases it may be necessary to adopt for a time the treatment by medicated plasters and bandages. The most simple method is to apply a drachm and a half of blue ointment to any portion of the skin which is free from ulceration, and then cover the part with a linen roller bandage. 'A chest protector' may also be smeared with a mercurial ointment and worn in the usual manner.

Dr. Merget impregnates a flannel with mercury in a state of fine subdivision by first soaking it in a mercurial bath and afterwards in ammonia, which reduces the mercury to an impalpable powder. The flannel which has been treated in this manner is then bound on to the body, and is changed from time to time.

Blaschko's 'mercolint' consists of cotton impregnated in a

somewhat similar manner. It is used by wrapping a piece of the mercolint in a handkerchief to prevent dispersal of the powder, and the handkerchief is then placed on the patient's pillow, so that he inhales the vapour of mercury at night. Bordier has shown that one of these pieces of mercolint, measuring eight inches by ten, gives off an average of one-seventh of a grain of mercurial vapour every hour. The method is sound, no doubt, theoretically, but I should be very sorry to advise any patient to trust to it for the cure of syphilis. It is, if possible, even less efficacious than Welander's mercurial bag, because the mercury in mercolint cannot be replaced as it is volatilized.

Welander's bag is made of cotton, and is sufficiently large to cover the whole of the chest, leaving the upper seam open. This is turned inside out every morning, and a drachm of mercurial ointment is spread on the inner surface of one side. The bag is then inverted and is worn day and night with the prepared side next the skin, and at the end of a fortnight a new bag is used. The course lasts a month at a time.

The Jews in the east of London still favour the use of mercurial plasters in the treatment of syphilis. They are applied to the skin, usually over the lower ribs, in the same manner as a belladonna plaster, and they are not changed for a week or more, when they are removed and a new one put on.

All these methods are dirty, makeshift, and dangerous. They give a false sense of security and prevent the patient adopting a more thorough course, by which means alone syphilis can be cured. Stomatitis is occasionally produced by the use of mercurial plasters, and mercury has sometimes been observed in the urine of patients who have worn them, but their action is too feeble to allow them to be of any real service in active syphilis, though they may be employed for the relief of slight local manifestations.

The use of plasters, too, is still adopted in the hospitals at Paris, and as lately as 1890 this method of treating syphilis has been advocated by Dr. Quinquaud, who recommends a medicated calomel dressing prepared according to the formula :—

℞

Diachylon plaster	30 parts
Calomel	10 parts
Castor-oil	3 parts

This dressing is applied to the skin for a week, and is renewed until the desired effect is produced. The appearance of mercury in the urine, and the occasional production of stomatitis, proved that some mercury is absorbed.

The French schools seem to have retained the use of the mercurial plaster in the treatment of syphilis owing to the great influence of John of Vigo (1460 ?–1517 ?). John of Vigo invented a cerate, 'which,' he says, 'I have proved a thousand times with great worship and profit. The form whereof is this :—

'℞ Of the oils of camomile, spykenard and lilies ana ℥ii. Of oil of saffron ℥i. Of swines' grease lb. i, of calves' suet lb. i, of euphorbium ℥v, of frankincense ℥x, of oil of laurel ℥i ss, of the fat of a viper ℥ii ss, of quick frogs in number vi, of worms washed with wine ℥iii ss, of the juice of the roots of walwort and enula campane ana ℥ii, of squinantum, of sticados and mugwort ana a handful, of odoriferous wine lb. ii.

'Let them seethe altogether until the wine be consumed, then strain them and put to the straining of litharge of gold lb. i ; of clear turpentine ℥ii. Make a cerate with a sufficiency of white wax after the manner of a sparadrap, adding in the end of the decoction liquid storax ℥i ss. Then take the cerate from the fire and stir it till it be lukewarm and afterward put thereunto of quicksilver quenched with spittle ℥iiii and stir it about well till the quicksilver be incorporate.

'This cerate is of more noble operation than liniments and more delectable to the patients. Furthermore from the day of the application of the said medicine the patient must hold in his mouth some of the decoction following and wash his mouth therewith until the cerate be removed :—

'℞ Of clean barley one handful and a half ; of the roots of langdebete one handful and a half ; of the seed of quinces ℥iss ; of the flowers of violets, of raisins ana one handful. Let them seeth altogether till the barley break, then strain them and use them with a julep of violets. This gargle cooleth and defendeth breakings out of the mouth.'

This cerate or plaster, known for years as 'the plaster of Frogs', was perhaps one of the most celebrated and extensively used remedies in the world, and it came next to Mithridate in popular estimation. Vipers were used because they were considered to

be 'alexipharmic, antiputrescent, stimulant, deobstruent, and depurative'. They went into the witches' cauldron :—

'Fillet of a fenny snake,
In the cauldron boil and bake ;
Eye of newt and toe of frog,
Wool of bat and tongue of dog,
Adder's fork and blind-worm's sting,
Lizard's leg and howlet's wing.'

Earthworms were regarded as diaphoretics, antacids, and resolvents. Frogs were temperants, emollients, aperients, dissolvents, humectants, and detersives. The beneficial effects of the plaster were perversely enough attributed to these agents, and not to the activity of the mercury it contained.

Professor Fournier gives the following as the formula for the Emplastrum de Vigo in use in the Paris hospitals at the present day :—

Emplastron simplex . . .	2,000 parts
Yellow wax Colophane . . .	āā 100 parts
Bdellium Ammoniacum Oliban	āā 30 parts
Myrrh Saffron	āā 20 parts
Liquid styrax	300 parts
Turpentine	100 parts
Oil of Lavender . . .	10 parts
Purified mercury . . .	600 parts

This formula contains 20 per cent. of mercury.

The method of inunction is not adapted for general use, but it seems to be especially indicated for patients who are suffering from severe syphilitic lesions of the central nervous system, of the larynx, the viscera, and the eye. It is also useful for patients whose manifestations have proved rebellious to other methods of treatment, as in cases of leukoplakia and fissured tongue, in persons who cannot tolerate mercury by the mouth, and in children. It is, too, an excellent method where it is necessary to supplement the treatment by ingestion with additional doses of mercury, and it

is the least unpleasant way of being cured when it can be combined with a visit to the sulphur springs of Aix la Chapelle or Uriage.

Inunction, however, is an uncertain method of treatment, because it is difficult to determine whether or not the mercury is being absorbed, and in every case, therefore, the amount of the drug excreted should be determined from time to time.

Qualitative Test for the Mercury in the Urine

There are several methods in use for estimating the presence of mercury in urine, but most of them require some technical skill, and the use of special apparatus which it is often impossible to obtain in private practice. I therefore asked Mr. Kenneth S. Caldwell, Ph.D., Demonstrator of Chemistry at St. Bartholomew's Hospital, whether it was possible to devise some easy colour test by which the presence of mercury in the urine could be detected by those who were not skilled in physics or chemistry, and who were unable to obtain any complicated apparatus. Dr. Caldwell, after some experiments, has employed the following method, which we have tried in many cases and have found to be satisfactory. The principle consists in decolorizing the urine and estimating the mercury colorimetrically by conversion into a sulphide :—

Add 5 c.c. of pure concentrated sulphuric acid to 100 c.c. of urine, and then add 2·5 grammes of permanganate of potassium in crystals. Boil the mixture for forty to sixty minutes, and add to it, whilst hot, a sufficient quantity of ammonium oxalate in crystals to decolorize. Transfer the colourless solution thus obtained to a 100 c.c. graduated flask and fill up to 100 c.c. with distilled water.

100 c.c. of normal urine are treated in an exactly similar manner.

50 c.c. of the decolorized urine containing mercury and 50 c.c. of the decolorized normal urine are then transferred to separate Nessler glasses. 2 c.c. of a solution of hydrogen sulphide are added to the glass containing the decolorized urine which contains the mercury. The tint produced is matched by adding

measured volumes of a solution of mercuric chloride (1 c.c. = 0·0001 gram Hg.) and 2 c.c. of hydrogen sulphide solution to the glass containing the decolorized normal urine.

A considerable amount of chlorine is produced by the action of potassium permanganate and sulphuric acid on the chlorides of the urine. It is necessary to boil the mixture, therefore, as the liberation of sulphur on the addition of hydrogen sulphide otherwise renders impossible the detection of the darkening due to mercuric sulphide.

The method here recommended is so delicate that 0·001 gram Hg. per litre of urine can be detected.

Preliminary concentration by evaporation is necessary with more dilute solutions, though the urine is not then so readily decolorized. The mercury in these minute amounts may be deposited on copper according to the method employed by Eschbaum, but instead of attempting to weigh the sublimate it is dissolved in nitric acid, and the mercury may be estimated colorimetrically, as described above, after the acid has been evaporated off.

MM. Carle and Boulud adopt the following method for detecting the presence of mercury in the urine of syphilitic patients. The urine to be tested is put into a porcelain capsule, and is thoroughly acidulated with hydrochloric acid. It is then warmed for a short time in a water bath, after which chlorate of potash is added little by little until the urine becomes of a very pale yellow colour. Care must be taken not to add too much chlorate of potash, or the fluid offers too great a resistance to the passage of an electric current. The organic substances in the urine are destroyed by the addition of hydrochloric acid and chlorate of potash. The urine which has been treated in this manner is then warmed again for a short time, after which it is allowed to cool, and is filtered. The filtered liquid being afterwards put into a vessel, where it is allowed to remain until it has ceased to precipitate anything. An electric current is then passed through it, the positive pole consisting of a fragment of iron ; the negative pole being a small spiral of platinum. The current is allowed to pass through the fluid for at least an hour.

When the current has passed long enough the platinum wire is taken out of the urine, washed in ether, dried at a low temperature, and dropped into a small but long test-tube. The test-tube is held horizontally, and the part where the platinum coil lies is heated in the flame of a Bunsen burner, and is afterwards allowed to cool. A grey ring is formed in the test-tube if mercury is present, and its presence can be confirmed by dropping a fragment of iodine into the tube and then warming it. The iodine vapour becomes converted into red iodide of mercury as it passes over the ring of mercury.

