symptoms of hepatic inflammation. Here, again, the aspirator may be invoked to make the diagnosis clear—the presence or absence of bits of hepatic tissue will prove the abscess to involve, or not, the liver-substance.

Treatment.—As suppuration occurs so promptly after the initial hyperæmia, it is doubtful whether any effort to prevent the formation of pus can be successful, but the extension of the area may be checked or limited. As soon as the symptoms manifest themselves, a large dose of quinia (twenty grains) should be given at once, and decided cinchonism be maintained by the same dose at proper intervals, or by smaller doses more frequently. That quinia has the power to check the migration of the white corpuscles is well established, but it is equally true that large doses are necessary to accomplish this. Morphia should be combined with it, unless some contraindication exist, and especially if there be much pain and the peritoneum be involved. Warm fomentations and turpentine-stupes should be applied over the right hypochondrium. At the earliest moment when the existence of pus can be made out, or there are good reasons to suspect its presence, an exploratory puncture with the aspirator should be made. The recent experiences of Cameron,* Condon,† and Sachs‡ have demonstrated that when the pus can be reached and evacuated a very large proportion of cases recover immediately. It is a remarkable fact that many cases in which the symptoms of abscess exist, and yet no pus is found, are greatly benefited by the puncture. The modern experiences have demonstrated also that, penetrated by suitable needles, no injury is done to the liver, and that repair takes place so perfectly that after death no trace of the operation is visible. The necessity for early evacuation of the pus consists in this, that only a portion of these abscesses are confined by a limiting membrane, and that those thus restricted do not long remain encapsulated, but tend to make their way externally. In Condon's collection of cases there were eight of abscess evacuated by the trocar, of which four recovered, and three of hepatitis, without suppuration, in which the trocar was inserted deeply in the right lobe, all of which were much relieved by the puncture and promptly cured. In Sachs's collection of twenty-one cases there were eight recoveries after puncture—being in the proportion of thirty-eight per cent. Under the old system of using the knife or trocar, when the pus was already pointing, as represented in the statistics of Waring, there were sixty-six deaths in eighty-one cases, making the percentage of recoveries 18·5. When the abscess is large, and repeated punctures

* "The London Lancet," 1863, June 6th and 13th—"On the Treatment of Acute Hepatitis in its Suppurative Stage."

† Ibid., August, 1877, Dr. E. H. Condon—"On the Use of the Aspirator in Hepatic Abscess."

‡ "Ueber die Hepatitis der heissen Länder," etc., von Dr. Sachs in Cairo, *op. cit.*

are necessary, the author has had excellent results from the injection of tincture of iodine; it lessens the formation of matter and prevents its decomposition. Mercury was formerly much used in all hepatic affections, but that it is injurious in abscess is now disputed by no one. It is probable that the sulphides, so much and successfully employed in external suppuration, will be found adapted to the treatment of hepatic abscess. The sulphides of sodium and calcium and the sulphurous mineral waters are suitable agents to be so exhibited. As the vital resources of the patient are severely strained, the strength should be carefully husbanded from the beginning. The diet must be generous, and stimulants judiciously administered. When suppuration has occurred, the alcoholic stimulants must be given freely. For the dysentery present in so many cases, ipecac is the best remedy, if prescribed in the necessary quantity—ʒj every three or four hours. If there are present old ulcerations of the intestinal tract, copper sulphate is an efficient remedy; but usually the astringents in turn will be administered in vain.

GENERAL PARENCHYMATOUS HEPATITIS—ACUTE YELLOW ATROPHY.

Definition.—As the hepatitis terminating in suppuration is confined to a part of the liver, it has been designated Local Parenchymatous Hepatitis, while the term General Parenchymatous Hepatitis is applied to Acute Yellow Atrophy, which consists in an acute diffused inflammation involving the whole organ, and terminating in atrophy. Various names have been applied to this disease, as "malignant jaundice," "typhoid icterus," "hæmorrhagic icterus," etc.

