On hydatids of the lung : their diagnosis, prognosis, and treatment, and observations on their relations to pulmonary consumption, and other diseases of the chest / by S. Dougan Bird.

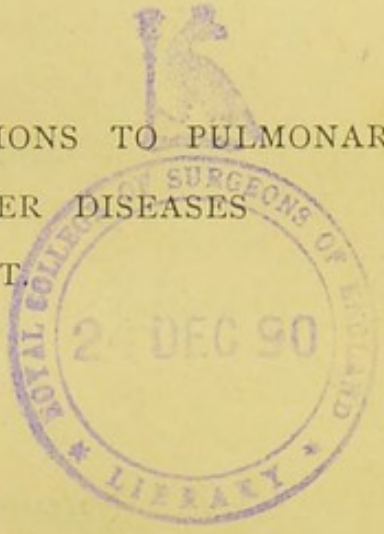
On Hydatids of the Lung

(2

Their Diagnosis, Prognosis, and Treatment,

AND

OBSERVATIONS ON THEIR RELATIONS TO PULMONARY CONSUMPTION, AND OTHER DISEASES OF THE CHEST.



BY

S. DOUGAN BIRD, M.D., L.R.C.P., &c.

PHYSICIAN TO THE ALFRED HOSPITAL,
AND LECTURER ON MATERIA MEDICA AND THERAPEUTICS
IN THE UNIVERSITY OF MELBOURNE.

"*Unbidden guests.*"—SHAKESPEARE.

Melbourne:
SAMUEL MULLEN, 55 & 57 COLLINS STREET EAST,
1874.

MELBOURNE:

M'CARRON, BIRD AND CO., PRINTERS

37 FLINDERS LANE WEST.

TO

W. H. WALSHE, M.D., F.R.C.P.,

TO WHOSE WORK

ON DISEASES OF THE LUNGS

ALL SUBSEQUENT WRITERS ARE INDEBTED

BOTH FOR

ACCURATE AND PRACTICAL INFORMATION,

AND FOR

A MODEL OF SCIENTIFIC STYLE.

PREFACE.

THIS Work is the result of the experience of thirteen years of practice in this colony, and is a *resumé* of two Papers which were read before the Medical Society of Victoria, and published in *The Australian Medical Journal* in March, 1871, and October, 1873, together with additional cases and further observations on the results of treatment. The author may lay claim to originality thus far, that specific rules for the Physical Diagnosis of the unbroken Hydatid Cyst within the chest wall are not to be found elsewhere.

ON HYDATIDS OF THE LUNG.

THE subject of hydatid cysts in the lungs is one of great interest to Australian practitioners, both from the frequency with which the disease is met with, especially in Victoria, and also from the fact that its successful treatment is still to some a problem or a subject of dispute, while its diagnosis often requires from all both skill, acumen, and experience. Indeed it is upon personal observation alone that we can rely for the recognition and cure of this parasite, as it is probable that any medical man in considerable practice in Victoria has had the opportunity of seeing many score of times more cases than any of the leading authorities on chest diseases in Europe.

The question of the origination of hydatid in the human body, though a question of vast interest, will not be entered upon here, as it has already been exhaustively treated by Cobbold, Kuchenmeister, and other entozoologists, who have proved that "The hydatid is the larva of the *Tænia echinococcus* of the dog, the eggs of which, accidentally swallowed

in the food or water by man, sheep and some other animals, become developed into the cystic parasite."* The object of this work is to consider specially the means at our disposal for recognising with exactness the existence and locality of hydatid cysts within the chest wall, especially while the parasite is still in its integral state, and the sputa afford no assistance in the diagnosis from other morbid conditions presenting physical signs somewhat similar. Next, the curative treatment of such cysts, whether before or after their rupture and partial evacuation into the bronchial tubes, by operative measures, and medicines given by the mouth or otherwise; lastly, the prognosis or probable future of persons so affected, and relations with other diseases, more especially with pulmonary tubercle.

