will not appear until after twenty minutes, but this should be confirmed and the conclusion would certainly be strengthened by invariable differences of dilution between human and ape's blood. Dried blood should be used for making such tests as it is practically always the only kind obtainable in criminal cases.

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SYPHILIS IN INTERNAL MEDICINE.

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IN order to emphasize its frequency, it may be well to call attention to some of the statistics in regard to the prevalence of syphilis in general. Whitney,¹ in San Francisco, found 6.9% of the patients attending the out-patient clinics of one hospital infected in a series of 7885 patients. Symmers,² in New York City, found syphilis in 6.5% of autopsies in a series of 4880 done at Bellevue. Of Whitney's cases, 21.8% were found in the medical clinic and 22.6% in the nerve clinic, so that nearly a half of the cases were affected with internal syphilis. I shall consider in this paper very briefly the facts concerning syphilis of the cardiovascular and renal systems, the respiratory system, and the digestive system.

HEART AND BLOOD VESSELS.

Symmers found aortitis in 56% of autopsies on syphilitics, or more than in any other organ of the body and a quarter of these showed involvement of the coronary arteries. Lenz³ states that 25% of syphilitic patients in large cities die of aortitis or myocarditis or their results as against three or four per cent. from general paresis. Brooks⁴ states that 60% of his luetic cases die from or with serious circulatory diseases, apparently of syphilitic origin. On the other hand, Herz,⁵ in 2000 cardiovascular cases in his private practice, where Wassermanns are not possible in many cases and where direct questions in regard to syphilitic infection were not made frequently for social reasons, found 15% showed probable syphilitic etiology.

In regard to the pathology, the lesions in the heart may be pericardial, myocardial, or endocardial, always starting around the arterioles.

Pericardial syphilis is usually fibrous, involving, in some cases, small patches and sometimes the whole sac. This may show scars later resembling the ordinary white patches and sometimes leaves an adherent pericardium. Pericarditis not infrequently is noted clinically in early syphilis, though usually it is not important. In the heart muscle Warthin⁶ has shown that spirochetes can be demonstrated, causing every variety of parenchymatous change and, also, which is more frequent in the late-acquired syphilis, interstitial changes, always starting about the coronary arterioles, either as an arteritis or a periarteritis and going on to a fibrosis. There may be true gummata of the heart wall, but these are rare. In endocardial inflammation due to syphilis the left ventricle and septum are more commonly involved than the valve cusps and, of the valves, the aortic is the one usually involved. Signs of mitral leak are more often due in these cases to a muscular insufficiency. In the large blood vessels, as the aorta, the disease begins around the terminations of the vasa vasorum and causes a mesarteritis and periarteritis with breaking up of the elastic tissue of the media and consequent weakening of the wall, which makes a starting-place for a dilatation. In the small vessels endarteritis and periarteritis are the lesions found, the former leading to sclerosis and obliteration of the vessels. The arteries most commonly involved are the cerebral, coronary and the aorta. The latter is usually affected in its ascending part, preferably about the sinuses of Valsalva, which means probable involvement of the aortic cusps and mouths of the coronaries secondarily. Grossly, the artery wall shows gelatinous, translucent-looking areas over the places where the intima is destroyed. Later lesions show wrinkling and puckering of the intima over the fibrous media, often in radiating lines. The cerebral arteries, and especially the circle of Willis, are very frequent seats of the periarterial changes, which cause miliary aneurysms.

The time of onset of the arterial and cardiac lesions may be very early. Brooks⁷ has notes of 24 cases in the secondary period, one before the appearance of the secondary rash. Three of these were fatal. Fordyce,⁸ also, has collected several fatal cases in this period and he is of the opinion that, in the secondary period, when the body is overrun with spirochetes, some are lodged here and form the nidus for lesions which usually do not appear, clinically, until years later, usually from 47 to 49 years of age. Stadler and others give the average as twenty years after infection.

