tion, or else retire from the field. This applies more especially to the higher members of the military, naval, and medical professions, who are left in confiding hope to their own pure discretion. They must lose no time in coming to a decision, for whilst they deliberate, their respective enemies of battle, tempest, or pestilence, may be acquiring an irresistible impetus. They must, under the worst emergencies, take the largest view they can of the state of affairs, and draw the most rapid conclusions; yet not, (as already observed in the introductory lecture,) that this rapidity is any rapidity at all, unless the conclusion be correct. For speed is something very distinct from mere haste; the one being the measure of our progress, the other of our effort. The physician must be calm and collected under the most alarming symptoms, or he is unworthy of his high vocation. His whole powers must be earnestly bent upon the issue of his case without any fear of that issue disturbing the equable exercise of his faculties. The more certain his knowledge, the more consistent and uniform will be his line of march; and that march, if guided by true wisdom, will rather be effected by long deliberate strides than by hurried and shuffling efforts.

OBSERVATIONS ON

HYDATID DISEASE OF THE LIVER.*

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PART II.

Descriptive and Minute Anatomy of Acephalocyst Hydatids; Theory of their Entrance into the System; Remarks upon their Generation, Development, Distribution, Progress, and Decadence.

In the liver an hydatid tumour invariably consists of a more or less dense and laminated fibrous globular sac, which is lined, internally, by a delicate albuminoid membrane, rendered tense by a limpid colourless fluid. This last is the parent sac or acephalocyst; it occasionally contains many smaller ones, which in their turn may contain others.

Echinococci are always to be found in human hydatids. The external fibrous sac is non-essential, and consists of altered liver structure; its thickness varies from two to ten lines, according to the age and situation of the hydatid. It is always roughly laminated, the external lamina being in close connection with the liver, the internal being in simple apposition with the albuminoid cyst, which constitutes the true hydatid. The microscope discovers in this external membrane, besides altered blood-vessels, and bile-ducts, much white fibrous tissue; there is a considerable vascular connection between the masses of this fibrous tissue and the surrounding liver structure, which is always more or less affected by the gradual pressure of the acephalocyst.

In very old and thick fibrous sacs, phenomena occur which interfere with the growth, and frequently with the life, of the hydatid which they cover. The innermost layers of their laminated structure become more and more removed from the pale of nutrition, and changes happen which appear to be independent of the vitality of the tissue; masses of crystals of a carbonate, and of cholesterine are found between the layers, and much exudation-matter in their substance and surrounding the blood-vessels which supply them. After a time these adventitious products increase to such a degree as to bring about changes in the acephalocyst itself, which gradually loses its fluid, and finally collapses, and after death is found beautifully folded up within the altered fibrous sac. The innermost layers of the fibrous sac are the most affected by the above-mentioned changes; and we find that large masses, of the consistence and aspect of putty, are occasionally thrown out from the free surface of the innermost lamina into the space between it and the acephalocyst, and the microscope discovers them to consist of crystals, oil globules, and exudation-bodies. In those subjects where the general nutrition is weak, especially in aged people, these deposits are most common. I have lately met with a fibrous sac of an hydatid, which in some spots was of osseous hardness.

From careful examination of the structures of the fibrous sacs of acephalocysts, I am inclined to believe that an atheromatous condition of the walls of the blood-vessels which supply them, invariably exists before the deposit of adventitious matter occurs. It would appear that, whenever from any cause the growth of the acephalocyst is stopped, and the office of numerous blood-vessels is of course at an end, that nature immediately commences operations which tend to their decadence and final obliteration. From some cause with which we are unacquainted, certainly not from an inflammatory one, but rather from some perversion of nutrition, a deposit of oil globules occurs beneath the internal lining membrane, and in the tissue of the middle coat of the smaller blood-vessels; cholesterine crystals are subsequently formed, and their calibre seriously interfered with. Soon, and especially if these deposits of atheroma exist to any great amount, the walls of the blood-vessels permit the transit of a considerable quantity of colourless blood-plasma; they have lost the power of antagonising the disposition to excessive exudation. Now, this exudation of plasma is totally different in its causation and subsequent development to that which owes its existence to inflammatory action; no tissues are formed from out of it, no cell-growth occurs; on the contrary, the plasma seems to lose the greater part of its vitality, its watery parts deposit crystals; oil, always typical of vital degeneracy, is found, and the only trace or evidence of life is in the abortive development of masses of exudation-bodies, which consist of myriads of very small and highly-refractile globules, in all probability nearly allied to fat, and at all events highly carbonaceous. These products of exudation press upon, and obliterate, many capillaries, and influence, in a secondary manner, the

* Continued from page 656 of last volume.

nutrition of the acephalocyst. It appears that in order that these changes should occur, either there must be some cause which prevents the acephalocyst assimilating the colourless blood-plasma by which it is nourished, and which necessarily retards its growth, or else that the powers of life, generally speaking, are on the wane. We find corresponding exudation from diseased vessels in the arcus senilis, in white softening of the brain in old people, and in the middle-aged like deposits occur from constitutional causes, and a perversion of the nutrition of the affected part. The exudation in the layers of large aneurisms is well known. The semi-transparent albuminoid membrane which lines the internal surface of the fibrous sac, is the true hydatid; it is not formed by altered liver structure, but consists of a tissue peculiar to itself, which, although nourished within, yet is not the product of the organism.

