

affected show marked atrophy and their epithelial cells show mucous degeneration; and the connective tissue of the mucosa and submucosa is greatly increased and may cause constriction of the lumina of some glands. In the latter event these glands become cystic, and the muscular coats undergo marked atrophy.

Frederick A. Baldwin.

MULLEIN. See *Scrophulariaceae*.

**MULTIPLE PROGRESSIVE HYALOSEROSITIS.**—**DEFINITION.**—An inflammatory affection of the serous membranes, of chronic and progressive development, characterized by a peculiar overgrowth of fibrous tissue with hyaline metamorphosis.

This disease is a very remarkable one, and, judging from published cases, somewhat rare. Examples have been recorded in Germany and Austria chiefly by Hamboursin,<sup>1</sup> Weiss,<sup>2</sup> Curschmann,<sup>3</sup> Vierordt,<sup>4</sup> Riedel,<sup>5</sup> Rumpf,<sup>7</sup> Pick,<sup>8</sup> Schupfer,<sup>9</sup> Siegert,<sup>10</sup> Schmaltz and Weber,<sup>11</sup> Rose,<sup>12</sup> Strajesko;<sup>14</sup> in England by Hale White<sup>5</sup>; in America by Nicholls<sup>13</sup> and Herrick.<sup>16</sup> It is only lately that a complete study of this disease has been attempted (Nicholls), and now that special attention has been called to it we may expect in the near future to have many more cases recorded, for the disease is probably not so rare as has been thought.

The affection may begin in various ways, so that differing clinical types are produced. Sometimes the capsule of the liver is chiefly affected, and it is to this class of cases that the terms "diffuse chronic hyperplastic perihepatitis," "chronic deforming perihepatitis," "Zuckergussleber," have been applied. In other cases it is the pericardium or the pleura that is first involved. Nevertheless, in whatsoever way the disease may begin, or in whatever part it may attain its greatest intensity, it is to be noted that the process is everywhere essentially the same, since it becomes diffuse and involves one serous membrane after another in a steady progression. Consequently the term *multiple progressive hyaloseritis*, denoting as it does an inflammatory process at once chronic and continuous, and emphasizing the peculiar hyaline change which is so striking an element in the anatomical picture, is perhaps the most suitable term to employ.

**DISTRIBUTION.**—The disease appears to be widely disseminated, being found in all countries and all climes; sex appears to have but little importance; the cases hitherto recorded have been chiefly in males. With regard

to age, the youngest patient affected was aged four, the oldest eighty years; those below middle age are probably the most likely to be affected.

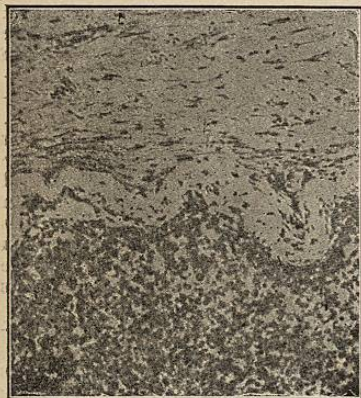


FIG. 3379.—Section of Liver, Showing well the Glisson's Capsule Thrown into Folds, with the Deposit of Hyaline Fibrous Tissue upon the Surface. (Nicholls.) (Winckel objective No. 5, without eyepiece.)

the serosae of a pearly white material having a dense, cartilaginous consistency. This substance has been compared to the sugar upon a cake (*Zuckerguss*) and to

porcelain. When forming a definite membrane it varies in thickness from a few millimetres to from 1 to 5 mm., and can be readily stripped off the subjacent organs without injury to their substance. On section the membrane has a semitranslucent, almost glistly appearance.

In the sporadic form the material usually forms flattened plaques, but may occur in elevated or even polypoid nodules. The favorite sites of localization are the capsules of the spleen and liver, the diaphragm, and the pleurae. When affecting, as the process usually does, more than one serous sac, no order of involvement is absolute, but combinations are numerous.

With regard to the diffuse form, in the majority of cases the capsules of the liver and spleen, the pericardium and the lower portions of the pleurae are involved. It is the rule also for more or less implication of the general peritoneum to occur. This results in induration and contraction of the great omentum and the mesentery; the omentum is frequently converted into an irregular tumor-like mass or a thick fibrous cord crossing the abdomen transversely. The contraction of the mesentery leads to dislocation of the intestines so that they lie bunched up along the spinal column. Bands of adhesions, fibroid and velamentous in character, are found connecting adjacent structures and are likely to be met with between the liver and spleen and the diaphragm and between the coils of intestines. While all or most of the serous membranes are involved in the process, they do not all present the same grade of affection. Thus, while one membrane presents the typical "icing" appearance, the other serous sacs may be obliterated by simple fibroid adhesions or traversed by bands, or in other cases may contain a fibrinous or fibrino-purulent exudation.