Causes.—Various theories have been proposed to account for the origin of acute yellow atrophy. It has been referred to an excess in the production of bile, to stasis of the bile, to sudden saturation of the hepatic cells with biliary matters contained in the blood of the portal vein. Budd supposes it to be caused by some special blood-poison of unknown nature, which acts especially on the liver. These hypotheses are without facts to support them. That it is an acute, diffuse, parenchymatous inflammation is established by the most recent investigations, but the exciting cause of this inflammation remains unknown. That it is in the nature of a specific morbid poison seems probable, since other organs are simultaneously attacked. It may be that the circumstances are such as to cause the formation of a peculiar *ptomaine*. There are certain points in the etiology of the disease, however, which are well known; it occurs most frequently in the female sex, and during the state of pregnancy. According to the statistics of Frerichs, in thirty-one cases of this disease twenty-two were females, and one half of these were attacked during the state of pregnancy. It occurs from the third to the sixth month of pregnancy, and in comparatively

young subjects, under forty, and rarely indeed after thirty years of age. Other causes have been supposed to exert an influence in its production: as anger—a violent passion having been the apparent cause in cases reported by the older writers—venereal excesses, syphilitic infection, and local miasms. Acute atrophy of the liver has been induced by the changes resulting from typhus fever. A condition analogous to it is brought about by the action of phosphorus, arsenic, antimony, and certain other minerals, and a similar state has been induced by subacute alcoholismus (Rendu).

Pathological Anatomy.—The liver presents a most characteristic appearance—it is much smaller, flattens out by its own weight, is soft so that it tears easily, and has a uniform yellow color. The peritoneal layer is roughened and wrinkled. On microscopical examination, the changes seen are those due to interstitial and parenchymatous exudation. There is, at first, an hyperæmia, traces of which are discoverable at various points, the rest of the organ being anæmic, a result of the subsequent atrophy and obliteration of vessels. Between the lobules there is deposited a grayish-yellow material, which widens the interlobular space, and in those cells which are still recognizable is contained a quantity of an albuminous and fatty matter mixed with pigment.* In the place of the disintegrated cells there is formed a quantity of brownish, fatty granular matter; fat-globules; pigment; bacterian colonies,† and needles of tyrosin and leucin. The ultimate radicles of the portal system and the hepatic artery are obstructed or obliterated. The kidneys also undergo characteristic changes, especially in the cases occurring in pregnancy. The organs are thoroughly stained by the icteric urine, especially the endothelium of the tubules, and besides the cells of the endothelium have become infiltrated by a granular albuminous matter, and are undergoing fatty degeneration. The urine is heavily loaded with bile-pigment, and usually contains some albumen; the urea is diminished or has disappeared, and is replaced by leucin and tyrosin. In the normal condition of the liver it is now regarded as probable that the urea which is eliminated by the kidneys is produced in the former organs by the metamorphosis of the albuminoids. The blood contains considerable urea, and much leucin in acute atrophy of the liver. The spleen is usually, but not invariably, increased in size. The muscular tissue of the heart undergoes more or less fatty change, but this alteration is common to many acute diseases. Spots of ecchymosis form in the peritoneum, the gastro-intestinal mucous membrane, in the skin, etc., and indicate the destructive changes which have occurred in the blood.

Symptoms.—This formidable malady begins insidiously—as a simple catarrh of the stomach and duodenum, with a slightly coated tongue, nausea and vomiting, headache, tenderness of the epigastrium, and a slight icterode hue of the skin which gradually deepens. There are some acceleration of the circulation and slight fever, which, however, are not constant, for the pulse may and usually does have the feebleness and slowness belonging to jaundice. The duration of these mild symptoms is by no means constant—they may occupy a week or more; and, from the appearance of decided jaundice to the onset of the serious symptoms, there may be a few hours to two weeks. Sometimes the severe symptoms come on with the jaundice and a day or two before the temperature rises. An obstinate insomnia now begins, and the headache becomes intense. This period has, by some,* been entitled the *icteric period*. According to Frerichs, these symptoms of gastro-duodenal catarrh exist in about one half of the cases, and the duration of them may be from three to five days, although in some cases they last two to three weeks. In one case† an attack of jaundice preceded, by several months, the fully developed attack.