In regard to symptoms, in the early cases, irregularity of no definite type, and rapidity of action on slight exertion or apprehension, are often seen in secondary syphilis. Pain and tenderness on deep pressure over the pericardium are common. Irregularity of force and rhythm of the pulse, but no rise of blood pressure, unless renal

or other complications ensue, are frequent. All these lesions are seen in other acute infectious diseases without organic changes in the cardiovascular system, but from a few of them that have come to autopsy Brooks and Fordyce are of the opinion that these slight signs may be the outward signs of beginning trouble. Systolic murmurs, also, are common at this period, 40% of secondary cases, according to Grossman.⁹ Some of these cases may become serious, as before stated, and the following is an example:—

Male, age 30. P. H. Attacks of acute rheumatism for past nine years, frequently following tonsillitis, but up to beginning of present illness never any cardiac signs or symptoms. Present illness. Two months ago sore throat and general malaise with severe pains in joints generally. One week later, typical intense syphilitic rash appeared with severe headaches and general glandular enlargement. Induration found along urethra about $\frac{3}{4}$ inch from meatus. Wassermann strongly positive. Two weeks ago, day following third injection of salvarsan and after patient had received four doses of mercury salicylate intramuscularly, patient had chills, cough and pain in chest. Condition grew worse and on admission had to-and-fro murmur all over precordia. Two days later precordial sound had disappeared and there were signs of fluid in the pericardium. Patient was dangerously ill with septic temperature, gallop rhythm, and pulse 140 to 150. Under treatment with mercury, however, the friction sounds reappeared and the signs of fluid gradually disappeared and in two months he was discharged showing nothing abnormal in the heart on physical examination. It is fair to say that the patient received the best of hygienic and medical care with the usual cardiac remedies, but I think that Dr. T. F. Leen, under whose care he was for the cardiac trouble, agrees that, without the aid of antisiphilitic remedies, the patient would have died.

Later in the disease, in the so-called tertiary period, substernal pressure and pain are the most frequent initial symptoms of trouble in the aorta or heart. But frequently the disease of the coronaries causes sudden blocking of the vessel, or an acute dilatation, or rupture of a previously weak myocardium occurs and sudden death ensues with practically no premonitory symptoms. If the cerebral arteries are affected, there may be sudden vertigo or confused mental state, or loss of function of speech, or a weakness of the arm or hand or one foot due to changes in the circulation. If this has been the cause, rather than a complete rupture of the vessel, the circulation is often restored with complete restoration of function. Such a case is the following:—

Male, age 29. Infection 10 years ago. Treated six weeks. Tertiary lesion of throat one year ago. At that time started treatment again and took four full doses of salvarsan and courses of mercury salicylate until March, after which he neglected treatment again. Sept. 16th, while at work as a club steward, sudden motor aphasia with weakness of right hand grasp. Under inunctions of mercury and iodide of potash prescribed by his family doc-

tor, Dr. W. A. Griffin, who had previously referred the case to me, he recovered absolutely and was back to work in two weeks.

The following is a case where there was a rupture of the artery:—

Male, age 25. Seen at the City Hospital out-patient department last May. Patient was an old case, having had a short course of treatment a couple of years before when he had a secondary rash. Came to the out-patient department on account of headaches, which appeared to be syphilitic from the story. He was given a prescription for inunctions of mercury. On his way home he stopped at the L St. Bath House and while there dropped dead. At autopsy by the medical examiner, Dr. Leary, a haemorrhage, filling the ventricles and covering a large part of one side of the cortex, was found arising from a ruptured miliary aneurysm at the base of the brain, about 2 mm. in diameter.