Another and somewhat simpler though rougher method of testing the urine for the presence of mercury consists in taking 1,000 c.c. of urine and evaporating it to 100 c.c. at a temperature of 93°–104° F. A 5 per cent. solution of sulphuric acid is then added, and a zinc-copper couple is suspended in the fluid. The copper is whitened in the presence of mercury.

The method adopted for use in the British army is as follows ('A Manual of Venereal Diseases,' by Officers of the R.A.M.C., p. 132) :—

Take about ten ounces of the morning urine, acidulate strongly with nitric acid, and boil for a quarter of an hour. Then place a very small piece of clean copper foil in the neck of a small-sized funnel so as nearly to plug the opening. Pour the urine into this funnel, and allow it to escape drop by drop over the copper. Mercury, if present, is deposited on the copper; it can then be volatilized by heating the copper in a glass tube. Or a minute piece of copper may be placed in the urine and left for twenty-four hours, the urine being kept warm during this time; any mercury in the urine is deposited on the copper, which if polished shows a metallic mirror. If volatilized in the presence of iodine, crystals of the red iodide are formed.

The results obtained from a number of observations carried out by these methods are very interesting. When the mercury is given in the form of pills its presence can be detected in the urine in three to twelve hours afterwards, and it continues to be excreted for one to five days. When the drug is administered by inunction it appears in the urine from two to eleven hours afterwards, and continues to be excreted for one to eight days. When it is injected as a soluble mercurial salt its presence in the urine can be recognized in three to twenty-four hours afterwards, and

the excretion continues for three to six days. But inunction gives less constant results than either ingestion or injection of mercury. In some cases no mercury was eliminated by the urine although the skin had been thoroughly anointed, so that it seems as though some skins were impervious to this method of administration.

Ehrmann first drew attention to this important fact in connexion with the elimination of mercury after inunction. He showed a patient at the Dermatological Congress, held at Vienna in 1901, whose urine was free from mercury although he had been rubbed with mercurial ointment on twenty occasions. Mracek, at the same meeting, told of a patient who was still covered with a maculo-papular syphilide, although he had received 400 inunctions of mercury. In spite of this energetic treatment he never had any mercury in his urine, and the syphilitic signs actually increased whilst he was under treatment.

The details of MM. Carle and Boulud's observations are contained in the following tables, which are well deserving of the most careful study :—

I. Pills of Green Iodide of Mercury

Patient	*Date*	*Mode of Administration*	*Time of Administration*	*Time of the appearance of Mercury*	*Duration of the persistence of Mercury*
St. Marguerite No. 10	July 19, 1902	Pills 5 grs.	7 o'c. in the morning	10 o'c. in the morning	5 days
St. Camille No. 16	May 14, 1902	Pills 5 grs.	7 o'c. in the morning	10 o'c. in the morning	5 days
St. Marguerite No. 18	July 10, 1902	Pills 5 grs.	7 o'c. in the morning	2 o'c.	4 days
St. Camille No. 16	August 18, 1902	3 Pills about $7\frac{1}{2}$ grs.	7 o'c. in the morning	10 o'c.	2 days
St. Camille No. 2	May 21, 1902	2 Pills about 5 grs.	7 o'c. in the morning	10 o'c.	3 days

II. Pills of Hyd. Perchlor.

Patient	*Date*	*Mode of Administration*	*Time of Administration*	*Time of the appearance of Mercury*	*Duration of the persistence of Mercury*
St. Camille No. 7	April 23, 1902	Pills 2 grs.	8 o'c. in the morning	4 o'c.	2 days
St. Camille No. 8	January 28, 1902	Pills 2 grs.	8 o'c. in the morning	Midday	4 days
St. Camille No. 6	April 30, 1902	Pills 3 grs.	8 o'c. in the morning	10 o'c.	4 days
St. Camille No. 6	April 25, 1902	Pills 2 grs.	8 o'c. in the morning	8 o'c. the next morning	1 day

III. Inunctions of Mercury Ointment

Patient	*Date*	*Mode of Administration*	*Time of Administration*	*Time of the appearance of Mercury*	*Duration of the persistence of Mercury*
St. Camille No. 2	July 10, 1902	1 Inunction 80 grs.	7 o'c.	6 o'c. in the evening	1 day
St. Alexandre No. 6	April 25, 1902	1 Inunction 80 grs.	10 o'c.	1 o'c.	1 day
St. Camille No. 3	June 2, 1902	1 Inunction 80 grs.	10 o'c.	Midday	8 days
St. Camille No. 13	August 17, 1902	1 Inunction 80 grs.	7 o'c.	10 o'c.	5 days
Chazeaux	October 14, 1903	1 Inunction 80 grs.	7 o'c.	Midday	4 days
St. Camille No. 12	May 1903	60 grs. 80 — 160 —	7 o'c.	?	?
Chazeaux	November 1, 1903	1 Inunction 160 grs.	7 o'c.	2 o'c.	3 days
Chazeaux	November 1903	80 grs. 160 grs.	7 o'c. 7 o'c.	2 o'c. 6 o'c.	2 days 4 days

IV. Injections of Mercury Biniodide

Patient	*Date*	*Mode of Administration*	*Time of Administration*	*Time of the appearance of Mercury*	*Duration of the persistence of Mercury*
St. Camille No. 13	June 17, 1902	Inject. 2 grs. sub-cutan.	8 o'c.	2 o'c.	6 days
St. Camille No. 21	July 7, 1902	Inject. 2 grs. intra-muscul.	8 o'c.	2 o'c.	3 days
Chazeaux No. 18	September 10, 1903	Inject. 2 grs. intra-muscul.	7 o'c.	Midday	3 days
Chazeaux No. 8	October 2, 1903	Inject. 2 grs. intra-muscul.	7 o'c.	7 o'c. the next day	4 days
Chazeaux No. 5	November 20, 1903	Inject. 2 grs. intra-muscul.	7 o'c.	2 o'c.	3 days
Chazeaux No. 7	December 8, 1903	Inject. 2 grs. intra-muscul.	7 o'c.	2 o'c.	3 days
Chazeaux No. 10	December 10, 1903	Inject. 1 gr. intra-muscul.	7 o'c.	Midday	4 days
Chazeaux No. 10	December 20, 1903	Inject. 3 grs. intra-muscul.	7 o'c.	2 o'c.	3 days

Fumigation

History. Fumigation, or the treatment of syphilis by mercurial vapour, is as old as the disease itself in modern Europe. It was employed at the beginning of the sixteenth century by Angelo Bolognini, who was Professor of Surgery at the University

of Bologna in 1493. The method soon came into general use as 'the treatment by perfumes', and it was used in two forms, a 'benignant' fumigation without mercury, and a 'malignant' one either with mercury or arsenic. Professor Fournier gives the following account of the method :—

'The old treatment consisted in preparation, fumigation, and sweating. The preparation, as in the case of inunction, included bleeding, purging, and the use of the so-called alterative and depurative remedies. The patient was stripped naked and put into a small tent in a heated chamber. A brazier was placed near him, and tablets were thrown into it to produce the fumigation. The tablets were variously compounded. They contained various mercurial preparations such as cinnabar, calomel, red precipitate, and turpith mineral mingled with substances which made a dense smoke when they were burnt, such as fats, resins, incense, mastiche, oliban, benzoin, aloes, and styrax. The patient was exposed to this hot and smoky vapour for half an hour to an hour, according to his strength, and he usually emerged from it in a half-suffocated state. If he showed signs of fainting he was allowed to breathe a little pure air through a tube which was passed into the tent. The patient was put into a hot bed as soon as the fumigation was finished, and he was left for an hour or two to perspire.

'The fumigation was repeated every day or every other day, according to the strength of the patient, and as it was not only a fumigation, but a real inhalation of mercurial vapours, it soon produced a profuse salivation lasting from seven to ten days.'

This method proved to be so dangerous that it fell into disuse, though it was revived for a time by Lalouette, who invented his fumigation box, and of late years it has been used rather extensively owing to the invention of cheap and portable Turkish baths. It appears to be useful in some cases of dense and widely distributed eruptions on the skin, as well as in the treatment of obstinate syphilitic ulceration when other methods have failed. But as a curative treatment for syphilis fumigation must not be relied upon in any way.

Method of Administration. The patient sits naked in a vapour bath whose aperture is protected by a sheet tied round the neck of the patient to prevent him inhaling the fumes. Twenty grains of calomel, or thirty grains of cinnabar, are vaporized below him by placing the mercurial salt on a small metal tray standing upon a tripod beneath which a spirit lamp is burning. The vaporization takes twenty minutes, and at the end of that time the lamp is

extinguished, and the patient remains for ten minutes longer in the bath. He then goes to bed, after putting on his ordinary night-clothes. It is only necessary to volatilize the calomel, and not to add more than a minimum of water, for profuse perspiration will defeat the object with which the bath is given, viz. to allow the calomel to be deposited upon the skin in a state of fine subdivision. The mercury is said to be absorbed with considerable rapidity, perhaps owing to its becoming mixed with the sebaceous secretion of the skin. But no estimation of its elimination by the urine appears to have been made, though stomatitis and salivation have been known to occur.

The patient should in every case be within easy reach of help whilst he is taking the bath, in case he becomes faint or should accidentally be scorched. The bath should not be taken within two hours of a meal, and at first one every other day is sufficient. The fumigations may be continued for a month or two if the result be satisfactory, but it is usual to employ them temporarily and only for a special purpose.

Mercurial Baths. Attempts have been made from time to time to administer mercury to syphilitic patients by means of baths. The best known form of bath is one of corrosive sublimate with or without the use of electricity. Gaertner's mercurial bath consists of a bath containing an electric battery. The battery consists of two cells which should be divided by a properly fitting diaphragm. Each cell is attached to one pole of a battery consisting of about fifty Leclanché elements. The box containing the battery is supplied with a finely divided rheostat, a galvanometer, and a commutator. Half an ounce of corrosive sublimate is thoroughly dissolved in a warm bath, and as soon as the patient is immersed, the diaphragm is put in place, the poles of the battery are attached, and the current is slowly increased by means of the rheostat until it is of the strength of 200 milliampères. The current is allowed to flow through the water for a quarter of an hour. It is then reduced, reversed, and increased again from 100 to 200 milliampères. The current is shut off at the end of the second quarter of an hour, the patient gets out, and the bath is ended.

