Post-mortem.—Abdomen filled with a thin yellow pus. Large amount of lymph covering the gut, particularly about the perforation. Omentum firmly adherent to intestine, at three places, over the ulcers. Last two feet of ileum form one almost continuous ulcer, with at places only the serous coat between the lumen and the peritoneal sac. Large amount of blood in the intestine.

SUPPURATIVE CHOLANGITIS.

By R. Llewelyn Jones, M.B. (Lond.), M.R.C.S., *Assistant Medical Officer, Durham Co. Asylum;* and T. Aldous Clinch, M.D. (Edin.), *Pathologist, Durham Co. Asylum.*

The recent success in the surgical treatment of affections of the bile ducts tends to enhance their interest, and likewise to emphasise the importance of their early recognition. The case herewith appended has been deemed worthy of report by reason of the irregular features it presents. It may therefore be not out of place to recapitulate briefly the cardinal signs and symptoms of cholangitis. Of this disease there are two varieties, infective and suppurative, and it is with the latter we have to deal. As etiological factors we have the following diseases—cholelithiasis, hepatic tumours, malignant and innocent, enteric fever, infective cholangitis, etc.

The possibility that suppurative cholangitis may supervene upon so common an affection as gall stones adds much to the gravity of the disease.

The classical symptoms are—Progressive enlargement of the liver, with possible distension of gall bladder; jaundice, usually marked and continuous; pain, usually well marked; persistent pyrexia, irregular in type, with rigors; profuse sweatings; and rapid emaciation and asthenia.

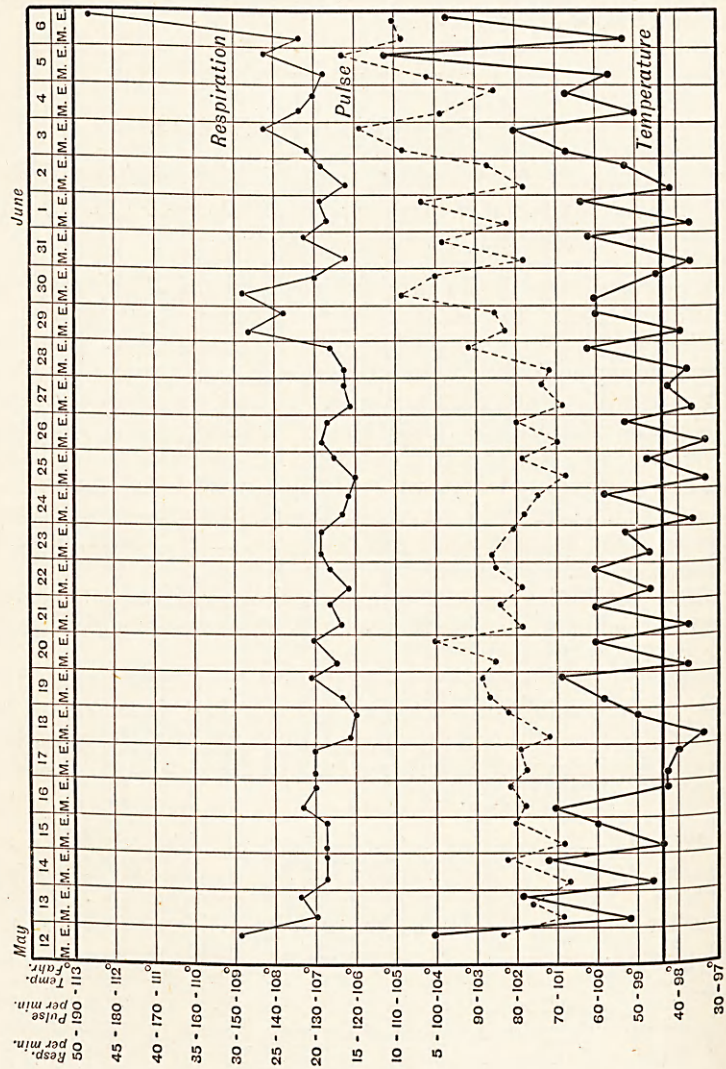
12*th May.*—Patient was seized suddenly with abdominal pain and faintness. There was intense cyanosis of face and hands. Pulse very feeble and irregular. Respiration shallow, temperature 104°. He was immediately conveyed to bed. Saline diaphoretics and whisky were administered. Throughout the night patient sweated profusely.