A rise of temperature either precedes or accompanies the serious symptoms—the *toxæmic period*. The pulse becomes very rapid, rising to 140, but suddenly again, without any apparent reason, it may be, or in consequence of hæmorrhage, falling to 70 or 80. These fluctuations, which may occur several times a day, are peculiar to the disease. When the cerebral symptoms come on, the pulse becomes uniform at 140 to 160. The temperature line is of the remittent type, with a morning remission (102° Fahr.) and an evening exacerbation (104° Fahr.). Jaundice is constantly present, and gradually deepens from its first appearance; and intermixed with it are large brownish ecchymotic patches, but these are not always present. The tongue and gums are brownish, dry, and covered with sordes and crusts, and the breadth is fetid. There are much nausea and vomiting, and severe pain is experienced in the epigastrium and through the right hypochondrium, and pressure over the hepatic region awakens severe pain. A diminution in the size of the liver can be readily made out by percussion, and at the same time and relatively an increase in the dimensions of the spleen. There is constipation in the beginning, followed by more free, tarry stools, the product of intestinal hæmorrhage. During the first vomiting, mucus and bilious matters are discharged; but, when the toxæmic symptoms come on, blackish, grumous blood, or "coffee-grounds," are ejected. There are more or less epistaxis, bleeding of the gums, as well as vomiting of blood, and ecchymoses form at various places. The urine is usually normal in quantity, acid in reaction, and has the normal specific gravity. When

* Drs. Lewitski und Brodowski—Virchow's "Archiv," Band lxx, p. 421—"Ein Fall von sogennanter acuter gelber Leberatrophie."

† Ibid., Band xliii, p. 533. Waldeyer.

* Jaccoud, vol. ii, p. 418.

† Dr. Joseph Coates, "The British Medical Journal," June 26, 1875.

delirium and coma exist, the urine is either retained or passed involuntarily. Very great changes are noted in its composition : the urea is diminished in amount, the phosphate of lime disappears, and a quantity of leucin and tyrosin and extractives are substituted. It contains also bile-pigment and traces of albumen, and cast-off epithelium deeply stained with bile-pigment. There must necessarily accumulate in the blood those excrementitious matters which it is the office of the liver to separate from the blood, and this fluid is deprived of those contributions to it made by the action of the bile in the digestion of certain aliments. We can not therefore subscribe to the doctrine of Flint, who assigns to cholesterin the toxic effects, which are doubtless produced by several excrementitious matters. Instead of the "cholesteræmia" of Flint, we hold to the older term, cholæmia or acholia. These poisonous materials act on the nervous system in a manner similar to a narcotic poison, producing at first a stage of excitation, followed by depression. A hypochondriacal state, with irritability and restlessness, is the first manifestation of mental disturbance, but this is soon followed by noisy delirium. From this state to low-muttering delirium and coma the transition is quick ; or convulsions, local twitching, cramps, and general epileptiform attacks occur, soon passing into coma and insensibility. Sometimes death takes place in tetanic spasms.*

Course, Duration, and Termination.—The behavior of acute atrophy of the liver is irregular : the prodromic period, the stage of jaundice, and the toxæmic stage, are uncertain in duration, but the last stage follows a more uniform plan. After the development of the jaundice period, from the rise of temperature and the insomnia which mark the onset of the toxæmic stage till death, the most usual period is five days. The prodromic stage may last a week or two, the jaundice stage from a day or two to two weeks, the toxæmic stage a week, but the rule is that the whole course of the malady is included within a week. The termination is in death. Some successful cases have been reported, but it is doubtful if they were genuine. It may be that many cases treated carefully at the outset have been arrested and cured, but such cases are, as far as we are informed, simply cases of jaundice from catarrh of the bile-ducts. When the hepatic cells are disintegrated, a cure can hardly be possible.

Diagnosis.—Acute atrophy is probably more frequently overlooked than recognized. It is impossible to differentiate the gastro-duodenal catarrh of this disease from the ordinary examples of the same disease. Great importance must be attached to the increased headache, rise of temperature, and obstinate wakefulness which mark the onset of the toxæmic stage. As so many of these cases occur in pregnant

* Morand, "Gazette des Hôpitaux," 20, 21, 1873.

women, they are apt to be confounded with puerperal fever, puerperal septicæmia, etc.; but the physical signs of a rapidly diminishing liver, the nervous phenomena, the hæmorrhages, and especially the changes in the urine, will serve to distinguish between them.