Mercurial baths without the passage of an electric current may be prepared according to the following formulae :—

℞

Mercuric chloride . . .	grs. 60–180
Ammonium chloride . . .	drms. 1–3
Water at 100° F. to . .	. gals. 30

or

Mercuric chloride . . .	grs. 60–180
Dilute hydrochloric acid . .	. drm. 1
Water at 100° F. to . .	. gals. 30

The patient should remain in the bath from ten minutes to half an hour.

These baths are said to be especially serviceable in the treatment of mucous patches and other forms of cutaneous syphilis, but they are useless as a cure for the disease, and as in the other methods of treatment, care must be taken that the patient does not rely too implicitly on their efficacy.

Suppositories

Mr. Bryant wrote in 1884 that, ‘during the last eight or ten years I have been using a mercurial suppository twice a day in the treatment of syphilis, and have been greatly satisfied with its action. The drug acts as well thus as by the mouth, and in no way interferes with digestion or the functions of the abdominal viscera ; indeed, I am disposed to think it by far the best mode of administering mercury. I know of no objection to its use.’ In spite of this, the use of mercurial suppositories has hardly yet been adopted to any considerable extent, though Professor Ch. Audry of Toulouse speaks highly of its value. He began his treatment in 1905, using at first a weak solution of perchloride of mercury in saline solution without any satisfactory results. He then tried a dilute watery solution of the biniodide of mercury without much success, as the injections caused diarrhoea and tenesmus. But he finds that excellent results can be obtained by the use of grey oil made into suppositories so that each suppository contains a quarter to half a grain of metallic mercury.

Professor Audry gives the following details as to his method of treatment :—

'The mercurial suppositories are made by incorporating grey oil (p. 224) containing 40 per cent. of metallic mercury with cocoa butter. The cocoa butter is warmed, and the grey oil is quickly mixed with it just as it loses its transparency on cooling again when it begins to set.

'As the grey oil contains 40 per cent. of mercury, different quantities must be taken, according to the amount of mercury required in each suppository. If a suppository containing one centigramme of mercury is required (equivalent to one-seventh of a grain), 0·025 grammes of grey oil must be added to every 4 grammes of cocoa butter ; for suppositories containing 0·02 grammes of mercury, 0·05 grammes of grey oil must be incorporated ; whilst for suppositories containing 0·03 grammes of mercury, 0·075 grammes of grey oil must be used. The grey oil itself, being prepared with mercury, oil of vaseline, and lanoline, mixes easily with cocoa butter. Suppositories containing 0·02, 0·03, and 0·04 grammes of metallic mercury are alone required. Suppositories of the strength of 0·03 are the most useful, whilst for children it is usual to employ those of the strength of 0·02. Experience teaches that one suppository given every night is sufficient. The treatment is used continuously for a month, when a break of four or five days should be made, after which the treatment is begun again.'

This plan of treating syphilis is still upon its trial, and it may prove serviceable in cases where mercury cannot be given by the mouth. I have used it with satisfactory results in my own wards at St. Bartholomew's Hospital.

BIBLIOGRAPHY

William Clowes, A Briefe and Necessarie Treatise touching the Cure of the Disease called Morbus Gallicus. London, 1585.

Ulrich Von Hutten, A Treatise of the French Disease. Turner's edition, London, 1730.

George Pernet, The Treatment of Syphilis. The British Medical Journal, 1907, vol. i, p. 730.

John of Vigo, Surgical Works. The English translation, 1543, book v, cap. ii, folio 162 verso.

Eschbaum, Deutsche Med. Wochenschrift, 1900, xxvi, p. 52.

Carle and Boulud, Quelques Recherches sur l'Élimination du Mercure par les Urines. Annales de Dermatologie et de Syphiligraphie, 1904, p. 97.

Ehrmann, Ann. de Dermatologie et de Syphiligraphie, 1902, p. 954.

Quinquaud, Ann de Dermatologie et de Syphiligraphie, 1890, p. 423.

Merget, Journ. de Méd. de Bordeaux, 1891.

Audry, Ann. de Dermatologie et de Syphiligraphie, 1905, p. 793, and 1906, p. 231.

Bryant's Surgery, fourth edition, 1884, vol. i, p. 142.

CHAPTER XIV

TREATMENT BY INTRAMUSCULAR INJECTION OF MERCURY AND OF ARSENIC

History. The treatment of syphilis by the injection of mercurial compounds into the tissues of the body has lately come into considerable use. Its origin is often attributed to John Hunter, but reference to the works of the great surgical pathologist shows that he only knew of inunction and the administration of mercury by the mouth. The mistake has evidently arisen from his loose manner of writing, as, for instance, when he speaks of ' throwing in mercury through the arm and the leg ', by which he means the inunction of these limbs. Hebra (1816–80) has a better claim to the invention, but it was not adopted upon any large scale until Scarenzio (1797–1869) tried it in 1864, and Lewin (1820–96) published his results in 1867. It was used for many years at Breslau, but it was not much used in England until 1888 or 1889.

Preparations. Many different methods have been employed with a variety of mercurial compounds, and the routine plan adopted in the British army is lucidly described by Col. Lambkin, R.A.M.C. (vol. ii, chapter xviii).

The methods resolve themselves broadly into the use of injections made at an interval of a week, and injections made daily; injections made deeply into the tissues of the body, and intravenous injections, where the mercurial salt is thrown directly into the blood. Furthermore, the injections consist of metallic mercury in a state of fine subdivision, of soluble salts of mercury, and of insoluble compounds of the metal. Each method has its own adherents, but, speaking in general terms, the simpler the method, the more seldom the injection, and the less complex the compound introduced, the more likely are the best results to be obtained. Scarenzio himself used calomel, and injected his solutions hypoder-

mically. Lang of Vienna employed grey oil, a modification of which forms the basis of Colonel Lambkin's preparation, whilst Lewin was the first to use a soluble preparation of mercury—a solution of corrosive sublimate.

The subcutaneous injection of mercurial salts has already fallen into disuse, and it has been found preferable to inject them deeply into the larger muscles of the body, care being taken to avoid puncture of the veins, and the consequent formation of a haematoma. When the injection is thus made deeply into the tissues, it is less painful, because it lies in the intermuscular planes, where there are but few sensory nerves ; inflammation is unlikely to follow if the injection has been sterile ; the insoluble forms of mercury may lie indefinitely without causing harm, until they are slowly absorbed by the action of the tissues; whilst the soluble forms are easily taken up by the lymphatics of the muscle.

Seat of Puncture. The actual seat of puncture is selected in each case with a view to a minimum of irritation, contamination, thrombosis, or accidental injury. It is usual, therefore, to choose the buttocks, the lumbar muscles on either side of the spine, or the depression behind the great trochanter of the femur. Galliot has determined the fixed point in the buttock which is most suitable for injections in this region. It corresponds to the point of intersection of a line drawn horizontally two fingers' breadth above the top of the greater trochanter with a line dropped vertically at the junction of the inner and middle thirds of the buttock. The muscle at this point is comparatively free from vessels and nerves, and an injection through it is less likely, therefore, to be followed by pain and inflammation. But injections anywhere in the upper third of the buttock are well borne, care being taken to direct the point of the needle forwards to avoid any chance of wounding the large vessels and nerves. The lower third and the central region of the glutaei should be avoided partly because these parts of the muscle may be pressed upon in sitting, and partly because of the course taken by the sciatic nerve and the large vessels. The hollow behind the great trochanter is suitable from the position, but it is not well adapted for a course of injections on account of the smallness of the space. The lumbar

muscles may also be used, but the thick layer of fascia covering them is, I think, a drawback to their use, because pain may be produced if swelling occurs beneath it. The muscles of the arm are still less suited for injections. The arms are used for more delicate movements than the legs, and any slight interference with their function is consequently felt more severely ; the muscles too are not so thick as those of the buttock, and any swelling or inflammation is likely, therefore, to be felt more acutely.

Pathology. An examination of the tissues where injections of metallic mercury have been made shows that a cavity is produced in which the injection lies mingled with a sticky yellow fluid. The cavity is lined with a thick layer of amorphous tissue which stains with difficulty, and probably represents the remains of the muscle fibres and the connective tissue at the seat of injection. This layer contains red blood-corpuscles and leucocytes with particles of metallic mercury, some lying free, others enclosed in the white corpuscles. External to this layer is a zone of condensed connective tissue containing many blood-vessels in a state of dilatation, and again externally a third zone of altered muscular tissue in which are many black points of metallic mercury. The vessels in this zone are also greatly dilated, and show very marked changes in the structure of their walls. The endothelial cells are proliferating, and in many cases have become detached ; the muscular coat is thickened, and the individual fusiform cells are often vacuolated. In the case of a patient who died of pulmonary tuberculosis with ulcerating cutaneous syphilides, for which she had been treated by injections of calomel, many crystals of calomel were seen in the microscopical sections of a node which had been observed thirty days before death.

Method of Injection. The method of injection is the same wherever it be made. Absolute cleanliness must be ensured, because syphilitic patients are more prone to suppuration from trivial causes than those who are in good health. This cleanliness must be equally complete for the surgeon, the patient, the syringe, and the injection.

The syringe used for injecting mercurial solutions into the muscles ought to be made entirely of glass. It should be graduated

up to 40 minims, and care should be taken in choosing it that the bore of the nozzle is sufficiently large to allow the passage through it of the particular preparation which is to be used. The needles ought to be made of platino-iridium, and the bore must be large in proportion to the size of the needle, so that the smaller rather than the larger sizes may be employed. The length of the needle for ordinary persons need not be more than an inch and an eighth. The needles should be soldered into metal sockets, because they are introduced through the skin with a rotatory movement which causes them to work loose if they are merely screwed into a vulcanite mount. The points must be as sharp as possible, and when they are not in use they ought to be kept in carbolic oil of a strength of 1–20. Both the needle and the syringe should be washed out with boiling oil before each injection.