In the perihepatic form, where the brunt of the disease falls upon the liver and diaphragm, the liver is usually diminished in size and much altered in shape, becoming somewhat globular; the edges are rounded and the anterior border is often rolled back upon the upper surface. The gall-bladder is usually contracted and enclosed in a dense mass of hyperplastic tissue. The surface of the liver, after the investing crust is removed, which may readily be done, is smooth or at most slightly uneven. On section the organ usually shows brown atrophy, fatty degeneration, with some passive congestion. Cirrhosis of the organ does not occur as a rule; at most there is a slight thickening of the septa passing in from the capsule. The spleen is often enlarged, generally covered with the "icing" membrane, and deformed. With regard to the pleurae, the right is as a rule more seriously involved than the left; the bases of the sacs are the sites of election

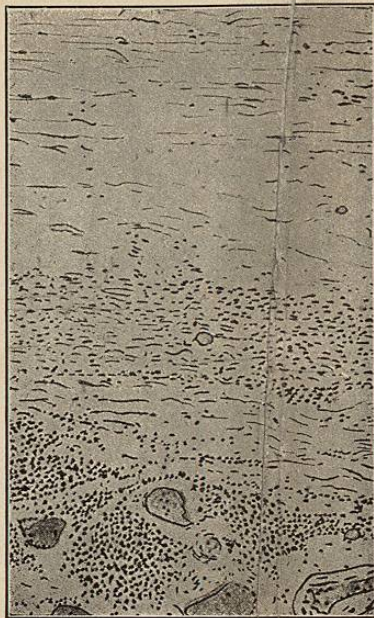


FIG. 3380.—Section of Peritoneal Membrane in the "Zuckerguss" condition Showing Perivascular Leucocytosis and Hyaline Degeneration of the Superficial Fibrous Tissue. (Nicholls.) (Camera lucida drawing; Reichert objective No. 3.)

for the process. The lungs are usually atrophied and partially collapsed. Chronic adhesive pericarditis, or, more correctly, mediastino-pericarditis, is frequently found. More rarely an acute exudative pericarditis is present, and more rarely still the pericardium may be normal. Occasionally the pericardial sac is only partially obliterated, and then the adhesions are denser on the right side toward the diaphragmatic surface. Calcareous deposits are sometimes met with in the adhesions. The heart is often small and may show the results of pericardial adhesion, namely, dilatation and insufficiency of the valves.

The kidneys in most instances show no special abnormality except possibly congestion. In a few cases interstitial fibrosis has been found. The digestive tract shows but little disturbance; the stomach and colon may be found adherent to adjacent parts. A duodenal ulcer was found in one case. Icterus is never present, unless the case is complicated by cirrhosis of the liver or by obstruction to the common bile duct. As complicating conditions which hasten the fatal termination, acute pneumonia, pericarditis, pleurisy, peritonitis, and osteomalacia may be mentioned. A striking feature of the diffuse form is ascites, which is usually extreme. The ascitic fluid is of pale straw color, high specific gravity, containing flakes of fibrin, and has all the appearances of an inflammatory exudate. Anasarca is usually not marked until toward the end.

In addition to the form just described it should be stated that an increasing number of cases of serositis of this hyperplastic type are being reported as due to tuberculosis. It is beginning to be recognized that tuberculosis is not necessarily destructive, but, on the contrary, may be constructive;—instead of extensive caseation and softening we may have the formation of a hyperplastic hyaline membrane with little or no caseation. In many cases it is only the discovery of the specific bacillus which will reveal the true nature of the process. It used to be thought that cases of the perihepatic or "Zuckergussleber" type, to which Curschmann first drew attention in his classical paper, were never due to tuberculosis; but this is certainly incorrect. Recently Strajesko (*loc. cit.*) and James B. Herrick (*loc. cit.*) have recorded typical cases undoubtedly of tuberculous origin.

Hyperplastic tuberculosis of the serous membranes is in my experience not very uncommon, but it is certainly rare for it to attack the capsule of the liver, the pericardium, and the right pleura in such a way as to simulate Curschmann's "icing" liver and atrophic cirrhosis. The lesions produced are not unlike those of the simple or non-tuberculous form, the main difference being that the process is not so liable to be concentrated on any special organ, but is more generalized over the serosae. Again, ascites is usually less marked and fibroid adhesions are more numerous. The membrane produced is rarely smooth and glistening, but is covered with fibrin and shaggy adhesions. A hypertrophic fibro-hyaline membrane may be produced also in this form, but in it caseous masses can generally be made out, disclosing the etiology of the case; the caseation may, however, be very trifling.

Microscopically the membrane in the simple form is composed of parallel laminae of connective tissue showing marked hyaline thickening of the fibrillae. In the deeper portions newly formed capillaries can be made out with some perivascular leucocytosis, and "Mastzellen" are numerous. Macroscopically the membrane has all the appearance of an organizing deposit upon the serosae.—a deposit in which hyaline degeneration constitutes the most striking feature. In the

tuberculous form the connective-tissue fibrillae interlace freely, and there are usually multiple areas of caseation with numerous giant cells. Hyaline degeneration is also present, but is rarely so marked as in the simple form. Tubercle bacilli can usually be demonstrated readily on making smears from the deposit.