13*th May.*—*Present state.*—Patient is a thin, spare man, æt. 53. He lies on his back in a state of mental hebetude. His conjunctivæ, in common with the general surface of his body, present a subicteric tinge. His malar eminences are darkly flushed; his eyes lustreless, with moderate-sized pupils; tongue thickly furred; bowels costive. His temporal arteries are tortuous and unduly obvious.

Personal history.—Admitted to the asylum nineteen years ago, suffering from mental depression and doubtful phthisis. His state of health was characterised as delicate. No history of any illness. Family history unknown.

Chest inspection.—Skin yellow. Subcutaneous fat, small in amount. Movements shallow, especially left side; cardiac apex beat, fifth space, just external to nipple line; well-marked epigastric pulsation.

Palpation.—Left lung. Diminished movement. Vocal fremitus



increased, especially over lower lobe posteriorly. Cardiac impulse feeble.

Percussion.—Diminished resonance over left lung anteriorly. Posteriorly there was an area of marked dulness fringed by normal resonance.

Auscultation (*left lung*).—Breath sounds weak. Posteriorly, over area of marked dulness above referred to, almost complete absence of breath sounds. Cardiac sounds first reduplicated.

Abdomen.—Movements fairly extensive, no tenderness to be detected. Liver and spleen apparently not enlarged.

Nervous system.—Nothing abnormal.

Genito-urinary system.—Micturition normal. Urine high-coloured; sp. gr. 1025; no albumin, sugar, or blood; indican and bile pigments present.

Progress.—13*th May.*—In the evening enema was administered, and dark brown stool passed.

14*th May.*—Patient perspiring profusely; tongue furred; breath foul; patient is very restless, tossing himself about even in sleep, his limbs being flexed and extended with almost convulsive force; stools clay-coloured; urine contains bile pigments; diet consists mainly of milk, with occasional doses of whisky; bowels are regulated by calomel powders followed by sulphate of soda. Quinine also was freely administered. From now on till 30th May patient became steadily weaker, lost flesh, and grew more lethargic. His temperature curve was extremely irregular; he sweated profusely; his bowels confined; stools generally clay-coloured, occasionally containing traces of normal pigment; urine scanty, high-coloured, containing bile pigments; jaundice was never intense, and varied in degree from day to day. The condition of his left lung was much the same, a few râles were heard at base. A slight cough was present, but no sputum. The heart showed signs of progressive dilatation. Treatment in the main was symptomatic and expectant.

31*st May.*—Loud coarse rhonchi to be heard over left lung. Patient is expectorating blood-stained sputum. Tongue dry, brown fur. A mixture containing quinine, digitalis, ammonia, and nux vomica was ordered.

1*st June.*—Patient is lying in a subconscious state, face cyanotic, breathing shallow; cardiac apex-beat very diffuse; sounds indistinct; the coarse rhonchi above referred to are absent, but there is still diminished resonance over left lung, with feeble breath sounds; no moist sounds detected. From now on till 6th June patient grew rapidly weaker, the profuse sweats and irregular pyrexia continuing. He coughed freely, sputum blood-stained. He became more and more comatose, his pulse more rapid, feeble, and irregular. He refused nourishment. Incontinence of urine and fæces prevailed towards the end.

5*th June.*—Temperature 105°·2, pulse 124. Breathing very laborious. Patient is evidently moribund, and, notwithstanding free stimulation, he rapidly sank, dying 9.5 P.M., 6th June, his temperature at 4 P.M. on the same evening registering 103°.

DIAGNOSIS.—The following are, we think, the crucial points of the case, and it is upon them that any possible diagnosis must be based:—

The extremely sudden invasion, the collapse, the irregular pyrexia, the jaundice, colourless stools, bile-pigmented urine, blood-stained sputum, and the rapidly induced typhoidal condition. The sudden

invasion, irregular pyrexia, and drenching sweats seem to announce septic infection, with probable suppuration, while the character of the urine and stools, coupled with the icteric tinge of the body, point to the liver as the primary focus. It now devolves upon us to consider those diseases in which such a combination of symptoms may be found, and the following suggest themselves:—Acute yellow atrophy, ulceration and perforation of gall bladder, phlegmonous cholecystitis, infective and suppurative cholangitis, suppurative hepatitis, Weil's disease, and portal pyæmia.

Acute yellow atrophy.—This disease is excluded by the non-diminution in size of the liver.

Ulceration and perforation of gall bladder, phlegmonous cholecystitis and infective cholangitis.—The acuteness of the onset, severe collapse, and abdominal pain were compatible with ulceration and perforation of gall bladder, phlegmonous cholecystitis, or with the ague-like paroxysms which occur in the course of infective cholangitis; but the non-intervention of acute peritonitis excludes the two first-mentioned, while the absence of any remissions in the course of the disease negatives the latter.