The patient may lie upon his side upon a couch, or he stands with his back to the surgeon. The skin of the patient is well washed with ethereal soap, which is rinsed away with freshly boiled warm water. It is then swabbed over with a 1–500 solution of biniodide of mercury, and is covered with a swab of sterilized Gamgee tissue, whilst the surgeon disinfects his own hands by washing them well with soap and water, and afterwards passing them through the biniodide solution.

The needle is then attached to the syringe, and is plunged with a rotatory movement and as quickly as possible through the skin, until the point lies deeply in the muscle. The piston of the syringe is withdrawn gently and for a short distance. The operation may be continued if no blood follows the withdrawal of the piston, but if the barrel fills rapidly with blood, or there is any other indication that a vein has been pricked, it is better to make a second puncture, as it is undesirable to inject the mercury into a part where there will afterwards be a haematoma. The syringe is detached from the needle, the required dose of injection is drawn into it, and is afterwards driven through the needle into the muscle slowly and steadily. Care should be taken not to introduce air, and before the needle is withdrawn a few drops of saline solution may be injected to expel the last drop of the mercurial injection, lest it should leave an inflamed track as it is withdrawn. It is hardly

necessary to apply any dressing over the puncture, and at the most a piece of sal-alembroth or white gauze may be put over it and kept in place by strapping.

Preparations of Mercury used for Injection

The injections into the muscles consist either of mercury itself in a state of fine subdivision; of insoluble salts of mercury like calomel or the salicylate; or of soluble salts like corrosive sublimate. The soluble salts are injected more easily, but the injections have to be repeated frequently because the salts are quickly absorbed and quickly excreted; the insoluble salts often cause pain, whilst the finely divided mercury requires a special syringe.

The Dose. The ordinary dose of mercury given to an adult by intramuscular injection is one grain contained in ten minims of Lambkin's cream, but this dose may be safely increased to $1\frac{1}{2}$–2 grains for men who are unusually heavy. Care must be taken before a course of injections is undertaken that the patient is not suffering from albuminuria, and in such cases it is better to defer the administration of mercury until the nephritis has been treated.

Metallic Mercury

Metallic mercury is injected in a state of fine subdivision, either as the grey oil (oleum cinereum) used by Professor E. Lang (b. 1841) of Vienna, or as the mercurial cream introduced by Col. Lambkin, R.A.M.C.

The oleum cinereum, or grey oil, used by Professor E. Lang is made according to the formula :—

℞

Lanolini anhydrici	℥iv
Chloroform	℥j ss.

Evaporate in a large mortar with continual stirring, and then add Hydrarg. vivi depurat ℥j.

Stir slowly until the chloroform has wholly evaporated and the metallic mercury can no longer be distinguished. Then add

135 grains of the ointment to 45 grains of vaseline oil, the oil being added so gradually and with such constant stirring that a smooth mixture is obtained. The oil must be kept in a wide-mouthed phial with a glass stopper. The dose is one minim for an injection.

Col. Lambkin's mercurial cream consists of mercury, 1 drachm by weight; anhydrous lanoline, 4 drachms; oil (carbolized to 2 per cent.), 5 drachms (see also vol. ii, p. 292).

The mercury is rubbed up with the lanoline in small quantities at a time in a glass mortar until the particles of mercury become invisible, a process which it takes upwards of two hours to perform thoroughly. The carbolized oil is then added, and the resulting product is kept in wide-mouthed bottles which have glass stoppers.

The mercurial cream should be well stirred with a glass rod which is first dipped in boiling oil to sterilize it. The cream becomes semi-solid in cold weather, and then it should be warmed in a water bath, whilst in the tropics it must be kept in an ice-chest, and it should then be well stirred before it is used, as the mercury tends to sink to the bottom of the vessel. This preparation contains one grain of mercury in ten minims, and ten minims is a full dose. Messrs. Squire & Son make up single doses of Lambkin's cream as 'Sterilettes'. Each is a sterilized and hermetically sealed capsule.

One injection a week is sufficient with either of these preparations, and a full dose may be given so long as the patient can be seen regularly, but if he be not under immediate observation it is better only to give half a dose at a time after the first injection. The injection should be repeated for six or eight weeks, after which the patient is allowed a rest for a fortnight, and the course is repeated in a similar manner for one year. Mr. George Pernet says that if the patient suffers from diarrhoea during the injections, the attack can be stopped by the administration of one or two cachets of salicylate of bismuth given before meals, each cachet containing five grains of the drug.

The Royal Army Medical Corps has published the following alternative plans of treatment by the injection of mercurial cream :—

Plan A

Each injection consists of *one and a half grains* of metallic mercury :—

	Months	Grains of Mercury
First Course :—		
Six injections, one every week	1½	9
Interval of two months	2	–
Second Course :—		
Four injections, one every fortnight	2	6
Interval of four months	4	–
Third Course :—		
Four injections, one every month	4	6
Interval of six months	6	–
Fourth Course :—		
Four injections, one every month	4	6
Total, 18 injections	23½	27

It is stated that this plan has been used for two years in Malta with satisfactory results. The second and third intervals may be reduced to three and four months each, and an additional course of injections may then be given if it be considered advisable to do so.

Plan B

Each injection contains *one* grain of metallic mercury :—

	Months	Grains of Mercury
First Course :—		
Eight injections, one every week	2	8
Interval of two months	2	–
Second Course :—		
Four injections, one every fortnight	2	4
Interval of two months	2	
Third Course :—		
Four injections, one every fortnight	2	4
Interval of two months	2	–

	Months	Grains of Mercury
Fourth Course :—		
Four injections, one every fortnight .	2	4
Interval of three months . . .	3	–
Fifth Course :—		
Four injections, one every fortnight .	2	4
Interval of three months . . .	3	–
Sixth Course :—		
Four injections, one every fortnight .	2	4
Total, 28 injections	24	28

The objection to this plan is that a greater number of injections are required to obtain the same effect as by Plan A.

This method has the merit of cleanliness, simplicity, and certainty, for the amount of mercury given is known accurately. It has the disadvantages, on the other hand, of the pain of a pin-prick, the necessity of a regular attendance, and the uncertainty as to how much of the mercury introduced into the body is really made use of by the tissues. Suppuration takes place occasionally, haematomata may be produced, and once or twice emboli have been noticed. But in spite of these slight drawbacks it comes next in convenience to the administration of mercury by the mouth as a cure for syphilis, and is at least equal in efficacy to the method of inunction.

Insoluble Salts of Mercury

Calomel and salicylate of mercury are the insoluble salts most often used for injection. The calomel should be sublimed, and must be sterilized before injection by boiling it in alcohol. It is then suspended in vaseline oil or olive oil, in glycerine, oil of almonds, or distilled water.

The formula generally employed for injection is :—

℞

Sublimed calomel	grs. vij ss.
Sterilized olive oil . . .	℥ xiv

Seventeen minims of this solution contain nearly five-sevenths

of a grain of calomel. The objection to the use of calomel for injection is the pain which it produces in many people, but it is said that by associating guaiacol and camphor with the olive oil the pain is diminished (see also vol. ii, p. 292). Five-sevenths of a grain of calomel is an average dose for injection once a week in the treatment of syphilis, but it may be reduced to a quarter of a grain or increased to a grain as circumstances may require.

Bertarelli gives the following method for preparing calomel injections in place of those adopted by Scarenzio :—

'Ten centigrams of calomel and one c.c. of liquid paraffin, or a solution of gum arabic, are placed in a special form of hollow cone made of glass, the inside of which is smooth and rounded. The top of the cone is covered with a glass lid. Several cones are prepared and sterilized in the autoclave. A glass syringe with a steel needle 4 cm. long is sterilized by boiling and subsequent immersion in a 1–20 solution of carbolic acid. It is washed through with alcohol before use. The skin at the seat of injection is sterilized in the usual way by washing with soap and water, swabbing with ether, and afterwards with a 1–500 solution of biniodide of mercury. The cover is then removed from the cone, and the calomel and paraffin are intimately mixed together by drawing it into and expelling it from the syringe. As soon as the mixture is complete the contents of the cone are injected deeply into the tissues, the needle being plunged vertically through the skin.'

Pain is the great drawback to the treatment of syphilis by injection of mercury or its salts into the tissues, and many experiments have been made to diminish this drawback to what is otherwise a most valuable therapeutic measure. Guaiacol has been employed with some success, whilst glycerine, gum water, olive oil, vaseline, vaseline oil, and lanoline have been successively used as vehicles. Lanoline and liquid paraffin have proved themselves to be fairly satisfactory, but Colonel Lambkin, R.A.M.C., says that the best results are obtained with palmitin, especially if it be combined with purified creosote and camphoric acid, which he calls 'creo-camph'. By the use of these substances he has been able repeatedly to inject calomel without causing pain (see also vol. ii, p. 292).

He recommends, therefore, the intramuscular injection of mercury and of calomel, according to the following formulae :—

℞

Metallic mercury	grms. 10
Creosote } . . .	āā c.c. 20
Camphoric acid }	
Palmitin basis to	c.c. 100

10 minims contain one grain of mercury.

℞

Calomel	grms. 5
Creosote }	c.c. 20
Camphoric acid }	
Palmitin basis to	c.c. 100

10 minims contain half a grain of calomel, and the melting-point is 98·6° F.

The camphorated creosote is absolute creosote in combination with camphoric acid, and is isolated as such from creosote obtained from beechwood by fractional distillation as methyl-catechol. The injections are prepared by Messrs. Oppenheimer as 'aseptules' in a sterilized form, each containing a maximum dose of 15 minims.