Diagnosis.—There can be no doubt that the only absolute evidence of the existence of hydatid in the lung, whether originating there, or in process of passage from the liver, is by the appearance in the sputa of the characteristic cysts or portions of them, or fragments of the hooklets of echinococci; but this does not happen till what we may call the second stage of the disease, when the entozoon has begun to die and be expelled from the body. Such an occurrence is, of course, positively distinctive,

* *Vide* Mr. MacGillivray's paper in the *Medical Journal*, in March, 1867, where may also be found an interesting account of the special facilities afforded by Australian mining and pastoral life for the contracting of hydatid disease, together with a record of thirty-eight cases in various parts of the body.

and settles the case at once without any difficulty or trouble beyond the use of a quarter or even half inch lens. But a personal microscopic examination should always be made. Patients have often described their sputa to me as containing "things exactly like the skins of grapes," which on examination proved to be only flakes of tough and hardened mucus. But when the cyst is still entire, and no definite information can be got from the examination of the sputa, we must fall back upon a systematic physical examination of the chest, by which, aided in some cases, but not all, by the general symptoms, a positive diagnosis may be formed; a successive exclusion of morbid states within the thorax other than hydatid, which may give rise to a group of signs more or less resembling it, being the safest and most scientific method of procedure. When doubt still exists, an exploratory puncture is not only allowable, but may be looked upon as necessary, (for reasons which will be given *in extenso* farther on), such an operation not only setting the diagnosis beyond doubt, but being the first step in curative treatment. In this colony we have become so familiar with the existence of hydatid cysts in the viscera, discovered during life or found unexpectedly *post mortem*, that we are always justified in concluding that an otherwise unexplained internal tumour, especially if it be painless, is in all probability a hydatid.

We must now consider the systematic diagnosis of the unbroken hydatid cyst within the chest wall, and probably imbedded in the lung substance. First we will note the *General symptoms.*

When the cyst is still of moderate size, and therefore does not interfere much with the surrounding structures, it *may* cause little or no disturbance—in fact, may remain unnoticed by the patient for a considerable period, particularly if, as often happens, he has a capacious, well-developed chest, and lives an active open-air life. I have frequently seen cases where a portion of the lung, amounting to certainly not less than one-fourth or even one-third of its bulk, was nullified for breathing purposes by the size and pressure of a hydatid cyst, though the patient complained but little of shortness of breath. The accommodating power of healthy lung tissue to increased work is indeed most wonderful when there is no constitutional mischief at work, as in these cases when uncomplicated. But as the cyst enlarges, which it inevitably does if not interfered with, a train of general symptoms in most cases ensues which are the result of *pressure*, or *irritation*, or both of these. *Dispnœa and duskiness of the skin* may be observed more or less marked according to the size, locality, and rapidity of increase of the tumour, and the capacity and mobility of the individual thorax. In women, if the cyst occurs in the upper lobes, these last symptoms are usually very

prominent. *A more or less phthisical-looking cachexia*, even when the case is not complicated with tubercle, is often noticed, with *progressive loss of flesh;* and in several instances I have seen *well-developed clubbing of the finger-ends and incurvation of the nails*, which gradually disappeared with the other symptoms after the hydatid had been tapped and the cure was complete. *Cough* nearly always occurs, and varies in character in the early stages, but when the cyst is large is usually of a violent and paroxysmal character, especially when the disease is situated near the base of the lung. The *expectoration* at first is simple mucus, which may or may not be stained with blood; as the case progresses it becomes more or less purulent. Profuse hæmoptysis is seldom or never noticed, but I have seen several ounces at a time in an aggravated case when tapping was too long delayed; it generally ceases altogether after operation or spontaneous rupture, being the result of pressure on the pulmonary veins, though in the latter case a good deal of blood may be spat at the time of rupture, and the subsequent purulent sputa and portions of cyst are nearly always stained with it. Should the last group of symptoms—dyspnœa, deficient aeration, wasting, clubbed fingers, cough, and expectoration—remain persistently after the death and expulsion of the hydatid, the probability is that the case is complicated with tubercle, either coincident with the origination of the

cyst, or called from latency into activity and localised by its pressure on the lung substance and pulmonary vessels and air tubes, and the consequent deficient oxygenation of the blood. This part of the subject will be considered more fully hereafter. *Visible venous engorgement* from pressure is in my experience rare, and often forms the distinguishing characteristic of intra-thoracic cancer from hydatid.