The circle of Willis is such a complete anastomosis that if these arteries are slowly shut off there may be no symptoms or only transitory disturbance of function, as is shown post mortem where the basilar artery may be completely occluded without any history of disturbance during life. A sudden blocking of any of these arteries, on the other hand, is necessarily always fatal. Another thing to be remembered in these cerebral cases is the fact that the lesions may be multiple and, after the patient has had one attack, he may be liable to have another under sudden mental strain. In the cardiac and the aortic cases, as the lesions progress, the symptoms develop according to the particular part affected, and they differ in no way from the same lesions—myocarditis, angina pectoris, aortitis, with involvement of the aortic valves and consequent regurgitations, or aneurysm of the heart or aorta—due to other etiological factors than syphilis. Certain lesions, however, are more common in syphilis than as a result of other infectious diseases. Aneurysm of the arch of the aorta is almost invariably due to syphilis. Fordyce recalls but one instance where he could ascribe it to other causes. Other authors vary on this point, some claiming that around 80% are due to syphilis, while others maintain that an aneurysm of the arch is *prima facie* evidence of syphilis. In my own experience, I have not met with a definite aneurysm of the aortic arch, with a negative Wassermann reaction. A roughening of the aorta with practically no enlargement of the heart and very little, if any, general arteriosclerosis, is usually of syphilitic origin. Heart block is nearly always due to syphilitic interstitial or gummatous disease of the Bundle of His. Brooks found that 70% of his cases of heart syphilis coming to autopsy showed valvular lesions, mostly of the aortic valve, but fairly often the mitral was also involved. He did not see any case where the mitral was involved without the aortic, however. The symptoms which all writers connect particularly

with syphilis are tachycardia and irregularity of the heart, the latter being just "irregularly irregular," as Brooks describes it, without any type whatever. Pain under the sternum and substernal tenderness after slight exertion are also particularly common and usually denote coronary disease or myocardial dilatation. With the x-ray we generally find a broadened aortic arch, and sometimes one part of it is slightly more dilated than the rest. The heart shadow is also said to be broadened in many cases. In aneurysm of the arch due to syphilis, the heart shadow is also lengthened and Friedländer¹⁰ considers a characteristic point, that the aneurysm of syphilis pulsates more markedly and the shadow is not so intense as in that due to ordinary sclerosis not due to syphilis; but I should imagine that this comparative difference would be hard to make out, and not of much practical value. The Wassermann reaction is practically always strongly positive in an aggressive case of cardiac syphilis, but some of the older ones, which are not showing anything more than a murmur, with compensation complete, may give a negative.

The venous system, also, is occasionally involved in acquired syphilis, but only rarely. Fordyce notes syphilitic thrombosis of the veins of the lower extremities. Friedländer mentions that nodular and general inflammatory changes of the venous walls, which appear to leave the lumen partly occluded by consequent puckering, may occur in any veins of the body, but the portal veins and their branches are the ones chiefly affected. The lumen of the vein is puckered, and around the vein is a gray, moist, translucent appearance fading gradually into the liver tissue.

DIAGNOSIS.

In early syphilis if care is taken to listen to the heart and note the pulse frequently, the appearance of a soft mitral systolic with irregular heart action and, perhaps, some tachycardia and substernal oppression after exercise, probably do not always mean cardiac syphilis, but they may be warnings enough to make us spare the heart in that patient by hygienic measures. Brooks has shown us, too, that these may mean real cardiovascular disease is present. In later syphilis, the problem is more difficult, from the fact that only about 30% of cardiac cases give a history of previous syphilis in hospital cases and probably less in private practice. Often the patient, thinking that the cardiac symptoms are so long delayed after the primary lesion, never imagines the connection and, unless directly questioned about syphilis, will fail to mention that he ever had it; but more frequently, in my experience, the patient is absolutely ignorant of ever having had any such trouble. As I have already shown, the cardiac lesion is only what we might find due to any other cause, except that aneurysm of the aortic arch and