Professor Fournier speaks very highly of this method of treating syphilis. He says that 'calomel injections act extraordinarily well, and produce results which cannot be obtained by the usual remedies, unless they are administered in very large doses which may be dangerous. The method of giving calomel by injection is well fitted therefore for the treatment of malignant syphilis, for the later forms of inherited syphilis, for obstinate inflammation of the tongue occurring in the later stages, and for such troublesome and dangerous affections as syphilitic inflammation of the larynx.' Its action, on the other hand, is uncertain because it sometimes fails to give any relief, and patients are very likely to suffer from a recurrence of their symptoms if the course is not continued for a sufficient length of time. Injections of calomel cause attacks of stomatitis more often than gastro-intestinal disturbances, and they are sometimes followed by 'calomel fever', characterized by an acute attack of malaise, with a rapid pulse and a rise of temperature, lasting three or four days, but returning after each injection. Col. Lambkin also speaks in terms of high

praise of the use of intramuscular injections of calomel in syphilis, though he does not trust to it entirely (vol. ii, p. 299).

Professor Fournier has carefully investigated the pain attending the injection of calomel, and he states that in 1,185 patients, 637 complained of pain in a varying degree ; in some it was intolerable, in others acute, in others moderate, whilst in less than half the cases it was slight or insignificant.

The pain generally occurs on the second or third day after the injection, rarely during the first few hours. It begins at the point of puncture, and is entirely local at first. Patients compare it to the effect of a blow or bruise ; sometimes there is aching, and the buttock is sensitive to the least pressure ; sometimes the pain is shooting in character and is made worse by movement. It is not always confined to the buttock but may radiate into the thigh, or more rarely to the loins ; occasionally it simulates sciatica and runs down the leg. The pain causes functional disturbances, which vary according to its severity. The patient may be entirely confined to his bed ; he may have difficulty in sitting up, or in lying upon the painful spot ; he may limp or may complain of difficulty in going up and down stairs. The acute pain seldom lasts more than two to four days, but aching and difficulty in walking may last several days longer.

Basic Salicylate of Mercury. Salicylate of mercury is an insoluble salt of mercury, which is less painful than calomel when it is injected, but of whose curative action in syphilis hardly enough is yet known. The basic salicylate is used because it is less painful when injected than the neutral salt. The formula is

℞

Basic salicylate of mercury . . .	ʒj
Oil of vaseline	℥j

The dose of the salicylate is a half to one grain, and it need not be injected more than once a week.

The salicylate of mercury must be thoroughly rubbed down before it is mixed with the paraffin, or the needle may become blocked. The advantages claimed for this preparation are : (1) that it can be prepared by simply mixing with the paraffin without

any prolonged stirring; (2) that it can be sterilized by heat as often as is necessary, without undergoing any chemical decomposition; (3) that vigorous shaking before use is all that is necessary to ensure a proper consistency of the mixture; (4) that it is not necessarily affected by heat or cold, and it is suitable, therefore, for use in any climate, without the special precautions necessary to preserve the other oils and creams of mercury. The officers of the Royal Army Medical Corps, who give these facts, state that it is less active than some of the other mercurial preparations, but that it may be used in the later courses of injection (see p. 290).

Thymol Acetate of Mercury. The thymol acetate of mercury is a white crystalline salt which is insoluble in water, and is said to be very slightly painful when it is injected. It is said, too, to be better tolerated than calomel or the salicylate of mercury. It is given in weekly injections, the dose being two grains in sterilized oil of vaseline.

Mercury Soziodolate is insoluble in water, and is administered in the form of a weekly injection suspended in sterilized oil of vaseline. The dose is one-third of a grain, the salt itself containing 35 per cent. of mercury.

There is also a phenate or *carbolate of mercury* which is insoluble in water, and a *urate of mercury*. The dose of each is 1½ to 2 grs.

The Soluble Salts of Mercury used for Injection

The number of the soluble salts of mercury which have been recommended for injection is so considerable that no pretence is made here to give an exhaustive list of them.

The chief soluble salt used for injection has been the perchloride in doses of one-twelfth to three-quarters of a grain, prescribed according to Lewin's formula :—

℞

Hyd. perchlor. . .	grm. j ss. = grs. xxiv
Sodium chloride . .	grm. j = grs. xvi
Distilled water . .	grms. 100 = ℥iij ss.

A cubic centimetre (17 minims) of this solution contains 65 milligrammes, or about one-thirteenth of a grain of mercury.

Professor Robert W. Taylor speaks in the following words of the use of injections of corrosive sublimate for the cure of syphilis:—

'Extended experience has convinced me that the most efficient dose of the bichloride when used hypodermically is one-quarter of a grain, and it may be increased in some cases to five-eighths or three-quarters of a grain. It is usually well to begin with injections of one-eighth of a grain, and to increase carefully up to one-quarter of a grain, and, if necessary, even higher. These doses are well borne in average well-developed men, and will exert a favourable influence upon the disease, producing no bad results. In former years these doses would have been considered toxic, but I have given so many thousands of them with so much benefit to patients, that I have reached the conclusion that it is only within the past few years that we have realized the full curative effect by this method.

'The bichloride solution should be freshly made, and so adjusted that ten drops of distilled water will contain one-quarter of a grain of the salt. The solution should be kept in a dark place.

'*Mode of Injection.* The syringe should be made of india-rubber, and should hold 10 or 20 drops. The needles should be of very fine calibre, of steel, and fully an inch and one-eighth or one-quarter long. The greatest care should be taken to keep the syringe and needles (for it is well to have quite a number) in a state of perfect cleanliness and removed from dust contamination. When the syringe is charged with the sublimate solution and the needle is affixed, the instrument should be placed in a saucer or tray containing a 5 per cent. solution of carbolic acid. In the operation complete asepsis should be aimed at; the injected part should be carefully washed with soap and water, mopped with carbolic acid solution (5 per cent.), and dried. The skin being pinched up in a fold, the needle is to be pushed gently but firmly deep into the subcutaneous tissues, and the fluid expelled slowly and with care, in order that the tissues may not be bruised more than necessary. Slight massage over the site of the injection will aid in its diffusion into the tissues. It must always be borne in mind that the fluid must not be thrown into the deeper parts of the derma proper, for the reason that if there deposited it is very prone to produce an eschar, which will result in destruction of the whole thickness of the skin. Then, again, great care must be exercised that the point of the needle is not in a vein, in which case dizziness, syncope, a feeling of suffocation, pain in the heart and lungs, and other alarming symptoms, will be observed. To avoid this accident the surgeon must watch the piston of the syringe whilst he is injecting. If there is a moderate resistance to the injected fluid, as will be the case if the tip is in the subcutaneous tissues, he may know that all is well. If, however, the injection seems to pass out of the syringe without any or with very little resistance, there is danger that the tip is in a vein. Under these circumstances it is well to push down farther or withdraw the needle a little until normal resistance is felt and no untoward symptoms

threaten. A very moderate amount of practice in the use of hypodermic injections will teach the surgeon to know when he is in danger of doing harm.

'The depressions behind the great trochanters are eligible sites for injections, as they cause little, if any, pain, and but small and ephemeral nodosities. In this region quite a number of injections may be given, and in most instances sufficient surface is offered for the requisite injection treatment. We can resort also to the hypogastric regions, and to the parts near the inguinal lymphatics above and below; but whenever the upper parts of the thighs are used great care must be exercised in order that the treatment may be continued. As it is often important to act locally upon lesions of the penis and of the lymphatics arising therefrom, we may have to utilize the tissues in their vicinity. It should always be remembered that injections should not be made into the mons veneris or under the skin of the penis. The region of the neck, particularly its back portions, may be used in extreme cases requiring local or regional therapy. Care must be exercised that vessels and nerves are not punctured or injured.

'As a rule, the injection of one-eighth or one-quarter of a grain of sublimate every second day will not be attended with annoying results, and even a daily injection may be well borne and may produce good results. No absolute rule can be given as to the dose or its frequency. It is astonishing how seldom stomatitis or intestinal troubles are produced, even when massive doses of the sublimate are injected.'

The unpleasant local effects following upon subcutaneous injections of corrosive sublimate are pain at the point of puncture; pain at the site of injection; an erythematous condition of the skin, with heat, itching, or burning; infiltration of the subcutaneous tissues, and localised firm nodosities.

The pain of the puncture is trifling, and although it may be severe at the site of the injection it generally subsides after a few hours. It may continue for a day or two in exceptional cases, and sometimes it is only felt after the first few injections, and passes off if the injections be continued.

The erythema varies from a slight and transient blush to a deep redness, accompanied by severe burning and itching. It is relieved readily enough by rest and cooling lotions.

Peptonate of Mercury. This substance is a mixture of peptones, corrosive sublimate, and chloride of ammonium in glycerine and water. It has been largely used in the form of subcutaneous injections for the cure of syphilis. It is said to be better tolerated

than the crude sublimate in doses of a quarter of a grain, but it has the disadvantage attending all the more complex bodies, that it is not a chemical compound and that the strength varies with different samples.

Cacodylate of Mercury and *Mercury Iodo-cacodylate* are both soluble in water. The dose of either compound is half a grain for each subcutaneous injection.

The iodo-cacodylate of mercury is prepared according to the following formula :—

℞

Iodide of mercury	grs. viij
Iodide of sodium	grs. xlv
Cacodylate of sodium . . .	℥iij ss.

Dose 16 minims.

Mercury Succinimide is freely soluble in water, and is said to be less likely to cause local irritation when it is injected than many of the other compounds of mercury. The dose is one-fifth of a grain for each injection.

Sublamin is a soluble preparation of mercury which contains 43 per cent. of mercury. It is mercury ethylene-diamine sulphate, and is administered subcutaneously in solutions of 1 : 50 or by intramuscular injections in solutions of $\frac{1}{4}$ per cent.

Hermophenyl is an amorphous white powder consisting of 40 per cent. of mercury. It is sodium-mercury phenol-disulphonate, and is usually injected in doses of half a drachm twice a week, or it may be given internally in doses of $\frac{2}{3}$ to $1\frac{1}{4}$ grains a day.