Treatment.—Frerichs reports a supposed case of acute atrophy, which got well under purgatives and mineral acids. This appears to be the routine treatment. If the disease had any relation to the amount or quality of the bile, the use of podophyllin, euonymin, ipecac, and other remedies of the same group, is indicated, and mineral acids should be given freely, well diluted, in small doses frequently repeated. As the disease is a diffuse parenchymatous inflammation, the best results will be obtained from the use of a large dose of quinia and morphia in the incipiency, but will be useless when the liver-cells have begun to disintegrate. The author advises the trial of very small doses of phosphorus, as early as possible, as this remedy affects the organ specifically, and an action of antagonism may be discovered between them. This remedy, as all others, will fail to do the least good, if disintegration of the cells has occurred. Alcoholic stimulants should be pushed freely, notwithstanding a condition not unlike acute atrophy has been lately observed from subacute alcoholismus.*

AMYLOID LIVER.

Definition.—By this term is meant a degeneration of the liver caused by the deposit of an albuminoid material, termed *amyloid*, because of a superficial resemblance to starch-granules. This disease is also called "waxy liver," and "lardaceous liver," in recognition of the peculiar physical condition of the organ.

Causes.—The chief cause of amyloid degeneration of any organ is prolonged suppuration, especially in connection with diseased bone, and the morbid process is then general, the liver suffering in common with other organs. A variety of explanations have been offered to account for the production and deposit of this amyloid matter. The theory of Dr. Dickinson, which assumes that this matter is a form of fibrin, altered by the loss of its alkali, which in the normal state is intimately associated with it, has been overthrown, by the recent investigations of Mr. George Budd, Jr.† In the blood, as Seegen first demonstrated, there exists a substance — *dystropodextrin* — "which agrees with lardacein in its most essential characteristic." This material, it is now supposed, becomes insoluble and is precipitated in the textures, under those conditions with which we are now familiar as causative of the morbid state. The suppuration of tubercular cavi-

* M. H. Rendu, "Note sur deux cas d'alcoölisme subaigu ayant donné lieu à des accidents comparables à ceux de l'ictère grave." "La France Médicale," September 17, 1879.

† London "Lancet," February and March, 1880.

ties, of scrofulous abscesses, of intestinal and leg ulcers, etc., may also, although less frequently, be a cause of this degeneration. Next to suppuration, the most influential factor is chronic syphilitic infection, and then chronic malarial poisoning. The abuse of mercury is an alleged cause which Frerichs disposes of satisfactorily. This morbid state occurs more frequently in men than in women, and attacks by preference the most active period of life—from twenty to forty years of age.

Pathological Anatomy.—The liver presents a very characteristic appearance: it is uniformly enlarged without alteration of the form and relation of its parts, and sometimes its dimensions are enormous. It presents to the naked eye a pale grayish, glistening, opaline, translucent appearance, and to the touch a doughy consistence. On section the surface is homogeneous, and resists the knife almost like cartilage, and is anæmic and whitish; and when the disease is far advanced no trace remains of the proper structure of the organ.* There may be parts only, or the whole organ, affected by the change. The deposits may be in patches, small or large, and restricted to parts of the organ, or be uniformly distributed through it, and may be so limited in amount as not to increase its size (Frerichs).† Cirrhotic or fatty degeneration may coexist with the lardaceous, when, of course, the appearances will correspond. The reaction with iodine and sulphuric acid affords a striking test of the amyloid deposits. The parts to be examined must be carefully cleansed, and a solution of iodine with iodide of potassium in water, or diluted tincture of iodine, brushed over, when they assume a mahogany color, quite different from the yellow color of the healthy tissue. This reaction may be sufficiently characteristic of itself, but, if to the iodized surface is now added some diluted sulphuric acid, the affected parts, after some minutes or hours, take on a violet tint, more rarely bluish. The violet may be very deep, almost black. Orth‡ advises that a large and thin section be laid in a saucer of water containing some iodine, and, when the changes are complete, placed on a white plate. The reaction will be very distinct. Microscopically, the structural alterations affect first the arterioles and capillaries; their diameter is increased, the lumen narrowed, even closed; the intima, the endothelium, and the muscular coat, more rarely the adventitia, are invaded by the deposits. The cells become cloudy, granular, then clear, bright, and homogeneous, and the nuclei disappear. When the process is completed, the cell is transparent, glistening, and brittle, easily breaking up into small fragments.§ The amyloid change is not