heart block are almost always syphilitic. The age of the patient, usually between 40 and 50, frequently younger, is a little under that of the ordinary arteriosclerotic. The history may reveal another acute infectious disease, such as acute rheumatism or scarlatina or typhoid as an etiological factor. Brooks and others say that a cardiac or aortic lesion, developing without other known cause and without fever, and especially if combined with a positive Wassermann reaction, in a middle-aged person is probably syphilitic. In those cases where the Wassermann reaction is negative, a provocative injection of mercury salicylate or of salvarsan may develop a positive reaction. If still in doubt, and the patient is not doing well under ordinary cardiac treatment, no harm can be done by giving him the benefit of the therapeutic test, and this is the most surely to be relied upon of all. Care must be exercised in the interpretation of the Wassermann reaction in these cases, for this only means that the patient has syphilis and not that the particular lesion in the heart is necessarily syphilitic. This brings up another very important point in the diagnosis, namely: other signs of past or present syphilis in the patient, such as tibial nodes, obscure bone or joint lesions, enlarged liver, etc. Several authors have called attention to the frequency of combined cardiac and nervous syphilis, especially tabes. Lesser¹¹ in 91 autopsies on tabetics found aortic aneurysm 18 times. Others place the frequency of combined cardiovascular syphilis and tabes as about 6 to 10% of tabetics. The cardiac lesion may be present before the onset of the tabes, but it is usually noted about four and a half to five years after the first tabetic symptom.

TREATMENT.

All writers at present call attention to the necessity of protecting the heart in early syphilis from sudden or severe strain, as one would do in any other acute infectious disease, in order to avoid later heart complications. Fortunately, the treatment of the earlier lesions is, usually, pretty thoroughly carried out, for then there are other and very obvious symptoms of syphilis which make the patient follow up the physician's instructions. But too much stress cannot be laid on the fact that the treatment of syphilis which is given must be intensive and prolonged. In these early cases, outside of hygienic measures such as rest, cardiac medications such as digitalis, etc., are not needed and are better not employed.

In the later cases, one often meets with a patient in whom a thorough course of ordinary cardiac treatment, with rest in bed and digitalis and other cardiac remedies, has failed to establish compensation and the condition is pretty discouraging. It is just in such cases as this that we often see the most satisfactory improvement follow a course of intensive anti-syphilitic

treatment. If there is no immediate urgency, it is safer to commence with mercury, preferably injections of the insoluble salicylate of mercury, which is given once every five days or a week into the muscle. Inunctions do better in some cases, using the strong 50% ointment or one of its less disagreeable substitutes. In a week or two we may start with the salvarsan, which is more permanent in its beneficial effects and seems to cause no more serious collapse in these cardiac cases than the neosalvarsan, though the immediate effects of the latter may be just as striking in the way of relieving symptoms. Salvarsan should be used with great caution in these cardiac cases, beginning with a very small dose and increasing only after the effects are well borne. Most especially in cardiac cases with disease of the myocardium and irregular heart action must one use great caution with the first dose of salvarsan. Brooks reports two cases of nearly fatal collapse following the initial dose of salvarsan and I have seen one in consultation with Dr. A. D. MacLennan where salvarsan, given at my suggestion, was followed by a fatal result in a little over twenty-four hours, in a case of heart block. It is fair to state, however, that in my case the patient was nearly *in extremis* when the salvarsan was given and it was administered only in the forlorn hope that something might be done for the patient and it was evident that it must be done quickly if the life of the patient could be saved at all. In another such case I would suggest salvarsan but in a dose of only 0.1 or 0.15 g. In cardiovascular cases it seems to be better to give the doses of salvarsan far apart, continuing the mercury in the meantime. There seems to be no doubt that mercury alone will cure many cases of cardiac syphilis, but the addition of salvarsan surely does it with more speed and relieves the symptoms more quickly. It is also true that salvarsan alone will cure many of the earlier cases and possibly a few of the later ones, but it is too early to know of the permanency of these cures and, in the few where salvarsan has been used alone, its effects do not appear to be nearly so lasting as when it is backed up with an intensive course of mercury. If the case does not seem to improve under one form of mercury, it sometimes is advantageous to change to another. Anders¹² and Brooks both mention cases that after a while seemed to do pretty well on mercury by mouth, though these are rather the exception. As regards the duration of treatment with mercury and salvarsan, it is hard to lay down any rules. One should try, if possible, to get a negative Wassermann reaction and continue the mercury at least one year after this is obtained. But a negative reaction is sometimes not obtained at all, and if, after a couple of years, the reaction is not altered from the original strong positive, it may be better to give up and merely give an annual or a semi-annual

course of mercury to make sure that the disease does not return, provided that the limit of improvement seems to have been already obtained clinically. Often the patient seems to have become immune to the effects of mercury and it is, therefore, better to give it to the limit of tolerance and then stop for a while before giving any more.