Such, then, are the general symptoms observable in cases of unbroken hydatid cysts within the lung, and no doubt they mimic with tolerable exactitude those of ordinary cases of phthisis, and it is not till we come to strip our patient, and observe the *physical signs* by auscultation and percussion, that we can form a reliable diagnosis. To give the reader an idea of how little has been hitherto done in this field, it is only necessary to quote a few of the best and most recent European authorities on diseases of the lungs. Dr. Walshe (fourth edition, 1871) says more on the subject than any other writer:—

"There may be a total deficiency of subjective symptoms, the disease in fact being latent, provided the cyst be of moderate size, and have not irritated the adjacent tissues. But the rule is that symptoms essentially phthisical in character occur—cough, dyspnœa, more or less severe chest pain, and inability to lie on one side; expectoration, catarrhal or bloody, followed by that of fragments of their walls, or of perfect acephalocysts of various sizes, *giving at length the special character to the disease.* . . . So long as the sac remains unbroken, the physical signs simply indicate solidification. . . . The diagnosis from tubercular phthisis

will in many cases probably prove impossible unless acephalocysts or echinococci, in fragments or whole, be discoverable in the sputa."

So that, in point of fact, Dr. Walshe, who has evidently had more experience of this disease than any other European authority, gives no means of distinguishing solidification of the lung from unbroken hydatid cyst, and practically rules that the sputa are the only signs which give a special character to the disease.

Fuller says nothing on the subject of diagnosis before the self-evident expectoration takes place, nor does Watson. Aitken nearly ignores the disease altogether. Tanner (sixth edition, 1869) only says, under the head of intra-thoracic tumours, "Primary hydatid disease of the lung or of the mediastinal structures is hardly ever met with. In cases where hydatids or portions of their cystic membranes are expectorated, the original seat of the parasitic growth has been the liver—at least, this has been the case with the great majority of instances." Laennec, quoted by Walshe (p. 529, op. cit.), mentions a case where hydatids occupied the pulmonary veins, but apparently were not discovered during life. Andral found a cyst in a patient's lung, *post mortem*, where "exaggerated respiration inexplicable during life" had existed. Dr. Hjaltalin, in the report on Iceland, where hydatid is endemic, in Dobell's "Progress of Medicine" for 1870, says these cysts are "most

common in the liver and the lungs," but does not even hint at diagnosis in the latter case.

What, then, are the physical signs from which we may infer with any degree of certainty the existence of a still unbroken hydatid cyst within the thoracic cavity? They must vary very much according to the *size* and *locality* of the sac. And first, it will here be convenient to consider the relative frequency with which hydatids occur in different parts of the thorax. Australian experience shows that they are found in this part of the body next in frequency to the liver. My own experience of thoracic hydatid comprises between ninety and a hundred cases; of these, one was in the mediastinum, one in the cavity of the pleura, two in that of the pericardium, and the rest were imbedded in the lung substance. As Dr. Walshe observes, they "exhibit a preference for the bases of the lungs, and when originating near the root and enlarging without rupture, generally approach the chest wall in the lateral region; but they may be found in any part of one lung, or in both—there may be a single cyst, or more than one in different stages of development." The fact of a hydatid existing in the upper lobe or apex of a lung will of course favour the resemblance of the symptoms to those of phthisis—in the lower lobe, to pleuritic effusion or some solid tumour. The *size* of the sac is limited only by the capacity of the chest, the compressibility of the lung and absence of

pleuritic adhesions, and the amount of disturbance to which the entozoon has been subjected by cough, external shocks as from falls, &c., and by operative interference and internal remedies. I have tapped cysts holding three or four pints of fluid, by which the lung has been compressed almost to the same extent as occurs in cases of empyema. But these are rare in Victoria, as the nature of the disease is generally recognised and treatment employed at an earlier stage. From eight to sixteen ounces of fluid is about the average capacity when they should be diagnosed with certainty and operated upon.

Furthermore, the nature and density of the cyst, and its influence on the lung tissue in which it is embedded, are most important pathological points in guiding us to a diagnosis. Dr. Walshe (who is really the only European or, I may say, extra Australian writer who appears to know anything definite on the subject under consideration) says:—

"The natural history of the echinococcus, of the acephalocysts it inhabits, and of the mother cyst, is essentially the same in this organ as in their greatly more common seat, the liver. There is this difference, however, that the mother acephalocyst sometimes lies in direct contact with the lung texture, and unlike that of the liver, is rarely surrounded with a thick shell or cyst-like wall of pseudo areolar tissue. The sac rarely attains great size. . . . Acephalocysts may be found in the midst of perfectly healthy tissue; this is very rare."