* Wagner, "Manual of General Pathology," p. 322. New York: William Wood & Company. 1876.

† *Op. cit.*

‡ Orth, "Diagnosis in Pathological Anatomy," p. 321. Riverside Press. 1878.

§ Förster, *op. cit.*, p. 272.

confined to the liver, but involves the spleen, the kidneys, the lymphatic glands, the intestinal mucous membrane, and other organs. Those portions of the liver remaining unaffected by this morbid deposit are in a state of congestion, and are softer; or parts of the organ are attacked with fatty or cirrhotic degeneration, or syphilitic gummata may be mixed up with the amyloid deposits.

Symptoms.—There are probably no exceptions to the statement that amyloid degeneration occurs in subjects already in a cachetic state by the existence of one or more of the causes already mentioned. The symptomatology is necessarily that of the malady with which this degeneration is associated, up to the time of the development of those signs by which the disease of the liver is recognized. The liver is usually enlarged, and often considerably so, extending several finger-breadths below the margin of the false ribs. The organ is smooth, firm to the touch, almost of stony hardness, it may be; its borders well defined, free from pain or tenderness, unless there is present local peritonitis. This increase of size has gone on without any local uneasiness to call attention to the organ. The spleen is also enlarged, and is firm in texture, as a rule, but the waxy degeneration does not always affect it when enlarged in the course of amyloid liver. Jaundice is exceptional, unless the common duct or the hepatic duct is obstructed by enlarged lymphatics. As the amyloid change first affects the branches of the hepatic artery, the portal is not interfered with until later. Ascites exists in about one fourth of the cases, and is often preceded by œdema of the lower extremities, the result of a general hydræmia. The appetite is usually poor, but in exceptional cases is voracious. Food in the solid form excites uneasiness soon after it is swallowed, and is rejected by vomiting, or passes unchanged in the fæces, unless it is very bland and capable of entire solution in the stomach. The fatty, starchy, and saccharine articles of the diet undergo decomposition in the intestine, and a great deal of gas—the foul compounds of hydrogen with sulphur and phosphorus—is the result. The amount of bile passing to the intestine lessens with the increase of the deposit in the hepatic cells, and ultimately the secretion is arrested, and the office of the bile in preventing putrefaction and in emulsionizing the fats terminates. The obstruction to the portal circulation maintains a constant hyperæmia of the gastro-intestinal mucous membrane. As a result of these causes, the stomach and intestines become irritable, and frequent liquid stools, now pale from the absence of bile, now dark from the presence of blood, are passed. Amyloid degeneration also invades the arterioles of the mucous membrane and the substance of the villi, and destructive ulcers are formed in consequence (Frerichs). The urine is pale, abundant, of low specific gravity, and contains waxy casts and a trace of albumen. It is not surprising, in view of the structural alterations and impairment of functions, that the sub-

jects of amyloid degeneration present a peculiar, anæmic, and pallid appearance, are breathless on the least exertion, and emaciate rapidly.

Course, Duration, and Termination.—As amyloid degeneration is preceded by suppuration, or some chronic wasting disease, the moment this change begins escapes recognition. Indeed, the peculiar deposits have been quite extensively distributed before any characteristic symptoms appear. When the process once begins it extends at a pretty uniform rate, and death takes place by exhaustion and general dropsy, or the end is reached by an intercurrent malady, as pneumonia, pleurisy, etc. Its course is essentially chronic ; its duration months or a year or more ; its termination fatal. Notwithstanding the unfavorable prognosis, the disease is not always fatal, and cures have been reported, especially of those cases having a syphilitic history.