Suppurative cholangitis, hepatitis, Weil's disease.—The non-enlargement of the liver is equally at variance with all these diseases, as far as is ascertainable. Jaundice may be slight in hepatic abscess, but is usually said to be persistent and intense in suppurative cholangitis, though subject to variations if secondary to gall stones. Weil's disease is excluded by the absence of hepatic and splenic enlargement, also by absence of nephritis, nervous symptoms, and hæmorrhages. Portal pyæmia is rendered improbable by the absence of any known focus of infection, the absence of ascites and other results of portal obstruction, *i.e.* hæmatemesis, splenic enlargement, etc.

The evidence, such as it is, is presumably in favour of suppurative cholangitis. As to the cause of the cholangitis, it seems to lie between (1) gall stones, (2) malignant disease of bile ducts, possibly secondary to gall stones. The points not in favour of malignant disease are the paroxysmal nature of the pain, which in malignant disease is either absent, or, if present, persistently severe; with the proviso that if the malignant disease be secondary to gall stones, it may have all the features of biliary colic. Other points against malignant disease are the absence of tumour and the usual distension of gall bladder, as well as the absence of any malignant cachexia, prior to onset of acuter symptoms. The personal history gives no help; there is no account of any previous illness, the patient having worked continuously up to time of seizure. It seems, therefore, very difficult to differentiate the possible causes of the cholangitis.

Re the lung condition, the diagnosis seems to lie between pneumonia, pulmonary infarction, atelectasis, localised pleural effusion. The bloody sputum suggested pneumonia, but its bright red colour was more in keeping with the sputum of tubercular hæmoptysis; other points against it were the absence of tubular breathing and the pulse respiration ratio.

To support the hypothesis of infarct, the possibility of infective organisms, eluding the vigilance of the liver, infecting the endocardium, with sequential pulmonary infarction, was hazarded.

In reinforcement of the suggestion, we have the progressive dilatation of the heart, coupled with the fact that cases of infective endocarditis, secondary to suppurative cholangitis, have been recorded by Jaccoud and Aubert; but the other features of endocarditis were wanting.

The possibility of lung collapse receives support from the fact that Leube refers to its incidence in cases of abdominal distension, *i.e.* ascites, and also in painful affections of the liver and spleen, citing as causes restricted diaphragmatic excursion, combined with fixity of posture; and in this connection he cautions us to be wary of diagnosing cardiac dilatation, as the lung retraction consequent upon the collapse may cause undue exposure of the heart.

As far as ascertainable from text-books, hæmorrhagic sputum does not occur in atelectasis, though the grave general toxæmia, with its attendant depravation of blood, supported by the well-ascertained tendency to hæmorrhages, petechiæ, etc., in hepato-toxæmic states, suggests its possibility. The physical signs were compatible with collapse. Futile aspiration negatived effusion.

In assigning as the diagnosis suppurative cholangitis, we are confronted with the difficulty of the non-enlargement of the liver; and in the presence of these hitherto assumed antagonistic conditions we have to invoke the existence of some condition in the liver which might curb its power of expansion; and the disease that most readily suggests itself is cirrhosis, and the supposition gathers probability from the fact that cirrhosis sometimes follows gall stones (Senator).

The difficulties of diagnosing the case were much enhanced by the mental condition of the patient, who lay wrapped in all the stoical indifference of dementia. To his sufferings he gave no voice, and the existence of pain was inferred from the fitful spasms that swept o'er his limbs from time to time, and disturbed his otherwise inanimate features.

Realising the lethal character of suppurative cholangitis, especially in the light of its sequential relation to so common a condition as cholelithiasis, one cannot but feel that too much pains cannot be taken to correct all tendency to gall stones by all solvent means in our power, and failing this, to avail ourselves of timely surgical intervention in suitable cases.

Inter nos we have often commented on the sensitive relationship existing between states of mind and even functional hepatic disturbance, and, granting the insane diathesis, it seems conceivable that the chronic invalidism and mental worry attendant upon gall stones at any rate might pave the way for, if not actually usher in, the graver degrees of mental alienation.

> "Sweet recreation barred, what doth ensue
> But dull melancholy, kinsman to grim comfortless despair."