The ordinary treatment with usual cardiac remedies should be in no way neglected, although they often do not seem to accomplish such definite results in these as in ordinary cardiac cases from other causes. In regard to iodides, the present idea is that they do not act in a specific sense, but merely absorb the products of inflammation and exudation after the cause has been removed by mercury and arsenic. From this point of view it is advised not to use them at first, but only after considerable treatment with mercury and arsenic. They do not need to be pushed very high, five to fifteen grains t. i. d. doing apparently as well as the larger doses. When once commenced they should be continued until their maximum effect is obtained, if any improvement is noticed, otherwise for a few months.

Now in regard to the prognosis in these cases. Under ordinary treatment the duration of life is usually about two years after the onset of symptoms. On the other hand, unless too far advanced, one can almost surely promise a prolongation of life by the specific treatment. In the secondary cases, with very rare exceptions, one can promise a cure in practically every case, regardless of the apparent hopelessness in some cases. In tertiary cases the inability to repair the heart muscle and the artery walls makes a cure impossible where much serious damage has been done. Post mortem, in a well treated case, one finds a fibrosis of the heart muscle, or an occluded coronary artery surrounded by fibrosis, or, if there has been a true aneurysm, this persists; and the same is true regarding serious damage to the valves, but, under the microscope, no active foci which can be diagnosed as syphilis and no spirochetæ pallidæ are found. Clinically the results compare very favorably with treated gummata of the bones and other places and one can never tell how much irretrievable damage has been done until a thorough course of treatment, both with anti-syphilitic and ordinary cardiac remedies, has been tried. Good effects are often astonishing. Cases, however, where through neglecting treatment the symptoms have relapsed, do not as a rule respond so readily a second time. Where combined anti-syphilitic and cardiac remedies fail, the downward course is usually pretty rapid.

SYPHILIS OF THE KIDNEYS.

Albuminuria in early syphilis is by no means rare, but a true nephritis is very uncommon. Stokes,¹⁸ in the last year, has described a typical case of the latter. Early syphilitic nephri-

tis comes on about the fifth month of the disease on the average, though it has been reported before the appearance of the secondary rash. The condition starts in rather suddenly and is distinguished by the very large amount of albumin, with marked anemia and oedema. But outside of some general weakness there is comparatively little disturbance of the general health. There is often rather rapid loss of weight. Fournier states that the cases go on, in about 30%, to uremia, but other authors do not find this so frequent. Most writers say that they generally get well under treatment, though Bradford has noted frequent relapses with albuminuria. The urine in these cases is slightly diminished and shows a very large amount of albumin, many hyaline and granular casts, occasional epithelial casts, occasional red blood corpuscles and leucocytes. Stengel¹⁴ and Austin have made a careful study of the double refractive bodies described by Munk in syphilitic nephritis and find that they are pretty constant in the parenchymatous, but rarely occur in the interstitial forms. As this early nephritis is of the former variety, the findings of these bodies are noted, but as they also are found in a fair percentage of nephritis due to other causes, their significance would hardly be considered as great. Spirochetæ pallidæ have been noted in the urine of one of these cases, but this was not from a catheterized specimen. In later syphilis, Squier¹⁵ in 186 autopsies on syphilitics, found 125 with renal lesions, amyloid 36, and gummata 6. Chronic interstitial and chronic parenchymatous nephritis, chiefly the former, are also found. Pathologically, in syphilitic nephritis, the chief characteristic is marked endarteritis with thickening of the connective tissue of the kidney and capsule (Fordyce). Spirochetæ pallidæ have not been demonstrated in the kidney. The diagnosis rests on the presence of a nephritis with a history of syphilis or a positive Wassermann reaction and the presence of syphilis elsewhere. There are very few cases, however, in which we can make a positive diagnosis of syphilitic nephritis without recourse to the therapeutic test. Barach¹⁶ reports several cases in which the albumin has disappeared, even in cases where it has existed for three years or longer before treatment. I have seen two such cases where the albumin has disappeared under the use of salvarsan. In my opinion, some of those which do not react to anti-syphilitic treatment are really due to syphilis, directly or indirectly, but there is no way of proving this. The treatment is by salvarsan given cautiously and in small doses, followed by mercury and the iodides. The physiological dose of mercury and salvarsan must be learned by trial on the particular case, as Stokes has shown that the proper amount can easily be overstepped and an increase of the albuminuria and suppression of the urine, with a return of the edema, are produced.