Diagnosis.—The enlargement of the liver due to amyloid deposit is to be differentiated from fatty liver, hydatid disease, cancer, etc. From fatty liver it is distinguished by the greater firmness of texture, the well-defined margin, and especially by the accompanying disorders of the spleen, kidneys, and intestinal canal. From hydatid disease it is separated by the same signs, and by the characteristics of the hydatid tumor, which enlarges painlessly, is elastic, and furnishes on palpation the "purring tremor." The changes in the liver produced by cancer are secondary to the original deposit, which is most frequently in the stomach, and the enlargement of the organ is hard, nodular and irregular. The urinary secretion is not affected in cancer, but jaundice is often present.

Prognosis.—Few if any cases of true amyloid disease recover, and indeed recovery can hardly be possible when the hepatic cells are entirely filled with such a material. Cases presenting the signs of amyloid degeneration, but not far advanced, have recovered. Although the prognosis is grave, it is not necessarily fatal.

Treatment.—Prophylaxis necessarily occupies an important position in the therapeutical management of this disease. As so many—much the largest number—owe their origin to suppuration of bone and to syphilitic infection, it is highly necessary to stop the influence of these morbid processes at an early period in all cases. If there be any reason to suspect constitutional syphilis, appropriate treatment should be at once instituted, and the most efficient remedy under these circumstances is a compound of iodine : the compound solution of iodine—ten drops in water, three or four times a day, may be given ; or, if there be much anæmia, the sirup of the iodide of iron, and especially the sirup of the iodides of iron and manganese. The author has had the best results from the persistent use of the iodide of ammonium in small doses frequently repeated—five grains every four hours, and well diluted with water. Budd urges the employment of the muriate of ammonia (ammonium chloride), but the iodide, the author believes,

is much more efficient. Mercurials are injurious. The diet should consist of those alimentary principles which undergo digestion and absorption in the stomach—as milk, animal broths, eggs, fish, etc. ; and starches—as bread, potato and rice—sugar in any form, and fats, ought to be avoided, because they require the action of the intestinal juices. The food-supplies should be small in quantity, and given frequently, because of the intolerance of the gastro-intestinal mucous membrane. Inunction of fat, especially of cod-liver oil, is a highly useful addition to means for promoting the nutrition.

CARCINOMA OF THE LIVER.

Etiology.—Nothing is definitely known as to the origin of cancer, in any situation, but there are certain facts connected with its development which it is important to recognize. It is a disease of advanced life, and is more apt to appear from forty to sixty than at any other vigintennary. But cancer of the liver appears in early life relatively more frequently than cancer of the stomach. It occurs with about equal frequency in the two sexes. Heredity, although the fact can not be expressed in figures, is doubtless the most influential factor in its genesis.

Pathological Anatomy.—The ordinary form of cancer is found in the liver, the variety being determined by the relative proportion of the fibrous stroma, the cells, and the juice ; it is most frequently medullary or encephaloid. When infiltrated with pigment it becomes *melanoid*, and, when vessels predominate, *telangiectatic* cancer, but these are accidental differences. The cancer formation may be in nodules or isolated masses, or diffused through the hepatic parenchyma. The size of the nodules varies from the dimensions of a pea to those of a child's head (Förster), and they are in numbers inversely as their size. There may be one or two of large size, or a great many of small size, distributed through the substance of the organ. Those on the surface are rounded, with a central umbilication, produced by a fatty metamorphosis of the center of the mass and contraction of the peripheral portion. The peritoneum is adherent usually, and is cloudy, thickened, and covered with a membranous exudation, or it may remain normal. The consistence of the masses varies with the form of the cancer—it is soft, brain-like, or almost creamy, or it is hard and cartilaginous. The explanation of the origin of the growth differs, but it may be stated that the cancer develops from the interlobular connective tissue. The branches of the hepatic artery are intimately concerned in the morbid process ; they increase in size, and permeate the new formation, while the branches of the portal vein shrink. With the development of the cancer-cells (by division and endogenous for-