At the Autopsy.—The following notes are abridged as much as possible on account of the exigencies of space:—

Body emaciated.—No distinct icteric tint of skin or conjunctivæ. There is more congestion than usual in the brains of the chronic insane, but the usual evidences of dementia are present.

Chest.—Cartilages rigid but not calcified; heart, pericardium normal; right auricle contains a large mass of pre-mortem clot; tricuspid orifice is

dilated; right ventricle is empty and contracted. There is commencing atheroma of aorta. Left lung, no adhesion to pleura; small amount of blood-stained fluid in cavity; upper lobe is slightly emphysematous. From the middle of the lower lobe extending to the lower border is an area of dark purple colour; the bronchioles are intensely blood-stained; pieces from it sink in water, *i.e.* collapse; right lung is very large, is œdematous and congested; pleura is thickened, there is considerable increase of interstitial fibrous tissue, and the bronchi are dilated.

Abdomen.—Liver is soft; capsule is irregularly thickened, especially in the neighbourhood of the gall bladder; this latter is adherent both to the liver and to the duodenum, and contains a calculus about the size of a pigeon's egg, of yellowish colour and finely granular exterior. The bile ducts are dilated, and in the liver substance their walls are thickened and bile-stained; on section, the liver tissue appears dotted over with small pus exuding points generally under $\frac{3}{16}$ in. in diameter. This pus is thick, tenacious, and lightly bile-stained. Congestion, enlargement, and softening of spleen.

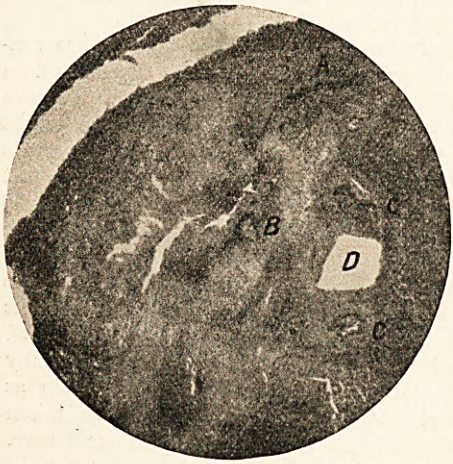


FIG. 1.—A necrotic area, showing—A, bile duct passing towards the centre; B, hyaline artery; C, transverse section of bile ducts, showing folding of mucosa; D, normal portal vein. (×720.)

Principal weights.—Brain, 52 oz.; heart, 9 oz.; right lung, 32 oz.; right kidney, 5 oz.; liver, 49 oz.; spleen, $5\frac{1}{2}$ oz.; left lung, 17 oz.; left kidney, $4\frac{1}{2}$ oz.

It will be observed that the liver still remains slightly smaller than the brain, in spite of the fact that this latter is considerably atrophied; hence we may conclude that the liver likewise is diminished in size.

Portions of the liver tissue were taken from various parts of the organ; they were hardened in graded alcohols; the principal stains used were hæmatoxylin and eosin, the Weigert-Gram method and methylene blue.

Under a low power, or even with the naked eye, sections show small spots, varying in size from $\frac{1}{2}$ to 2 mm.; some of these, the majority, appear much more lightly stained than the rest of the tissue, while others show a peculiar concentric marking, which strongly differentiates them from those first mentioned. On examining the first of these small areas with progressively higher powers, we find that in their centre as a rule are to be found vessels in a state of hyaline degeneration, in the centre of which is usually amorphous débris with perhaps a few nuclei, the remains of the intima; beside these is generally an area consisting of granular débris, in which occasionally may be found a few degenerate-looking columnar cells, the remains of a

bile duct which has undergone rapid necrosis. (As a proof that this is so, we may see a bile duct pass from the centre, where it is necrotic, to the periphery, where it is merely catarhal (Fig. 1).) Around their central areas are sometimes found a few engorged capillaries, but for the most part they are closely surrounded by the liver cells in a partially necrosed state.

The nuclei of these cells as a rule stain well; they may be shrunken or swollen, or they may stain a brownish tint or be apparently perfectly normal; the volume of the cell is always greatly increased, and the cell protoplasm is now apparently represented by a loose network, which generally stains a faint reddish purple, while the interstices are occupied by a clear substance of a delicate pink tint. We have observed in a few instances that this protoplasmic network may stain in the same vigorous manner as a nuclear network normally does (Fig. 2).