SYPHILIS OF THE RESPIRATORY SYSTEM.

Mucous patches of the trachea are seen and a bronchitis, occurring in early syphilis and responding quickly to anti-syphilitic treatment, is probably a similar process in the bronchi; but secondary lesions of the lung are unknown. Tertiary lesions of the trachea and bronchi (gummata of the submucous tissue) are not uncommon and may lead to ulceration or cicatricial stenosis. Tertiary syphilis of the lung is very rare, according to the pathologist, but not so uncommon, according to the clinician. Clayton¹⁷ has analyzed the cases and says that they can be grouped into three classes:— 1. gummata, which may occur anywhere but are most frequently situated near the root of the lung, and especially of the right lung and in the middle lobe. Some authors claim that these may break down in the center and discharge into the bronchi leaving cavities, but surely the more common change is into fibrous tissue with broad bands extending out into the lung. 2. A so-called syphilitic pneumonia which consists of an infiltration that may extend over the entire lobe and in which the blood vessels are much thickened. 3. What is, apparently, a later process of the preceding, fibroid induration, which consists of a proliferation of connective tissue starting around the root and extending around the bronchi and blood vessels, or occurring as nodules of fibrous tissue in other parts of the lung until the whole lung may be involved. Clayton does not believe that a case of true syphilitic phthisis, meaning a progressive destructive disease with cavity formation, has been proved. Bronchiectatic cavities are fairly frequent in syphilis of the lung and this fact aids a little in the diagnosis when they are found by the x-ray. Symptomatically, there is little difference between this condition and tuberculosis of the lung. The fever is not so common and the hæmoptysis is rather rare, though several cases are reported. Levin reports one where this was the first symptom. The emaciation is usually not so marked. The duration for several years with a rather extensive process in the lung, especially if it is around the root of the lung, yet the patient does not show marked emaciation or poor nourishment, is a rather characteristic picture, and especially so when combined with an absence of T. B. in the sputum on repeated examinations, and with a positive Wassermann and other signs of syphilis elsewhere. The treatment is that of syphilis anywhere, but, according to the cases reported, if the lesion has existed for a very long time, results of treatment are unsatisfactory.

SYPHILIS OF THE GASTRO-INTESTINAL SYSTEM.

Symmers, in nearly 5000 autopsies, in which there were 314 cases showing signs of syphilis, found only seven cases of gastro-intestinal syphilis, of which only one was a lesion of the stom-