In the tuberculous form, unlike the first variety, the liver is usually enlarged and often shows signs of miliary tuberculosis with slight interstitial fibrosis. Old tuberculous foci are usually found in the lungs, pleura, and peribronchial glands. The case often terminates with a generalized miliary infection.

**ETIOLOGY AND PATHOGENESIS.**—Two views have been advanced as to the causation of the disease. The first is that of Pick, who regards the primary condition as an adhesive pericarditis which leads to portal obstruction and the so-called "cardiac" cirrhosis of the liver, eventually resulting in ascites and thickening of the liver capsule. The objections to Pick's view briefly are, that cases occur in which pericardial adhesion is absent, and in most of the recorded cases it has been shown that portal stasis was not present; nor, again, does the development of the physical signs accord with what should occur were Pick's view correct. It must be said that all those who have carefully studied the question are agreed that the overgrowth of fibrous tissue and the ascites are due to an inflammatory process involving the various serosae. Most cases give a history of some previous acute inflammatory disease, and the development of the lesions can usually be traced from one serous membrane to another. Cases have been known to follow acute rheumatism, typhoid fever, whooping-cough, measles, malaria, and perityphlitis. The transmission of the infective agents from one serous sac to another takes place by means of the lymphatics. In the tuberculous form, which is anatomically strictly comparable to the simple type, the true nature of the disease is of course obvious. With regard to the ultimate nature of the process in the simple form, some little doubt must still exist; but it is probable that micro-organisms of low virulence are at work.

The inflammatory process usually begins in the peritoneal cavity in the form of a hepatitis or perihepatitis, or, more rarely, about the stomach and duodenum; it extends to the right pleura and eventually to the pericardium. Next in frequency, the primary lesion is a chronic pericarditis with adhesion extending to the right pleura and thence to the peritoneum; more rarely still, chronic pleurisy may extend to the liver capsule. The process is accompanied by an exudation of sero-fibrinous fluid into the abdominal cavity, which fluid tends to be

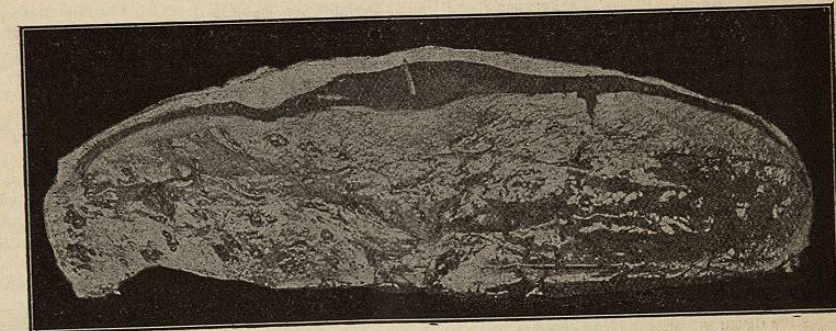


FIG. 3381.—Tuberculous Perihepatitis. The illustration shows the thick hyaline and caseous membrane produced in the chronic hyperplastic type. (Nicholls.)

abundant owing to the involvement of the absorptive surface of the peritoneum by the dense fibrous deposit, and also from the fact that the contracting fibrous masses sometimes lead to pressure upon the inferior vena cava and portal vein, thus promoting ascites. The liver gradually diminishes in size, and the spleen becomes enlarged in the later stages when passive congestion be-

comes marked. Gout and alcoholism appear to have little to do with the process. Syphilis has been known to produce chronic adhesive and membranous peritonitis (Lancereaux), but as yet no case of multiple hyaloseritis has been recorded as due to this cause.

**CLINICAL COURSE.**—The sporadic form being entirely of pathological interest and giving rise to no characteristic symptoms may be dismissed from consideration. In the diffuse variety, the most striking clinical symptoms are those to which Curschmann first drew attention, namely, shortness of breath, slight general weakness, and a gradually increasing and refractory ascites. The resemblance to atrophic cirrhosis of the liver is striking. Most cases begin insidiously and give a history of indefinite disturbance from the first, such as anorexia, dyspnoea, and epigastric pain. In other cases the disease begins acutely with fever, rigors, and epigastric pain, during which time the liver region becomes tender and swollen. The affection ultimately becomes chronic and periods of latency alternating with exacerbations are the rule. According to the manner of onset we can recognize two main types: first, the *perihepatic*, and second, the *mediastino-pericardial*.

In the first, after more or less evidence of involvement of the liver capsule, such as pain and tenderness in the right hypochondrium, with or without fever, ascites develops and the liver is found to be enlarged. It is frequently observed later that one or both of the pleural cavities contain fluid, or the mobility of the lungs is impaired by adhesions. Finally, in most cases, although exceptions occur, there develop evidences of adhesion of the pericardium, and dilatation of the veins of the neck, chest, and arms may be noted. As the disease becomes well established the liver becomes smooth, hard, and gradually contracts, while the spleen steadily enlarges and may become palpable. Anasarca appears only in the later stages.