Ssukof believes that the internal administration yields better results in curing syphilis than its subcutaneous application. It is very rapidly absorbed by the system, but it does not irritate the stomach or intestines even when it is taken for a long time. It is said that it does not even give rise to inflammation of the mouth and gums. Ssukof orders two to four pills twice a day, each pill containing one-quarter of a grain of hermophenyl and one-sixty-fourth of a grain of extract of belladonna. M. Dieupart thinks that the best results are obtained from the use of large doses of hermophenyl. He accordingly prescribes a weekly injection of

1 to 1½ grains of hermophenyl by hypodermic injection, and states that after extensive experience he has not seen the drug produce any irritation of the skin.

Cyanide of Mercury. Marfan recommends cyanide of mercury, and says that it is less painful when injected than some of the other preparations. He uses it especially in children. For a child of 10 years old he injects 5 c.c. (80 minims) of a solution of one in one thousand every other day. This amount represents one-fourteenth of a grain of mercury.

Benzoate of Mercury. This preparation is rendered soluble by the addition of sodium chloride. It is given in daily doses of one-seventh to one-quarter of a grain in accordance with the following formula :—

℞

Benzoate of mercury . . .	grs. j ss.
Benzoate of ammonia . . .	grs. vii
Distilled water	℥iij

Benzoate of mercury does not precipitate the proteid bodies of the blood, but it must be carefully prepared to get it pure, easily soluble, and neutral. The pain when it is injected is then reduced to a minimum.

MM. Desmoulière and Lafay have succeeded in obtaining such a preparation of the benzoate of mercury, and it has been used extensively in Professor Gaucher's practice with excellent results. The formula which seems most satisfactory is :—

℞

Benzoate of mercury . . .	grs. xvi
Pure sodium chloride . . .	grs. xl
Sterilized water	℥iij ss.

A quarter of a grain of the hydrochlorate of cocain may be added to this solution if necessary. The dose is 30 minims a day, which may be increased gradually. The injection is repeated daily.

Biniodide of Mercury. This preparation was first used for hypodermic injection as biniodide oil by Panas, in the proportion of sterilized oil 10 c.c. and biniodide of mercury 4 centigrammes, 1 c.c. of the preparation containing one-sixteenth of a grain of

biniodide. But this is too small a dose, and may be doubled with advantage to the patient.

Professor Fournier says that ' it is an active and safe remedy which is better tolerated than most injections. It causes very little pain, as a rule, and seldom gives rise to nodosities or stomatitis '.

Professor Fournier clearly recognizes the limitations of the drug, for he also says: ' It is undoubtedly inferior to calomel and also to grey oil, and to put biniodide on the same level with these remedies is certainly a therapeutic heresy. If I had to establish a hierarchy among the different agents for hypodermic mercurialization, with regard to their relative power, I should unhesitatingly place calomel in the first rank, as a remedy which is at present unsurpassed, grey oil in the second rank, and biniodide a long way afterwards in the third rank, along with some others, such as the benzoate, salicylate, and cyanide, all active and useful remedies, but incomparably inferior to the preceding in therapeutic energy.'

M. Duret has employed camphor and guaiacol in combination with calomel to render the injections less painful. The two substances, when they have been chemically combined, form a liquid to which the name ' guaiacoloid ' is given.

The treatment of syphilis by intramuscular injection cannot yet be said to have taken its place as a routine method, and in all probability it will never entirely displace the administration of mercury by the mouth. It is especially useful at the present time in cases where it is desirable to make sure that the patient receives adequate treatment in spite of his own carelessness, as in men of the lower orders who do not feel their responsibilities, and in prostitutes who cannot be made to understand the necessity for taking proper precautions against spreading the disease. When the State recognizes its duty to prevent syphilis as it already understands the necessity of preventing the spread of scarlet fever, small-pox, and diphtheria, treatment by injection will come into very general use.

In private practice the injection of mercury is a cleanly and quicker method of treating those cases which used to be treated by inunction, that is to say, not as a routine treatment, but when

from any reason it is undesirable or impossible to give mercury by the mouth. It is especially useful, therefore, when the severity of the symptoms, dyspepsia, stomatitis, diarrhoea, and failure to control the disease by the dietetic use of mercury, make it necessary to adopt some other plan; as well as in those later forms of syphilis like leukoplakia, fissured tongue, and syphilis of the nervous system, which do not respond to mercury given in the usual manner or to potassium iodide.

Intravenous Injections

The method of giving mercury by injecting a soluble salt into a vein was introduced by Professor Baccelli in 1893. It has since been carried out by Mr. J. Ernest Lane in London, and by many continental surgeons, but has never come into very general use. The mercurial compounds which have been injected most often are the perchloride, the cyanide, the benzoate, and the biniodide, suitably dissolved, and in doses of one-thirtieth to one-seventh of a grain every second day for a month.

Mr. Ernest Lane recommends the cyanide of mercury in a 1 per cent. solution, the amount to be used at each injection being 20 minims, though this dose may be doubled without danger. He employs daily injections. The arm is first rendered aseptic, and a fillet is tied round it above the elbow sufficiently tightly to distend the veins. The most prominent vein is then selected, and this is usually the median basilic. The needle is thrust into the vein, the syringe is attached to it, and the injection is made as soon as the fillet has been loosened. The needle is then withdrawn and the puncture is covered with the surgeon's finger for a few moments, as no dressing is needed.

The advantages claimed for the intravenous method are that it is absolutely painless, that the functions of the digestive tract are not interfered with, that the doses of the mercurial salt are small, are certain of absorption, and can be easily regulated to the susceptibilities of the various individuals. The treatment is perfectly safe if ordinary precautions be taken, and even if the vein be missed, little or no inconvenience is caused. The resulting

improvement is said to be certain and rapid. But the disadvantages outweigh these advantages. There is the natural fear of thrombosis, which does not seem to be a common accident. There is the real difficulty of finding suitable places for so many venous punctures, as well as the necessity for skilful injection, so that the needle may pass exactly into the lumen of the vein, and neither fall short nor go beyond it. It is unsuitable for women, because in them the larger amount of adipose tissue makes it difficult to ensure proper distension of the veins.

Balzer, at the French Medical Congress in 1904, said that he considered intravenous injections to be inferior to the other methods of administering mercury in syphilis, because the drug was eliminated too quickly to be of much service. But he thought that the method might be useful in cases of ocular and cerebral syphilis. Barthelmy and Levy-Bing have used intravenous injections of biniodide of mercury, which is less poisonous and more active than the cyanide. They have come to the conclusion that the method has no advantages over intramuscular injection, except when very rapid absorption of mercury is required. It may be assumed, however, on *a priori* grounds, and from a knowledge of physiology, that for all practical purposes, mercury injected into the tissues in a suitable form will be absorbed by them to greater advantage than whilst it is circulating in the blood-stream in the crude form of a salt.

Organic Compounds of Arsenic

Various organic arsenical compounds are being employed at the present time in the treatment of syphilis because they are serviceable in cases of sleeping sickness, which is also a disease due to similar micro-organisms.

Atoxyl is the best known of these complex arsenical substances. It is the sodium salt of arsenic acid in which one hydroxyl radicle of arsenic acid has been replaced by the aniline radicle. It is, therefore, sodium-amino-phenyl-arsonate and it contains 27·3 per cent. of arsenic. It is a white crystalline

powder with a refreshing taste, soluble in about six parts of cold water and readily dissolving in hot water. Atoxyl gives an olive-green precipitate with ferrous sulphate and a white precipitate with mercuric chloride. A sensitive test is obtained by adding to it a mixture of hypophosphorous and hydrochloric acids, which shows the presence of so small a quantity of atoxyl as 0·05 milligramme by the production of a deep brown precipitate on warming. The reagent is made by dissolving one part of sodium hypophosphite in one part of water and by then adding ten parts of hydrochloric acid. This test shows the presence of 10 milligrammes of atoxyl in 250 millilitres of urine, and if one or two drops of $\frac{N}{10}$ iodine solution be added to the mixture of the solution and reagent the delicacy of the reaction is so greatly increased that 0·02 of a milligram of arsenic acid can be recognized.

The drug is administered by injection into the muscles in exactly the same way as Lambkin's cream (pp. 226 and 288), but it is necessary to sterilize the syringe by heat only since acids decompose atoxyl. It is said that the atoxyl itself can be boiled for five minutes without undergoing decomposition.

The dose is six grains dissolved in water and given every alternate day until eight injections have been administered. Local applications may be ordered in the form of an ointment of the strength of twelve grains to the ounce. Atoxyl should not be given by the mouth. The symptoms usually disappear after eight or ten injections and the remedy may then be discontinued and only used again if there is a recurrence.

The effects of atoxyl are best marked when there is ulceration of the mucous membrane of the mouth, tongue and throat as well as in cases where large condylomatous masses are present.

The advantages claimed for atoxyl are that it is easy to inject since it is soluble in water. The injections are painless, and they are not followed by any induration. It is thought that the drug will be especially suitable for India and other tropical countries where the debilitated condition of the patients does not allow of the administration of mercury in any form. Certain disadvantages attend the use of atoxyl, the most important being

that there is, as yet, no certainty that it cures syphilis, though it may relieve some of its more marked signs. It causes certain toxic symptoms, the chief amongst which are jaundice, vague pains in the arms and legs, general weakness, loss of appetite, vomiting, painful micturition, and in some cases blindness without obvious retinal changes. The drug should, therefore, be administered with caution, and it should be borne in mind that it accumulates in the system.

Two other compounds of arsenic have been introduced recently, the one called KHARSIN or sodium-3-methyl-4-amino-phenyl-arsenate ; the other, ASODYL, which is sodium-3-methyl-4-acetyl-amino-phenyl-arsenate. It is claimed for kharsin that it contains 25·4 per cent. of arsenic and is soluble in its own weight of water, the solution being neutral. Asodyl contains 2·48 per cent. of arsenic and is also soluble in its own weight of water. (See also vol. ii, p. 308.)

ANTIMONY

Antimony has been injected experimentally in syphilis because it has been found useful in trypanosomiasis, but the injections caused so much pain and local trouble that they had to be abandoned.

BIBLIOGRAPHY

Ssukof, Russische Zeitschrift f. Haut- und Geschlechtskrankheiten, 1904, Nos. 11 and 12.