Whatever may be the size of the albuminoid membrane or acephalocyst, it is always, except when in its decadence, tense with fluid; it may or may not contain others like itself, and produces from the surrounding tissues, by the pressure incident to its growth, the fibrous sac. In colour the acephalocyst is generally of a blueish tint by transmitted, and of a pearly colour by reflected, light; it is in contact with the fibrous sac, but there is no organic connexion between them; it is perfectly extra-vascular, and yet is nourished by the exuded plasma of the capillaries of the lamina of the fibrous sac nearest to it.

The microscope reveals some very interesting facts in the structure of the acephalocyst; upon using a magnifying power of 600 diameters, or even much less, with the aid of a not too brilliant transmitted light, a thin section parallel to the diameter of the acephalocyst, and placed in water, presents a series of lines of most extraordinary delicacy, number, and regularity. These lines occur in pairs, the distance between the lines constituting the pair being very small, but the distance between the pair of lines on each side of any one is more considerable. So that commencing with the periphery and passing inwards, we find first of all, a single line, then a considerable distance, then a pair of lines, then a considerable distance and a pair of lines follows, and so on till the inner surface of the acephalocyst is reached. Here the structure ends by one line. No structure or lines of any kind, are to be seen in a section parallel to the circumference. By breaking up the first section mentioned, we discover that the acephalocyst consists of many scores of concentric layers, each layer is a cyst, and has a layer on its out and inside, the connexion is that of simple apposition only, but is a very close one. The two edges of each layer or lamina are closely applied to corresponding edges of other lamina, there results then a pair of lines, *i. e.*, the proximated edges of two laminae, then a space free from lines, of some considerable dimension, the structure of the lamina, and then two more lines, the one being the edge of the lamina and the other being the edge of another in apposition with it. The outside of the outermost lamina is in apposition with the inside of the fibrous sac, and its inside is in contact with the

outside of the next lamina, and so on; the outside of the innermost lamina of the acephalocyst, is in contact with the lamina next external to it, the inside is washed by the fluid of the interior. The laminae vary in number according to the age and size of the acephalocyst, which probably in its earliest stage of existence, simply consisted of one lamina. It appears to me that the layers are developed eccentrically, both because the innermost layers are in old acephalocysts, frequently the seat of a crystalline deposit, and because the two innermost layers perform an office which is peculiar to them, they having to do with the generation and development of the secondary acephalocysts, (those floating in the fluid of the acephalocyst) and of the echinococci.

The laminae are homogeneous in structure, no markings of any kind are to be found in them by the highest powers of the microscope; they are readily permeated by their nutrient fluid, but seem to resist the outward passage of the fluid contained in the centre of the acephalocyst. They would also appear to assimilate the albuminoid principles, and to allow the aqueous part of the blood plasma to pass into and mix with the central fluid. The external laminae are thicker than the most internal. When the acephalocyst contains fluid and echinococci alone, it is said to be simple, and when other cysts are found within it, we call it compound, and these cysts are said to be secondary. The secondary acephalocysts resemble the primary or containing cyst in structure, they are globular, except when mutual pressure causes them to take on some other form, and contain a fluid like that in which they float, echinococci and occasionally other cysts like themselves. Their contact with the parent cyst, is occasionally necessary for their existence by nutrition. The fluid of the acephalocyst is limpid, colourless, saline, and has a specific gravity which averages 1010, common salt, an animal matter, and, according to Dr. Budd, "a trace of other saline matters, probably all the salts of the blood not associated with its albumen, and water, enter into its composition. The fluid is generally in sufficient quantity to render the acephalocyst very tense; it is, however, liable to absorption, when the nutrition of the fibrous sac and of the acephalocyst suffers. Occasionally floating about in the fluid, but more frequently at the bottom of an hydatid sac, we find numerous ovoid, pearl-coloured bodies of the size of a very small pin's head. The microscope proves them to belong to the lowest tribe of entozoa, and to be, and merit the name of, echinococci.

Livio asserts that echinococci exist in all acephalocysts; and Dr. Budd and Mr. Busk have invariably met with them. Formerly their existence was supposed to be a matter of accident, and by some they were thought to be parasites of their enclosing cyst. To the naked eye they are just visible, and are of a pearly white colour; found attached to all parts of the internal surface of the true acephalocyst; they also float in great numbers in the fluid, which does not, however, appear to be their proper place, as the circlet of hooks with which each is furnished, indicates an existence more or less stationary and fixed.