In the second type, the earliest signs are referable to an indurative mediastino-pericarditis, namely, pain in the chest, cough, palpitation of the heart, dyspnoea, cardiac dilatation, and possibly the pulsus paradoxus and systolic retraction of the chest wall. Signs of pleural effusion or adhesion appear and the process eventually spreads to the liver capsule. As before, the liver is large and smooth, but contrary to what occurs in the perihepatic form, anasarca is an early, though it may be a transient sign. As time goes on the liver decreases in size and a scites makes its appearance.

In all forms, eventually, paracentesis becomes necessary and must be repeated at gradually diminishing intervals. The condition of the liver and spleen can be made out only after free tapping. Digestive disturbances when present are trifling, such as anorexia, constipation, or diarrhoea; jaundice does not occur in uncomplicated cases. Albuminuria is found occasionally and is attributable to passive congestion of the kidneys. Fever is usually absent except during an exacerbation or complication. The disease is essentially chronic, lasting for from two to sixteen years. The sufferers may not be seriously incapacitated for work for long periods, but the condition proves singularly refractory to treatment and relapses are frequent. Death occurs usually from some acute complication, lobar pneumonia, or peritonitis.

The tuberculous form of the disease, as the cases of Strajsko and Herrick have shown, may occasionally present almost exactly the clinical picture of the "icing" liver of Curschmann's description. Little is known of this form as yet, but, so far as my experience goes, the only differences between the simple or non-tuberculous and the tuberculous forms are, that in the latter the liver remains enlarged to the end, fever is more constant, and the disease tends to run a more rapid course. In fact, most cases of tuberculous origin run a course very similar to that of chronic tuberculous peritonitis, with the addition of evidence of the involvement of the other serous membranes. There is little in the physical signs to suggest a chronic hyperplastic lesion rather than an exudative one in these cases, unless the liver capsule is chiefly involved. Unlike what takes place in the non-tuberculous form, ascites is rarely extreme and sacculation of the abdominal fluid is more likely to occur. Usually, too, the disease begins with signs of tuberculous involvement of the lungs, pleurae, peribronchial glands, or, in the female, the tubes and ovaries.

**DIAGNOSIS AND PROGNOSIS.**—The diagnosis lies between chronic hyperplastic perihepatitis, atrophic cirrhosis of the liver, and carcinoma of the peritoneum, for in all there may be ascites, more or less abdominal pain, and, in most, induration of the great omentum. The combination of extreme ascites with relatively little anasarca, an adhesive pericarditis, pleural exudation, or adhesion, particularly if on the right side, should always arouse a suspicion of multiple progressive hyaloseritis, and especially perihepatitis.

Perihepatitis is differentiated from atrophic cirrhosis by the fact that portal congestion does not occur except

TABLE OF DIFFERENTIAL DIAGNOSIS.

Special features.	"Zuckergussleber."	Atrophic cirrhosis of liver.	Chronic tuberculous peritonitis.	Carcinoma of peritoneum.
Age.....	Occurs about middle life or later.	Oftenest about middle age....	Commonest between ages of twenty and forty.	Occurs late in life.
Sex.....	Slight predominance in favor of males.	More frequent in males.....	Predominates in females....	More frequent in females.
Previous history.....	Often a history of acute pericarditis or perihepatitis.	History of alcoholism, syphilis, or digestive disturbances.	Often a chronic cough; diarrhoea, or general tuberculous.	In some cases a history of cancer of stomach or ovaries.
Alcoholism.....	No influence.....	Frequently present.....	Unimportant.....	Unimportant.
Syphilis.....	No influence.....	Occasionally present.....	Unimportant.....	Unimportant.
Hereditarity.....	No influence.....	Unimportant.....	May be family taint.....	Unimportant.
Incidence.....	Acute becoming chronic or insidious from the first.	Insidious.....	Onset may be acute or insidious.	Insidious.
Chronicity.....	Cases last for years.....	May last for years.....	Prolonged.....	Fairly rapid course, with cachexia.
Fever.....	Generally absent except during exacerbation or some complication.	May be afebrile; when present is slight.	Usually slight, often absent.	Rarely absent; due to complications.
Pain.....	Indefinite and trifling.....	Trifling.....	Apt to be troublesome.....	Variable.
Digestive disturbance.....	Trifling or none.....	Constant; dyspepsia, nausea, vomiting, gastric hemorrhage, melæna.	Fairly common.....	Often marked.
Ascites.....	Constant and extreme.....	Constant.....	Never extreme; may be absent; may be hemorrhagic.	Moderate grade; may be hemorrhagic or pseudo-chylous.
Anasarca.....	Constant but slight.....	Relatively slight.....	Trifling.....	Slight.
Jaundice.....	Absent in pure cases.....	Occurs in twenty-seven per cent. of cases.	May occur exceptionally.....	Common, when liver is involved.
Liver.....	Not cirrhotic; at first enlarged, then small; smooth.	Cirrhotic; at first enlarged, then small and warty.	Often enlarged.....	May be enlarged, with nodules.
Spleen.....	Gradual enlargement.....	Gradual enlargement.....	Nothing special.....	Nothing special.
Omentum.....	Thickened and contracted.	Normal.....	Often matted up.....	Often matted up.