Dieupart, Injections mercurielles de l'hermophényl. Arch. Gén. de Méd., 1905, No. 9, p. 546.

Desmoulière and Lafay, Nouveau Mode de préparation du Benzoate de Mercure. Annales de Dermatol. et de Syphiligraphie, 1906, p. 492.

Trabucchi, Sulla struttura dei nodi conseguenti alle iniezioni inframuscolari di calomelano. Giornale italiano delle malattie veneree e della pelle, 1905, fasc. 6, p. 680.

J. Ernest Lane, The Treatment of Syphilis by Intravenous Injections of Mercury. The British Medical Journal, 1896, vol. ii, p. 1702.

Barthelmy and Levy-Bing, Les Injections Intraveineuses dans la Syphilis. La Syphilis, February, 1905.

Scarenzio, Ann. univ. di med., Milano, 1864, vol. clxxxix, pp. 602–622.

Duret, Ann. de Dermatol. et de Syphiligraphie, 1906, p. 39.

CHAPTER XV

TREATMENT BY THE IODIDES AND BY THE IODIDES COMBINED WITH MERCURY

IODINE may be given in a variety of forms in the treatment of syphilis. Iodide of potassium, iodide of sodium, and iodide of ammonium are the salts in common use, and until recently they have always been given by the mouth. New forms of iodine have been introduced lately, with other methods of administration. But in whatever form iodine is given, the surgeon should have a clear idea of the capabilities of the drug and of its limitations. It must be quite clear to him that neither iodine nor its salts in any form are capable of curing syphilis. Symptoms can be relieved and inflammatory swellings can be reduced by the administration, but the syphilitic poison is not destroyed, and the progress of the disease continues, more slowly, perhaps, but none the less surely. Mercury cures, iodine relieves. The fact that a swelling due to syphilis has been reduced by the use of iodine is evidence that the patient needs a further course of mercury to cure the disease.

Mode of Action. Iodides act upon the mononuclear leucocytes, which are very numerous as a result of syphilitic inflammation, and they cause the absorption of new and imperfectly developed connective tissue so long as it retains its cellular character. But the iodides have no action upon fully formed fibrous or scar tissue, nor is their power of causing absorption limited to the products of syphilitic tissue. It is exerted also upon inflammatory products due to such widely different causes as cancer, actinomycosis, osteo-arthritis, and rheumatism. The term absorption, indeed, is merely used for convenience, because the manner in which iodine acts upon newly formed connective tissue to cause its disappearance is as yet wholly unknown.

Major H. C. French, R.A.M.C., believes that potassium iodide

acts 'by its power of removing the barricades of nascent fibrous tissue in which the syphilitic virus is ensconced. It therefore permits the leucocytes bathed in plasma and containing an opsonin to enter. The syphilitic microbe is thus taken up or attenuated, and this explains the lessened anaemia of the patient.'

Iodine is easily absorbed and as easily eliminated, and the tissues quickly become so used to its presence in the circulation as to be tolerant of it. The drug should therefore always be given in full doses and in frequently interrupted courses. The best results are obtained by giving it only for a week at a time with a week's interval. The long-continued and uninterrupted courses extending over many weeks or even months are a wasteful and useless expenditure of an expensive drug.

History. In the early years of the eighteenth century there was a reaction against the indiscriminate use of mercury in the treatment of venereal disease. Sarsaparilla, which had always been a favourite remedy with those who decried mercury, was at first given a more extensive trial, and when this failed to satisfy the more critical, iodine came into use.

Iodine and its compounds seem to have been used at first empirically in the form of burnt sponge, which was employed in the treatment of venereal ulcers of the throat until, in 1821, Martini of Lübeck substituted iodine for burnt sponge and obtained good results in these cases. In the course of this year Biett, at the Hôpital St.-Louis, employed iodine combined with mercury in the treatment of syphilides, and in 1831 Lugol published cases of tertiary affections cured by preparations of iodine alone.

Treatment by iodide of potassium was adopted in England about 1831. It was used extensively by Dr. Robert Williams (1787?–1845), Physician at St. Thomas's Hospital. Dr. Williams was in advance of his time, for he believed in the infective nature of disease, and throughout a long life he sought for specific remedies to cure disease. In the course of these inquiries he discovered the curative properties of potassium iodide in syphilis, and he introduced bromide of potassium into the practice of medicine in England. But Dr. William Wallace first placed the treatment of syphilis by potassium iodide upon a sure basis, for he proved its

value experimentally, chemically, and clinically. He published his views in a series of clinical lectures delivered in 1836 at the Jervis Street Hospital, Dublin. He began his lectures with the words: 'You are aware, gentlemen, how very much I have been engaged for the last two or three years, both in this hospital and in the Skin Infirmary, in investigating the influence of iodine over the morbid states produced by the venereal poison. I had not long entered upon the investigation before I felt with so much force its importance that I determined to suspend the further publication of my work on syphilis, one volume of which had appeared, until I had collected a sufficient number of facts to enable me to deduce accurate and general conclusions on the subject.' These lectures attracted much attention, and as they confirmed the experience gained by students at the Borough Hospitals in London, the treatment of syphilis by potassium iodide soon attained the important therapeutic position which it has ever since held.

Iodism. As mercury produces a train of symptoms known collectively as 'salivation' (p. 197) from the most prominent sign, so the administration of the iodides may cause a train of symptoms which are grouped together as 'iodism'. The condition is sometimes local, sometimes general; chronic in the majority of cases, but occasionally so acute as to lead to serious mistakes in diagnosis.

The commoner symptoms of iodism are loss of appetite, with gastro-intestinal disturbance, a metallic taste in the mouth, coryza, lachrymation, tinnitus aurium, and a pustular eruption which is generally acneiform, but in severe cases may be purpuric. These symptoms are often produced by small doses of 2–5 grains of potassium iodide, and they disappear if the quantity be increased to ten grains and upwards, as well as when the use of the drug is discontinued. But some people present a remarkable idiosyncrasy, for minute doses will produce in them the symptoms of iodism, whilst in the vast number of people the iodides can be taken in varying doses for long periods of time without any ill effect.

The local symptoms appear to be due to the irritation produced by the iodine, which is eliminated by the various secretions of the body. Thus a conjunctivitis may easily be set up if calomel be

dusted into the eyes of a patient who is taking any of the iodides, because the drug is eliminated by the tears. Acne in the same manner may be caused by the decomposition of the iodides, and the elimination of free iodine in the sweat and sebaceous secretion, and this troublesome condition is prevented or relieved by the daily use of baths to keep the skin perfectly clean, as well as by the administration of arsenic.

Professor Fournier describes a condition of acute iodism in the following manner, and gives to it the name of 'Iodic Grippe'. He says: 'Suppose you have prescribed iodide for a patient to-day; to-night or to-morrow morning you may be hurriedly sent for to find the patient in an alarming condition, confined to his bed, frightened and anxious, with a splitting headache, breathing with difficulty, his face red and swollen, his eyelids oedematous, and his nose looking as if he had erysipelas. He has all the symptoms of an acute coryza, with nasal obstruction, sneezing, running at the eyes, and sometimes a sore throat and hoarseness. The symptoms come on suddenly, and quickly disappear if the drug be discontinued.'

Patients who are taking full doses of the iodides sometimes complain of acute pain in the chest, with cough and difficulty of breathing. They may also suffer from haemoptysis and present the physical signs of effusion into the pleural cavity with some consolidation of the lung; in other cases the troublesome symptoms are confined to the larynx, and the patient presents the signs of laryngeal obstruction.

Method of Administration. The iodides are given in the form of iodide of potassium, iodide of ammonium, and iodide of sodium, in doses of ten grains three times a day, rapidly increased to twenty or thirty grains. Potassium iodide is used most commonly, but the three iodides may be given together, and it is thought that the addition of a little carbonate of ammonium increases the good effect of the drug. The smaller doses of ten grains can be given in the usual ounce mixture, but the larger quantities should be given at meal times dissolved in a tumblerful of some aerated water. If the drug causes dyspeptic symptoms it may be given in milk, the essence of pepsin, or the elixir of lactopeptine. If the patient does not like milk the iodide can first be dissolved in it, and

the milk can then be curdled by the addition of rennet. The whey thus medicated practically contains all the iodide, and is generally digested easily. The iodides of lithium and of strontium may sometimes be substituted with advantage for the more usual preparations. As has already been said, the tissues quickly become accustomed to the presence of iodine, and the courses should therefore be full, short, and frequently repeated. A tonic mixture containing iron, nux vomica, and dilute phosphoric acid ought to be given during the intervals of the iodide courses.

The disadvantages attending the use of the alkaline iodides have recently led to the introduction of other methods of giving iodine. The two preparations most highly recommended are iodipin and iothion.

Iodipin is a combination of iodine with sesame oil, and is said to be absorbed by the small intestine rather than by the stomach. It may be given by the mouth in the form of tabloids ; it may be injected subcutaneously, or into the rectum. The dose by the mouth is from half to one ounce of a 10 per cent. solution three times a day ; subcutaneously, two and a half to three drachms of a 25 per cent. solution ; or a drachm and a half of a 25 per cent. solution into the rectum. When iodipin has been given, comparatively small amounts are eliminated for long periods of time by the urine, whilst potassium iodide is quickly eliminated in large quantities; the action of iodipin, therefore, is extended over a longer time than that of iodide of potassium. (See also p. 322.)

Iothion is a slightly yellow syrupy liquid containing 70 to 80 per cent. of iodine, and it is chemically a hydriodic ether. It is only slightly soluble in water, but it mixes in all proportions with alcohol, chloroform, ether, and benzol ; it is soluble in olive oil and glycerine. It volatilizes slowly at ordinary temperatures, but more quickly at body heat. It is used either pure, dissolved in spirit, or in the form of an ointment made according to the following formula :—

℞

Iothion	℥ ij
Lanoline	
Vaseline	ää ℥ j

The ointment is said to be preferable because it produces less irritation than when the drug is used in any other form. Iothion must be employed carefully, as it occasionally gives rise to irritation of the skin and other symptoms of iodism in a severe form.