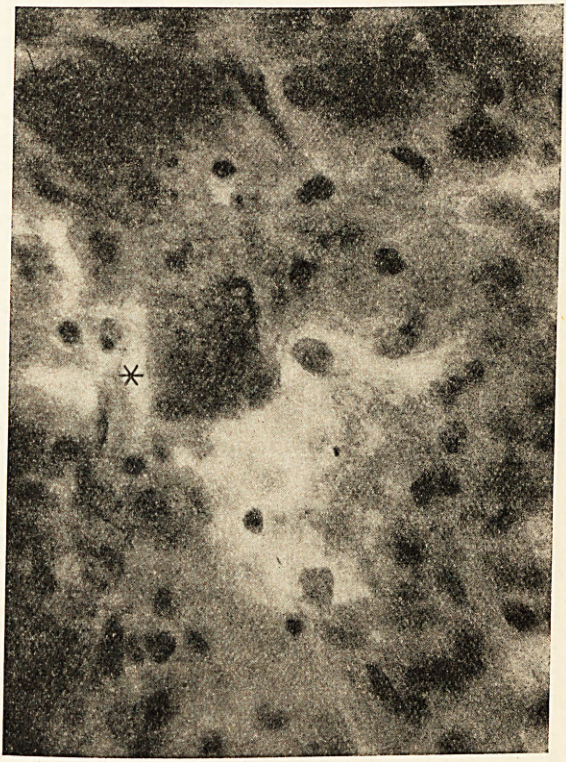


Fig. 2.—Section of edge of necrotic area, showing swollen vacuolated cells. Beside the asterisk are two cells, whose chromatin network has stained deeply like nuclei —an unusual occurrence. (×700.)

The degree of degeneration gradually diminishes from within outwards, and on the outer border of the necrotic area we find that the cells are becoming flattened in a concentric manner, showing that in necrosis an actual increase of volume occurs. Around this compressed area is a region of capillary engorgement, but without cellular infiltration. In a few instances the central part of these areas has refused all stain, apparently consisting of a granular network; more careful examination shows that this network is composed of the outlines of cells, and in the centre the nucleus still remains recognisable by its different refractive index, and attached to the cell wall by a few threads of the now almost totally destroyed cell protoplasm.

The other areas referred to can now be recognised as bile ducts of fairly large size, which are practically abscesses. They are filled with pus, and have lost the epithelial lining; surrounding them is a region of extreme inflammatory reaction, and external to this is a zone of intense vascular engorgement.

The portal spaces are much enlarged by growth of fairly firm fibrous tissue, in which are embedded an excessive number of bile ducts. The increase of fibrous tissue is as a rule confined to the portal space itself, the tissue beside it is gradually destroyed, islets of liver cells being occasionally to be found in the borders of the space. In a very few instances a lobule may be enclosed by fibrous tissue.

The cells of the mass of liver tissue show cloudy swelling, and there is evidence of a good deal of chronic congestion, in the shape of dilated capillaries, and of atrophied and pigmented cells; sometimes small round green globules are found in the cells. The old bile ducts, when retaining their epithelium, contain cast-off cells and débris; the mucosa is folded and villous, though never to the degree described by Rolleston and Pigg (1), and the cylindrical cells are frequently gone from some part of the wall (see Fig. 3). In the immediate neighbourhood of the duct, the fibrous tissue is probably œdematous (*i.e.* is clear and translucent, and does not stain vigorously), but beyond this the tissue of the portal space is commonly infiltrated with leucocytes for a moderate distance; similar infiltration frequently occurs apart from the neighbourhood of a bile duct. The endothelium of the hepatic arteries is frequently detached and separated from the subendothelial intima by red corpuscles, this change appearing possibly to be an early stage of the hyaline degeneration already mentioned. The veins never show any changes of importance.

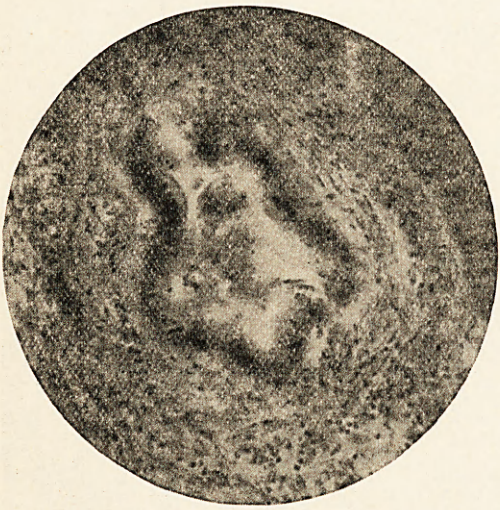


FIG. 3.—Transverse section of bile ducts, showing catarrhal contents and highly embryonic state of the surrounding connective tissue. (×150.)