**NATURE AND ETIOLOGY.**—Mumps prevails widely as an epidemic, and also occurs in the sporadic form.

It is propagated by a specific virus the nature of which has thus far eluded the search of bacteriologists. Numerous organisms have been found in the blood, saliva, and other secretions by Bordas, Capitan, Charrin, Boinet, and others, but the cultures obtained have failed to stand the crucial test of reproduction by inoculation. The disease is communicated by contact with the infected, and by the intermediation of various substances to which the virus adheres. The contagious principle is supposed to be chiefly transmitted by the breath, and is capable of reproducing the disease from the beginning of the parotid swelling up to ten days or two weeks after the fever has subsided. It is highly contagious. When the disease breaks out in schools, children's hospitals, or other institutions where large numbers of young people are congregated, few escape, unless protected by a previous attack. However, the susceptibility is not the same in all individuals.

It is quite rare in infancy and after the middle period of life, occurring chiefly in youth and early manhood. Males are more prone to attack than females. Like the diseases of the class to which it belongs, it rarely occurs more than once in the same individual.

It is more apt to prevail during the winter and spring, but epidemics have been observed at all seasons. Bad hygienic surroundings certainly favor its diffusion.

**MORBID ANATOMY.**—The opportunity for post-mortem examination in cases of mumps, for obvious reasons, is very limited. On this account pathologists differ as to the seat of the morbid process; some locating it in the gland proper, and others in the periglandular connective tissue. Among those who maintain the glandular origin, some hold that it is rather the fibrous stroma which supports the acini than the acini themselves, which are primarily involved.

The weight of authority is in favor of the initial lesion being a catarrhal inflammation of the gland ducts, but the local swelling which gives character to the disease is unquestionably largely due to an infiltration of the surrounding cellular tissue. The swelling disappears by the absorption of the exudation, and only in very exceptional instances does suppuration take place.

Occasionally the glands remain enlarged for a considerable time, and, in very rare instances, the enlargement and hardening are permanent. Atrophy of the parotid and other affected glands has been observed as a result of an attack of mumps.

**SYMPTOMS.**—The period of incubation varies greatly and is estimated by different authors at from seven to twenty days. Premonitory symptoms are, in most instances, either absent, or so mild as to attract little attention. When present they are those commonly met with in mild febrile attacks: chilliness, hot flushes, languor, anorexia, and sometimes vomiting and diarrhoea.

Very exceptionally the initial symptoms assume a grave character, and the disease is ushered in with high fever, profound depression, persistent vomiting, and, in children so predisposed, with convulsions.

Pain and tenderness in the region of one or both parotid glands, if not present from the beginning of the illness, speedily make their appearance, and are never delayed longer than twenty-four or thirty-six hours. Swelling appears simultaneously with the pain and tenderness. It is at first noticed in the depression between the mastoid process and the ramus of the jaw, and is confined to the gland. The adjacent cellular tissue is soon invaded and the tumefaction extends forward on the face and downward and backward on the neck.

The degree of enlargement varies greatly, being at times moderate and confined to the parotid region, and in other cases involving a large portion of the face and neck. When both parotids are involved and the swelling is fully developed the configuration of the face is peculiarly altered, the lower half of the face being enormously widened and the outline of the chin lost in the œdema of the neck. The swelling is firm, slightly elas-

much later on and is never marked; secondly, severe digestive disturbances, such as dyspepsia, vomiting, hæmatemesis, and melæna, are not present. Jaundice does not occur except in the rare event of a mixed cirrhosis accompanying perihepatitis, a case of which has been recorded by Rose.<sup>12</sup> The liver is never warty; signs due to cholemia do not occur. Further, the great omentum is nodular and contracted, while in cirrhosis it never is.

In carcinoma of the peritoneum, when the liver is enlarged, jaundice is often present, the course is fairly rapid, cachexia and digestive disturbances are marked. There is usually some evidence of cancer of the stomach or ovaries.

Having diagnosed the presence of chronic perihepatitis, it is next necessary to determine if it be tuberculous or not. In the tuberculous form ascites is rarely so extreme; abdominal pain and tenderness are apt to be more marked and the liver is enlarged throughout. Careful examination of the lungs, lymphatic glands, testes, ovaries, and Fallopian tubes, as well as of the urine, feces, and sputum, should be made. In suitable cases tuberculin injections should be tried. The preceding table presents in a convenient form the main points characterizing the various infections likely to be confused. Diagnosis may, however, be very difficult and often impossible.

The prognosis should be guarded; the disease is essentially chronic and may last for years without seriously incommoding the patient. The simple form is steadily progressive and invariably fatal. The tuberculous form is also practically always fatal, but may possibly heal after suitable interference. Tuberculous cases and those complicated with adherent pericardium run a more rapid course than the others. The special risk to life arises from some intercurrent complication.