Tiodine is a sulphur containing preparation of iodine forming an organic compound, and therefore open to the usual objection to this class of remedy, that it is not of constant composition. It is given by subcutaneous injection or in the form of pills. The introducers of the compound claim that it contains as much as 47 per cent. of iodine, and that it is neither toxic nor caustic in its action.

The administration of mercury and potassium iodide. It is fortunate for the treatment of syphilis that mercury can be given in combination with the iodides, for the mercury cures syphilis by destroying the poison, whilst potassium iodide enables the cellular products of the disease to be removed by the tissues. A combination of mercury and potassium iodide has been employed for many years, and at St. Bartholomew's Hospital the draught has long been called ' Paget's mixture ', after Sir James Paget, who introduced it when he was working as an assistant surgeon in the out-patient room of that charity in 1847. The original formula, which is still in use there, contains about one-tenth of a grain of the red iodide of mercury, and is prepared as follows :—

℞

Iodide of potassium . . .	grs. 5
Solution of perchloride of mercury . .	℥j
Caramel	a sufficiency
Chloroform water	to ℥j

This draught is ordered to be taken three times a day directly after meals. It is efficacious, but the mixture is so nauseous that it cannot be recommended to any one who is at all fastidious. I have asked the dispensers at St. Bartholomew's Hospital—Mr. Langford Moore and Mr. S. Tweedy—to devise something more palatable, and after a series of trials they recommend the following formulae, in both of which the metallic taste of the mercury and the acridity of the potassium iodide are successfully

masked. The one is for the use of those who like sweet medicines, the other for those who prefer bitters :—

1.

℞

Liq. hydrarg. perchlor.	℥j
Potassii iodidi	grs. 5
Syrupi	℥j
Mucilagin. tragacanth.	℥ij
Ol. amygdal. essent. (sine HCN)	♏ ¼
Ol. cinnamomi	♏ ¼
Aq. chloroformi	℥j

M. Fiat haustus.

2.

℞

Liq. hydrarg. perchlor.	℥j
Potassii iodidi	grs. 5
Tinct. chirettae	♏ 10
Elixir glucidi (B. P. C.)	♏ 4
Infusi gentianae	ad ℥j

M. Fiat haustus.

It is not essential that the perchloride of mercury should be used, and Professor Robert W. Taylor, of New York, recommends the following prescription :—

℞

Hydrarg. biniodidi	grs. 2–4
Potassii iodidi	℥ ss
Tinct. cinchonae comp.	℥iij ss
Aquae	℥ ss

M.

Sig. One teaspoonful three times a day, to be taken in a wine-glassful of water an hour after eating.

Professor Taylor says that he has come to look with much favour upon a combination of a full dose of mercury with a small dose of the iodide of potassium. The mercurial salt in this preparation is the efficient agent, and the iodide simply serves to make it soluble. When there is debility the fluid extract of coca may be

added. 'From a wide experience,' he tells us, 'I have convinced myself that this mixture of mercury and iodide of potassium is remarkably efficient and beneficial after the sixth or eighth month of the secondary period, particularly in cases which have been previously subjected to treatment. This combination is usually well borne by the stomach, even when the maximum quantity of the biniodide is ordered. But great care must be observed in its administration, and if gastro-intestinal irritation is produced the dose must be made smaller, and if a depressing effect upon the general nutrition or upon the nervous system is observed, the remedy must be suspended for a time. In these cases rest and change of air and scene are very beneficial.'

It is not essential that the mercurial preparation should be combined with the iodide before it is administered, and it is often convenient to give the two remedies separately. Nothing is known of the fate of drugs when they have been assimilated by the tissues, nor of the manner in which they act upon them to effect a cure. I often order grey powder (hyd. cum cret.) to be taken in the form of tabloids, with a mixture containing potassium iodide after an interval of two hours.

'Zittmann's' method. There are still a few other methods of giving mercury to patients who do not improve under the usual courses, and amongst these is 'Zittmann's treatment'. Zittmann was a Polish military surgeon who lived from 1671 to 1757. He held a distinguished position at the Court of the Duke of Saxony, and acquired a knowledge of one of the many ancient and traditional forms of treating syphilis by sarsaparilla. This knowledge he communicated, without in any way modifying the original formula, to J. C. A. Theden (1714–97), the great army surgeon of Germany during the Seven Years' War, and to Proebisch, who was surgeon to the Court of Prussia.

'Zittmann's treatment,' therefore, is one of the most ancient empirical methods of treating syphilis, and it still lingers as a survival amongst the more scientific methods. It is not useful in every case, but it sometimes acts most excellently when other methods have failed. I often employ it, knowing that only the smallest traces of any active drug are being given, and yet feeling

assured that the patient will improve if the case has been wisely selected. The treatment is discontinued at the end of a fortnight, and the patient is then put upon a more rational method.

Zittmann's Treatment :—

The course of treatment extends over a fortnight, during which time the patient is put upon a strict diet and regimen. The following are the details of this method of treatment.

The decoctions and pills are made according to the following formulae of Sir Alfred Cooper, which differ slightly from those given on p. 306 :—

Zittmann's decoction No. 1.

℞. Rad. sarsae contus, 4 ounces ; semin. anisi contus, semin. foeniculi contus, āā grains 80 ; fol. sennae, 1 ounce ; rad. glycyrrhiz. contus, 4 drachms.

Add in a linen bag :—

Sacch. alb., alum sulph., āā 2 drachms ; hydrarg. subchlor., grs. 80 ; hydrarg. bisulph. rub., grs. 20 ; aquae, C. iii.

Boil down gently to one gallon, strain, and put into four forty-ounce bottles, and label ' The Strong Decoction '.

Zittmann's decoction No. 2.

To the dregs of No. 1 decoction add :—

Rad. sarsae contus, 2 ounces ; cort. limonis contus, semin. cardamom contus, rad. glycyrrhizae contus, āā 1 drachm ; aquae, C. iii.

Boil down gently to one gallon, strain, and put into four forty-ounce bottles and label ' The Weak Decoction '.

℞ Hyd. subchlor., grains ii ; ext. colocynth co., grains v ; ext. hyoscyami, grains ii.

M. ft. pil. ii. Signa, ' The Pills.'

The patient is kept in a room at 80° F.

The diet consists of :—

Breakfast. Boiled egg or bacon, tea, no sugar or spices.

Lunch. Butcher's meat, vegetables, no fruits.

Dinner. Soup, fish, and poultry.

The evening before beginning the treatment the two pills are taken, and for the next four days at 9 a.m., 10 a.m., 11 a.m., and 12 noon, half a pint of the strong decoction is to be drunk very

hot, whilst at 3 p.m., 4 p.m., 5 p.m., and 6 p.m., half a pint of the weak decoction is drunk cold. The patient is kept in bed except for an hour in the evening. He is allowed to get up on the fifth day, when he may have a hot bath and dress, and, if he asks for it, he may be allowed a little brandy or whisky and soda. In the evening of the fifth day two pills are again administered, and on the morning of the sixth day the patient begins again with the decoctions. The third course is begun on the eleventh day, and on the fifteenth the treatment is discontinued.

The sweating, dieting, and keeping the patient in a uniform temperature are mere adjuncts to the treatment, which is serviceable in a great many cases where the patient has been careless of the disease.

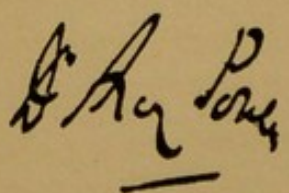
Zittmann's treatment, therefore, is a continuation of the treatment by sarsaparilla, which has survived in consequence of the minute amount of mercury which it contains. Like many other methods in which only small quantities of mercury are given, it should be looked upon as palliative and not curative. It may be employed with the greatest advantage for the relief of symptoms, but the mere fact that it has caused improvement should lead the surgeon to put the patient on a full course of mercury with or without iodides. If he fails to do this, the signs of syphilis will reappear after a shorter or longer period.

It is unnecessary after what has been said to do more than warn against the use of sarsaparilla, guaiacum, and sassafras, the 'three sudorific woods', as remedies for syphilis. They have had their vogue, have been very thoroughly tried, and in every respect have been found wanting. The good effects formerly attributed to their use seem to have been due to the withholding of mercury in excessive doses. Syphilis then ran its course, and as the later manifestations of visceral and cerebral syphilis were unrecognized, the woods were said to have done good because the general health of the patient remained unimpaired.

Thyroid extract has been recommended during the later stages of syphilis, which are attended with much cachexia, but except on the principle of *omne ignotum pro magnifico*, I do not think with any reasonable chance of success, and certainly without any

good results so far as I have tested it. The general treatment of syphilis may be outlined as follows, if it be clearly understood that there is no such thing as a routine course. Every patient is a law to himself in this, as in other diseases, and syphilis varies markedly in its course and in its severity apparently, without reference to the body in which the poison is generated.

The duration of treatment should be at least two and a half years as a minimum, and during this time the mercurial course should be continued with short interruptions at regular intervals. The general condition of the patient, and the condition of the lymphatic system, will then give some clue as to the advisability of discontinuing mercury for longer periods to ascertain whether any symptoms of the disease reappear, or if the patient remains healthy. When he marries, he will be more likely to have healthy children if he be again placed upon a mercurial course, even though he appears to have no signs of the disease about him. No rule can be laid down as to the proper time for giving iodide of potassium. It is necessary in some cases within a few months from infection, whilst in other cases it is never required at all. A spreading ulceration which is not controlled by the use of mercury can often be stopped by giving potassium iodide simultaneously, and when its course has once been arrested the cure should be perfected by the use of mercury. It appears that it is the continued presence of mercury in the tissues, rather than the amount of the drug which is circulating, which is effective in the cure of syphilis, and care, therefore, should be taken that the course is of sufficient length and that it be not interrupted for too long a time.



BIBLIOGRAPHY

Dr. Robert Williams, The Elements of Medicine, vol. ii, p. 163 : London, 1836.
Dr. William Wallace, The Lancet, 1835–6, vol. ii, p. 5.
Sir Alfred Cooper, Syphilis, London, 1895, ed. 2, p. 464.