ach, and he considers gastric syphilis as very rare. Smithies, in 7545 cases of gastro-intestinal affections, found 25 cases, or 0.34%, of gastric syphilis. Pathologically, syphilis of the stomach begins, according to Smithies, as a dense round-cell infiltration of the loose areolar tissue of the wall, frequently with endarteritis. This progresses by infiltrating the wall of the organ generally and causing a stiff, thickened wall, or it forms single or multiple gummata, which may ulcerate, or may form a large tumor which, if it goes on to cicatrization, may give an abnormal shape to the stomach or may cause a stenosis. Clinically, the patient may show only symptoms of chronic gastritis, but often there is a history resembling chronic ulcer of the stomach. Haematemesis is not an infrequent symptom in these cases and, in one case reported by Clark,¹⁹ it was the only symptom in a fatal case. Other cases resemble carcinoma of the stomach very closely. Smithies found the hydrochloric acid in these cases not diminished, but most authors consider achylia the rule. A palpable tumor frequently is felt. A rather curious fact in some of these cases is the persistence of a good appetite and less anemia and cachexia than one would expect from such an extensive process if it were due to carcinoma. Usually the loss of weight is only about twenty pounds, on an average, which is less than we would expect in advanced cancer of the stomach. X-ray shows only a tumor or ulcer or stenosis, which is not characteristic of syphilis. Usually the Wassermann reaction is strongly positive and Smithies considers that this is the only way that we can be sure of a diagnosis, but Einhorn and Eiselman²⁰ report cases with a negative reaction. Three cases which I have seen had positive reactions and were clinically indistinguishable from cancer, so that the blood test was the only symptom which led to anti-syphilitic treatment, the effects of which were remarkably satisfactory in all three. The treatment is that of late syphilis anywhere, as these cases are almost always tertiary. In Smithies' 26 cases, the results generally were pretty satisfactory, though recurrences must be guarded against in giving a prognosis. Only four of his cases remain cured over a period of three years and three of the cases show no improvement whatever. In these latter cases it would seem as if there were some surgical condition present such as stenosis, or there may have been mistaken diagnosis. Hayem and Niles both report cases which were cured very quickly by anti-syphilitic treatment.

Syphilis of the intestines is rare, with nothing to characterize it as syphilitic. Symmers found one ulcer of the cecum in his series of autopsies and four cases of syphilitic stenosis of the rectum. The latter is more common in women. Another interesting lesion noted by Fordyce²¹ is a periproctitis involving the surrounding tissue to such an extent that it resembled a tumor of the adjacent fascia.

SYPHILIS OF THE LIVER.

This is fairly frequent, occurring 142 times in 5088 autopsies done by Fordyce. Symmers in 314 autopsies on syphilitics found the liver involved in 105 cases (33.4%). Nearly one half of these cases were the so-called *hepar lobatum* which appears to be more common in negroes and in women. In this condition the liver is separated grossly into numerous small lobules by scars and bands formed of fibrous tissue caused by syphilitic inflammatory changes resulting in an over-production of connective tissue. The spleen often is enlarged, also, in these cases. Clinically they are, practically, indistinguishable from cirrhosis due to alcohol. Gumma of the liver also is a fairly frequent result of syphilis. Usually they are multiple and the most common site is under the capsule on the anterior surface, where they are easily palpable. Amyloid resulting from syphilis gives a large, smooth liver clinically and, in the presence of other lesions elsewhere, is fairly frequently recognized during life. Perihepatitis, with fibrous adhesions to all the neighboring organs, is still another variety of the results of late syphilis. This may go on, as in one of my own cases, to adhesions throughout the abdomen which are most intractable to any form of treatment. In early syphilis we have a lesion which has attracted considerable attention in the last few years, namely, a parenchymatous hepatitis, similar to the parenchymatous changes in the kidney in early syphilis. Michael²² has shown that they are true syphilitic changes and not due to pressure on the gall ducts, as was formerly maintained. This process may be very acute and go on rapidly to acute yellow atrophy and death, as in one of our cases at the Carney Hospital, or it may clear up with the formation of connective tissue and resulting cirrhosis. Clinically, the liver is enlarged and somewhat tender, but in the very acute cases the size is diminished. The jaundice is intense, the stools may or may not be clay colored, usually not, and the gastro-intestinal symptoms are usually mild, consisting of nausea and occasional vomiting, resulting probably from the icterus.