**TREATMENT.**—No specific medication has been devised. The chief point is to meet the symptoms as they arise. Pain may be relieved by hot fomentations and opium. To relieve the ascites, diuretics have been recommended, notably caffeine in doses of 0.1 to 0.15 gm. six to ten times daily; digitalis and diuretin may be tried. When ascites is extreme, tapping must be resorted to. Some cases, especially the tuberculous forms, may be benefited by laparotomy. Needless to say, the patients must be kept under the best hygienic surroundings.

Albert George Nicholls.

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**MUMMIFICATION.** See *Necrosis*.

**MUMPS.**—(Synonyms: Cynanche parotidæa; parotitis; parotiditis; Fr., *Oreillon*; Ger., *Ziegenpeter*.)

Mumps is an acute, infectious disease, self-limited, and characterized by inflammation of the parotid, and sometimes of the submaxillary and sublingual glands, with a tendency to involve the mammae, testes, and ovaries.

tic, and moderately sensitive to pressure. The head is fixed with the face directed straight forward, or, if but one parotid is affected, the head will be inclined to the diseased side. The skin usually preserves its natural color, but may be red and glossy. Slight desquamation may take place after the inflammation has subsided.

More or less fever is always present, lasting, in cases of moderate severity, not more than four or five days, but occasionally it is intense, protracted, and attended with delirium and prostration.

The oedema generally extends internally, affecting to a greater or less degree the mucous membrane of the tonsils and pharynx. The secretion of saliva may not be materially altered in quantity, but dribbles continuously from the half-open mouth.

Tinnitus aurium and earache are often experienced, and there may be a temporary or permanent impairment of hearing. The movements of the jaw are, of necessity, greatly impeded and very painful. Speech is difficult, and the voice is husky or muffled.

Mastication and deglutition are almost entirely suspended, the patient enduring the pangs of hunger rather than undergo the suffering required to satisfy his wants.

Mumps usually affects both parotids, but not simultaneously; the left is most frequently the first to become involved, and in from two to four days afterward, or even when the swelling has disappeared, the opposite gland becomes the seat of disease. Not infrequently the affection is limited to one side.

Very often the submaxillary and sublingual glands are affected conjointly with the parotids. Dr. Penzoldt, of Erlangen, records an epidemic of mumps which fell under his observation, in which there were many cases in which the disease process was almost wholly confined to the submaxillary glands.

The swelling reaches its height in from two to five days, remains stationary about forty-eight hours, and then rapidly subsides, making the duration of the attack from ten to fourteen days.

**COMPLICATIONS AND SEQUELÆ.**—These relate especially to affections of the nervous and glandular systems. The tendency for the inflammation to invade by so-called metastases other and remote glands is a singular and interesting feature of the disease. As was originally pointed out by Niemeyer, it is probably not a true metastasis. The testes in males and the mamma and ovaries in females are the organs of special election. This complication is much commoner in males than in females, and less common in childhood than in adult life. When the testicle is invaded, it becomes swollen and painful, and there is often effusion into the tunica vaginalis, with oedema of the scrotum. Bruising of the testes is said to invite the disease.

The migration may take place at any period of the parotid swelling, which then usually subsides, but occasionally the two inflammations run their course together. Sometimes the inflammation of the parotid disappears suddenly before the advent of the metastatic affection; in this event, alarming constitutional symptoms are liable to supervene. There may be high fever, headache, delirium, or profound collapse, which promptly disappear on the appearance of the local lesion. The new affection runs a course very similar to that of the original disease, and lasts about the same length of time.

Atrophy of the testicles sometimes results, or their function may become impaired from occlusion of the spermatic duct.

Meningitis is in evidence in a very large percentage of the fatal cases of mumps. Various diseases of the nervous system have been recorded as complications (insanity, neuritis, hemiplegia, facial paralysis), but certainly in many, if not most, instances, they were mere coincidences.

Otitis media is not uncommon and occasionally terminates in permanent deafness. In a few cases a complete loss of hearing in one ear takes place without the slightest evidence of the presence of the inflammation in the corresponding middle ear; thus warranting the belief

that the lesion—whatever may be its nature—must in these cases be located in the cochlea or in the auditory nerve at some point in its extra-labyrinthine course.

Albuminuria with convulsions has been noted. **PROGNOSIS.**—Mumps is a mild though painful disease, and almost invariably runs a favorable course. The inflammation of the parotid rarely leads to the formation of an abscess, contrasting, in this respect, strongly with the non-specific form of parotiditis which occurs in the course of typhoid fever and other maladies.

Occasionally a hard, painless enlargement of the gland is left, which persists for a variable time and disappears, but which in very exceptional instances may be permanent.

The **DIAGNOSIS** is rarely attended with difficulty. The disease can scarcely be mistaken for any affection other than the non-specific inflammations of the parotid glands, which occur as complications of various constitutional diseases.