The tissues were examined bacteriologically, but the results have not been sufficiently conclusive and satisfactory to merit publication.

The existence or not of a real biliary cirrhosis is one that is still undecided; the type usually described as biliary is that known as the monolobular form, the characteristics of which are too well known to need recapitulation here. The present case

differs in a not unimportant manner from this type, while it is still further removed from any other. Microscopically, as a result of the repeated biliary colic which must have occurred repeatedly but unobserved from the mental state of the patient, we find adhesions binding the gall bladder to the liver, and to the duodenum (2). The perihepatitis in the neighbourhood gives corroborative evidence of the long duration of the disease. The liver is not increased in size, its surface is smooth—points at variance with monolobular form (though often in this form the surface is smooth). Microscopically, we find the increase of fibrous tissue is confined to the portal spaces, and only with extreme rarity are bands of fibrous tissue sent forth enclosing lobules or collections of them. There is, however, increase of the bile ducts, which, as in the classical form, run parallel with the edges of the portal spaces. As the immediate cause of this localised condition, we have the catarrhal condition of the bile ducts, which has probably existed many years. Apart from this, there is no other known cause, the residence of the patient so long in the asylum completely excluding alcohol. Ligature of the bile ducts has experimentally led to contradictory results with regard to the production of cirrhosis (3), but in the present case complete obstruction can have rarely if ever occurred, on account of the size and shape of the stone. Whether the biliary catarrh is antecedent to the calculous formation, or subsequent to it, cannot be definitely cleared up, as it may be accepted that secretion of albumin into the bile ducts is the usual cause of gall stones; if the calculus is not the cause of the catarrh which existed at death, it must have much aggravated its course.

As far as we have been able to ascertain, the association of cirrhosis with cholangitis is scarcely recognised; Mayo Robson, in a list of sequelæ to gall stones and to cholangitis, makes no reference to it. Yet it is of great importance, as the enlargement of the liver, which is so constant a sign of cholangitis, is masked by the cirrhosis, and the difficulties of diagnosis are greatly increased. We have seen that the areas of necrosis and inflammation are associated with swelling; and, scattered so thickly as these areas are throughout the organ, it can scarcely be denied, we think, that a real enlargement did occur, but was screened and masked by a previously unrecognised contraction.

The above are some of the principal points which are raised by this rare and interesting case; we have not attempted to discuss points of great interest, which this case has illustrated, of the relation of hepatic disturbance or of pain to mental disease, or of the relation of hæmorrhages to collapse of the lung, or to septic states.

In the bacteriological examination of the tissues, we have been able to obtain the valuable opinion of Dr. Wakelin Barratt, who agrees that the organisms are present, and that they resemble,

both morphologically and in their staining reactions, the *Bacillus coli communis.*

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THE HYGIENICS OF MILK.

By W. LESLIE MACKENZIE, M.A., M.D., *Medical Officer of Health, Leith.*

1. *The problem.*—The problem of milk-supply is: To bring to the consumer clean, harmless, palatable cow's milk. By clean, I mean free from adventitious impurities, such as sand, dust, cobwebs, cow-dung, hairs, epithelial scales, and the like. By harmless, I mean not capable of producing any disease, infectious or other. By palatable, I mean not so altered from the natural flavour of wholesome milk as to disgust. Other qualities of milk are equally important, from other points of view. For example, as a matter of therapeutics, the percentage of butter-fat may be more important than the absolute freedom from dirt; or, again, fat may be of less importance than the readiness to decompose. But those qualities are only indirectly, not directly, questions for hygienics; because hygienics, which here practically means the scientific care of the human environment, concerns itself with the reduction in number of abnormal factors. Dirt, disease, and the consequent decompositions of milk may destroy it as a possible human food, so throwing it out of relation to the physiological needs. These three, therefore, it is the first duty of hygienics to eliminate. Practically, therefore, the problem is how to eliminate dirt and disease, how to prevent unintended decompositions, and how, thus, to preserve in its full physiological relations, a food of immense value.

2. *Assumptions preliminary.*—In thus placing the problem, I make certain assumptions. Among other things, I assume that milk is a highly important factor in the food environment of our present highly complicated society; that our present methods of providing the consumer with milk are full of defects; that the rectification of these defects is an entirely practical enterprise.

3. *Milk dirt, germinal and non-germinal.*—Under dirt, I include all the non-pathogenic germs; for these, though they do indirectly encourage specific diseases, are not individually