Owen asserts, on the authority of Müller and Quekett, that the echinococcus hominis differs from those of the hog, in having suctorious cavities beneath the circlet of hooks, and visible when this is protruded. Dr. Budd says that these suckers have not been visible in any specimens he has examined, whether taken from human hydatids or from those of the sheep. I must add my humble testimony to the same effect. The well-known accuracy of the two first-mentioned observers, forces us to believe that there is more than one kind of echinococcus, viz., those having suctorious cavities, and those in which they are absent.

The following is Dr. Budd's description of the kind he and most others have seen:—"Echinococci are oval, transparent, colourless creatures, somewhat egg-shaped, and presenting under the microscope a distinct double outline. The anterior end has a depression or cleft, from which there is an evident canal or mouth, leading to a circlet of hooks which is within the body, and nearer the posterior end than the anterior. The posterior end has also a slight depression, which has now and then a fibrous pedicle attached to it. The creature is studded with globular bodies, which from their refracting light strongly, have under the microscope a strong dark outline, and a bright centre. They seem to be in the membrane of which the body is composed, or rather between the outer membrane and an interior solid body, and are at different depths from the object-glass, so that while some are clear under the microscope, others are indistinct."*

I have not detected any muscular or nervous structure in the creature, the circlet of hooks is retracted by the irritability or rather the contractile nature of the surrounding parts. After the death of these creatures, during decomposition, the circlet is protruded; whilst they are attached to the cyst-walls such is also the case; the stimulus of light, however, excites the contractility of the tissues which retract the circlet, and we see them with the row of hooks in the centre of their body. It would appear that the protruded state was the natural or usual one, and that only under peculiar circumstances, owing to an unusual stimulus, or before perfect development for instance, the circlet is retracted. The hooks or teeth of which the circlet is composed, are generally between twenty or thirty in number, they are hard, and resist decomposition, resembling somewhat the iron part of a pickaxe in shape, they have a sharp and a blunt extremity, and there is a tubercle in the centre. The teeth are fixed around a circular base, the sharp end points posteriorly, so that when the circlet is plunged into the albuminoid texture of the cyst, it is not very easily removed.

The echinococci have not been discovered elsewhere but in acephalocysts, primary or secondary; they appear in these last very shortly after they have become visible to the naked eye, and as the cyst increases in size, so do its inhabitants increase in number.

The organization of the echinococci is very simple, and their place is also very low in the animal scale; they

do not always present the refractile globules beneath the superficies. In one of the cases I have described there were none to be seen, but in considerable numbers, in the vicinity of several echinococci, there were globular cells, some refractile, others presenting a granular mass in their interior. In this case the fluid of the acephalocyst had become absorbed, a simple halitus remained, and numerous echinococci and these cells were found congregated wherever there was a slight excess of moisture. Now, as the acephalocyst must have been in the state described, for at least fifteen years, it becomes interesting to observe the great latent powers of life possessed by these entozoa, a peculiarity almost equalling that of the rotifera. The refractile globular bodies I believe to be ova, of whose future destiny I shall presently treat.

[To be continued.]

DEATH CAUSED BY THE INHALATION OF CHLOROFORM.

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J. S. aged 21, a young man studying for the medical profession, of a reserved disposition, but at times immoderately cheerful. Has enjoyed tolerable health throughout life, although suffering very frequently from toothache or tic doloreux. A week previous to his death he sustained a great loss in the death of his master; this threw into his hands a more than usual amount of labour, and he appeared somewhat anxious as to the course he should pursue in carrying out his studies, but there was no evidence of any remarkable depression of spirits. He had been accustomed at various times, when he suffered from toothache, to inhale chloroform on a pocket handkerchief, but in the presence of the servant man, to whom he gave instructions to arouse him, if stupor continued beyond a certain time; he had also been accustomed to take small quantities of opium at bed-time, being subject to restlessness and disturbed sleep.

On the 23rd of June he followed his customary avocations, and in the evening went to church, and from thence accompanied a friend to supper. Although he complained of not being in his usual health, still there was nothing to attract attention, and he parted from his friend cheerfully, promising to meet him the following evening. He had partaken, for his supper, of veal and tart, with a little sherry, and retired to rest at half-past eleven. At a quarter to twelve, a gentleman, (Mr. R.,) who occupied a bed in the same room as the deceased, retired to rest. The deceased had extinguished his light, and appeared to Mr. R. to be in a sound sleep. The latter got into bed without taking further notice, and after a period of fifteen minutes, he heard a moan, which he regarded as nothing unnatural, or probably, he thought, the result of dreaming, and fell

* Budd on Diseases of the Liver, p. 339