The comparative mildness of the general symptoms, the speedy resolution of the swelling, and the epidemic character of mumps, contrast strongly with the preceding severe illness and the inherent tendency to suppuration which constitute the clinical features of the non-specific or symptomatic parotiditis.

**TREATMENT.**—The treatment is purely symptomatic. The disease is self-limited and runs a definite course, uninfluenced by the administration of drugs.

The patient must remain indoors, preferably in bed, even in mild cases, until convalescence is assured.

On account of the difficulty in swallowing, the diet should be exclusively fluid. If there should be high fever, a bath or surface sponging with tepid water will be of service. Should there be much pain or restlessness, an anodyne, preferably Dover's powder or chloral, may be prescribed; otherwise refrigerant diaphoretics, such as a solution of bitartrate or citrate of potash, or the neutral mixture of the Pharmacopœia (see under *Potassium*), will meet all of the indications. External fomentations to the neck are both useful and grateful to the patient. Soap liniment, to which a little deodorized tincture of opium may be added, warm olive oil, or the tincture of belladonna and glycerin (3 i.–3 i.), are eligible preparations for external use.

When metastasis to the testes or other glands takes place, the new affection should be treated in the same manner as if it had occurred independently of the parotid inflammation. The writer has obtained excellent results in orchitis from the inunction of guaiacol (3 i.) and lanolin (3 iij.–iv.). When it is applied from two to four times daily the pain and swelling usually promptly subside. If the onset of the metastasis is heralded by great prostration, or by alarming symptoms of any kind, stimulants must be freely given and warmth applied to the body.

A course of tonics is advisable should convalescence be tardy.

W. J. Conklin.

**MUSCARINE.** See *Poisonous Plants*.

**MUSCLE.**—**HISTOLOGY OF MUSCULAR TISSUE.**—Muscular tissue (Lat., *Tela muscularis*; Ital., *Tessuto muscolare*; Fr., *Tissu musculaire*; Ger., *Muskelfaser*) is the tissue in the animal body the physiological characteristic of which is its power of contracting in one direction, thus giving rise to definite movements. It is composed of structural elements, the length of which is usually much greater than the breadth. Muscular tissue in some form is present in all the groups of animals, except the *Protozoa*.\*

Anatomically or morphologically, muscular tissue is of two kinds: (A) *Striated or striped muscular tissue*, that in which the structural elements or fibres are marked by distinct transverse, and usually much less distinct, longitudinal striations. The structural elements are uni- or

\* Among the *Protozoa*, the striated ectoplasm of some infusoria and the contractile stalk of *Vorticella* are perhaps physiologically muscular tissue, but they can hardly be so considered anatomically, since these organisms are supposed to be unicellular.

multinucleated (Figs. 3383 to 3405). (B) *Smooth or unstriated muscular tissue*, that in which the structural ele-

lower vertebrates, besides the muscles of the trunk and limbs, striated muscular tissue is found in situations where it is not present in man. In birds, in the iris and choroid; in snakes, around the poison glands; in fishes, in the wall of the stomach of *Cobitis fossilis* and *Syngnathus acus*, and in the intestine of *Tinca chrysolis*; in *amia* it forms a double layer over the surface of the lung-like air bladder, and is present in the trabecula-like cords within it; in *lepidosteus*, it is very abundant in the trabecula within the air bladder; in *polypterus* there is present an enclosing sheet of muscle for the air bladder as in *amia*.

**Constituents of Striated Muscular Tissue.**—These are: (A) the essential and characteristic, elongated and transversely striated muscular fibres (Figs. 3383 to 3390); (B) blood- and lymph vessels (Figs. 3382 and 3396); (C) nerves (Fig. 3382); (D) muscle spindles (Fig. 3400) (E) a considerable quantity of adipose and connective tissue (Figs. 3382 to 3385.) The connective tissue of a muscle has received special names according to its position in the muscle: (a) *epimysium* or *perimysium externum* (Fig. 3382, ep). This is the connective

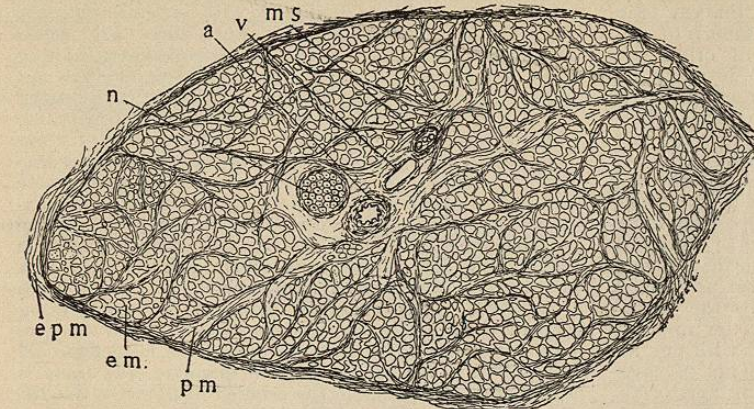


FIG. 3382.—Transsection of the Occipitoscapularis Muscle of the Cat, to show the Components of an Ordinary Striated Muscle. The whole muscle and the fascicles were outlined with the camera lucida at a magnification of about twenty diameters. The muscular fibres, the artery, vein, and nerve were not drawn to scale. (Drawn by Mrs. Gage.) a, Artery; em, endomysium, the connective tissue between the individual fibres; epm, epimysium, the connective tissue surrounding the entire muscle and giving off (pm) the perimysium, which combines the fibres into bundles of fascicles of various sizes; ms, muscle spindle; n, nerve; v, vein (cf. Figs. 3395, 3400).

ments are apparently homogeneous, or marked by fine longitudinal striations only. The elements are mostly uninucleated (Figs. 3406 to 3409).