A good many cases have been reported in the last few years during or following treatment with salvarsan and neosalvarsan. At first these were supposed to be due to the toxic effects of the arsenic, but Milian²³ has shown pretty conclusively that they really are always syphilitic, corresponding to a Herxheimer reaction or to the nerve recurrences which were so much discussed a few years ago. They all improve with more mercury and salvarsan.

SYPHILIS OF THE SPLEEN.

During the secondary stage the spleen is very frequently enlarged, often accompanied by asthenia and fever. Later we find changes similar to those in the liver, namely: interstitial

splenitis, at first with an enlarged spleen and, later, as the contraction of the connective tissue goes on, a small spleen; amyloid spleen; also multiple gummata. Perisplenitis is rather more common than perihepatitis, though the two often are combined. Clark²⁴ has described a case, with splenomegaly and asthenia and anemia, which resembled a case of early Banti's disease, but which quickly cleared up under anti-syphilitic treatment.

SYPHILIS OF THE PANCREAS.

Warthin, after finding marked interstitial changes in the pancreas in seven autopsies on cases of diabetes in whom there were, also, syphilitic changes in the myocardium, made a further study of the pancreas in a large number of autopsies in cases of apparently latent syphilis and found no one of them showing a normal pancreas. All showed marked changes in the form of a diffuse or patchy fibrosis with active inflammatory foci, corresponding to the localization of the spirochetes. This shows the necessity of investigating cases of diabetes thoroughly with reference to syphilis as a possible etiological factor. I have seen one case where the glycosuria cleared up quickly under anti-syphilitic treatment and several of these have been reported.

SYPHILITIC FEVER.

A few words about syphilitic fever do not seem to be out of place in a review of internal syphilis. A low grade of fever in early syphilis, generally at the outbreak of the rash or a little before it, is not uncommon. Fournier states that it occurs in about 20% of cases. The type may resemble that of rheumatic fever, especially when it is accompanied by pains in the bones and joints. Occasionally it simulates typhoid. This lasts only three or four days, and seldom goes above 100° F. Later, in the secondary stage, usually in combination with other complications, a more prolonged fever occasionally is observed which goes higher and lasts for some time. In tertiary syphilis there may be prolonged fever or short attacks of fever. These are especially noticed in syphilis of the liver. Febrile attacks in general paresis, from no apparent cause, are quite frequent. Kraus²⁵ maintains that these late fevers are due to the entrance of spirochetes into the blood stream. Taussig²⁶ claims that they are due to the entrance into the blood stream of endotoxins and dead bacteria, analogous to the fevers seen after a dose of salvarsan.

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A COMPARISON OF SEVERAL METHODS OF SPECIFIC EARLY TREATMENT OF ACUTE ANTERIOR POLIOMYELITIS.

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Of the cases of acute anterior poliomyelitis that came to the Haynes Memorial Hospital during the recent epidemic, 120 are included in this comparative study. They are divided into six groups: Group I was treated with three intraspinal injections of immune serum; Group II was treated similarly with normal serum; cases of Group III were injected with their own spinal fluids (autotherapy—Duncan); Group IV comprised cases on which the effect of simple withdrawal of spinal fluid was tested; Group V received no specific treatment; Group VI includes cases of which one was of doubtful diagnosis, one died of pneumonia, and the others were moribund on admission.

1. The use of *immune serum* followed the discovery by Flexner and Lewis¹ that experimental poliomyelitis in monkeys produced immunity against reinfection. This resistance was found by Römer and Joseph² to be due to immune substances in the monkey's blood.

This immune body has the power of neutralizing the virus of poliomyelitis *in vitro*. It was furthermore found³ that serum from recovered human cases possessed curative or, at least, prophylactic properties if injected into monkeys within twenty-four hours after they had received an injection of virus. The treated animals did not develop the disease, whereas the control animals did.

The first application of this experimental knowledge in the treatment of human cases was made by Netter,⁴ who treated thirty-two cases by intraspinal injection of the immune serum.