**STRIATED MUSCULAR TISSUE.**—This, in man and many of the lower animals, is the so-called flesh or lean meat. It is usually collected into more or less distinct masses, termed *muscles*; and in every case, whether the muscle is in distinct masses or not, it is composed of structural or histological elements, which, when viewed lengthwise under a microscope, are characterized by an appearance of being composed of alternating dark and light segments (Figs. 3383 to 3404); this gives the elements their transversely striated appearance. Physiologically, striated muscle is characterized by the rapidity and energy of its contraction.

**Distribution.**—Striated muscular tissue is present in all vertebrates and in some members, at least, of all the great groups of invertebrates except the *Protozoa*. Structurally and physiologically, striated muscular tissue in vertebrates is of two kinds: (A) The skeletal, or the so-called muscle of animal life, which is mostly voluntary; (B) the cardiac, or the muscular tissue of the heart, and the other pulsating organs of the blood-vascular system. This is wholly involuntary, and belongs to the tissues of organic life.

**Skeletal or Voluntary Muscular Tissue** (muscles of animal life).—In man and the mammals, this tissue forms from forty to forty-five per cent. of the entire body weight. Its specific gravity is about 1.058. It is usually collected into distinct muscles, the ends of which are in most cases attached to some firm part (bone or cartilage) by means of fibrous connective tissue.

**Distribution:** In man and the mammals generally, this tissue forms the muscles of the trunk and extremities, those moving the globe of the eye and all those of the ear, those moving the lips, and those moving the skin (*platysma myoides* in man, the cutaneous muscles over nearly the entire body in many mammals). It is also present in the tongue, pharynx, larynx, the true sphincter of the urethra, and the ectal sphincter of the anus; in mammals possessing them, it is found in connection with Cowper's and the anal glands. In the oesophagus of man, the horse, and some other animals, striated muscle is usually present only in the pharyngeal half; in ruminants, the dog, cat, rabbit, house mouse, rat, and many other animals, it extends to, or nearly to, the stomach; and in the rat it is even continued upon the stomach from the cardiac end of the oesophagus. In many of the

tissue which forms a kind of envelope or sheath for the entire muscle, (b) *perimysium* (Fig. 3382, p). This is the connective tissue which extends into the muscle from the epimysium. It combines the fibres into bundles (*fasciculi, fascicles, or lacerti*) of various sizes, and separates the fascicles from one another; (c) *endomysium*. This is the minute network of connective tissue extending from the perimysium into the fascicles, and separating the individual fibres from one another. Finally, connective tissue, commonly in dense masses or tendons, serves to connect the muscles to other parts, usually bones or cartilages, which are moved when the muscle contracts.

**Fascicles (fasciculi or lacerti) and their Relations in a Muscle.**—In some muscles, as the sartorius, the muscular fascicles extend from end to end of the muscle. In such a case, if the muscle has a broad tendon of origin and insertion, the fascicles are usually nearly parallel and of nearly the same length. Where, however, one or both ends are fusiform, as in the biceps brachii and the gracilis of man, the central fascicles are considerably the longer. In penniform and bipenni-

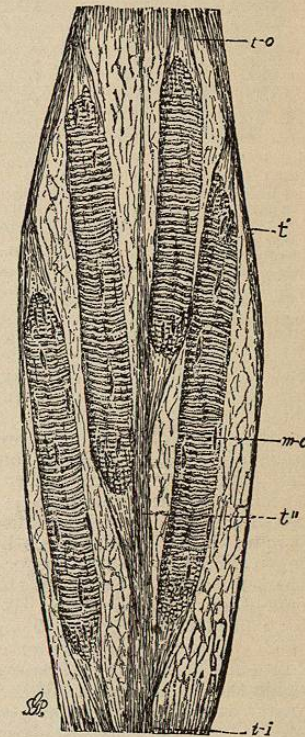


FIG. 3383.—Diagram to show the Arrangement of the Fascicles in a Bipenniform Muscle (*Biceps Brachii* of the Cat). Each fibre represents a fascicle. (Drawn by Mrs. Gage.) m-c, Muscle corpuscles; t-i, tendon of insertion; t-o, tendon of origin; t-e, tendinous expansion over the surface of the muscle (it is thickest near the tendon of origin); t, extension of tendon through the middle of the muscle. It thickens toward the tendon of insertion.