My own experience accords rather with the earlier portion of this extract, namely, that the development

of the cyst is much the same as in the liver, modified only by the greater elasticity and extensibility of the lung tissue. I have seen old lung cysts with as thick a shell as any in the liver or elsewhere. All depends on age and non-interference. Young subjects doubtless are tender and fragile, and the external investing cyst is adventitious and the result of sub-inflammatory exudation from the lung tissue in immediate contact with it. I have seen small cysts, not larger than a walnut or small apple, in the dead body, in immediate contact with the lung tissue; but beyond this size the investing shell always commences to form.

The condition of the lung tissue surrounding the cyst is a most important subject in aiding us to diagnosis. So far from the undisturbed cyst being rarely embedded in perfectly healthy lung tissue, my experience is that it usually is so; and this explains the wonderful success of operations on the lung, which do not require to be repeated nearly so often as in the liver. The small amount of irritation caused by a slowly-enlarging cyst in the lung, and the very trifling modification in the breath sounds in the immediate neighbourhood which may be caused by it are, as we shall see presently, most important negative signs in the diagnostics of hydatid. I have very often in the dead-house found cysts, holding from one to three ounces of fluid, in perfectly healthy lung tissue. In such, the mother acephalocyst was delicate and fra-

gile, and had as yet no investing sac. Large old cysts, which have generally undergone spontaneous rupture, often have a dense leathery sac, and the surrounding lung tissue is more or less in a state of chronic hepatization; but these we are not at present considering. I have fortunately never had the opportunity of examining the lung of a patient after an operation on the hitherto untouched cyst, as all the cases I have seen have recovered, whether in the practice of others or my own; but the complete restoration of the healthy breath sound in the locality of the tumour, after a shorter or longer period, negatives the possibility of any change in the lung tissue further than that temporarily caused by mechanical pressure.

The conditions then, which we have in these cases to bring about signs recognisable by the usual methods of physical diagnosis, are these, supposing the case to be uncomplicated and the cyst of moderate size—in fact, an average case suitable for immediate tapping; a cyst, embedded in healthy lung tissue, more or less globular in form, containing fluid, slowly enlarging towards the periphery of the chest as affording the least resistance. Dr. Walshe says, "So long as a sac remains unbroken, the physical signs simply indicate solidification; the quantity of respiration sound will vary with the existence or absence of pressure on an important bronchus." Now, with all deference to the opinion of so high an

authority, I must assert that this is in no way borne out by my own observation. When the cyst is still small, and it consequently exerts little or no pressure on any important bronchus or bloodvessel, the signs are indeed simply *nil.* But as it enlarges, the pressure being always centrifugal, only a layer of lung mechanically squeezed and emptied of blood and air, and the two layers of pleura intervene between it and the chest wall. The result of this in physical signs is, therefore, a nullity of respiration sound, no air whatever entering the compressed lung, though beyond the clearly defined margin of the cyst the breath sounds are at once normal. The signs of consolidation are absent, while the negative and positive signs of fluid are prominent even to fluctuation, which may sometimes be palpably detected in thin persons long before any bulging of the intercostal spaces takes place, especially if the tension of the cyst is not excessive. The compressibility of a layer of lung tissue by the gradual enlargement of a cyst of this kind is very remarkable, and the practical results of such pressure on its future, if too long continued, most important. It is very rare to find any interval between an absence of physical signs and the actual (to all intents and purposes, as explained above) impingement of the sac on the chest wall. It is quite possible, however, that the reason of this may be that patients do not generally apply till this last state of things

comes about. Of course, as Dr. Walshe describes, if breakage occurs into a bronchus, a set of symptoms and physical signs ensues of a totally different character.

The following, then, are the physical signs observable in a case of hydatid cyst of the lung which has progressed to the capacity of a pint or more of fluid, without interference from within or without:—Expansion more or less deficient on the affected side; mensuration but little affected; absolute dulness on percussion, with absence of respiratory sounds over a space of the chest-wall not smaller than the palm of the hand, generally in the lateral or infra-clavicular regions, with absence of vocal fremitus in most cases. This dull space always presents a rounded outline—is limited by a line of demarcation so exact that it can be mapped out with pen and ink, and is unaltered by position. Beyond the boundary line percussion is clear and normal. The respiratory sounds, though inaudible over the dull surface, commence immediately beyond the pen line, and though probably rather harsh and puerile in character, are indicative of healthy lung tissue. Besides this, the distinctive vibratile thrill of fluid may sometimes, but not always, be detected by percussion over the intercostal spaces —a perfect exemplification of "peripheric fluctuation." The percussion and respiratory sounds over the rest of the lung are probably not much altered. A localised pleuritic effusion, confined by adhesions,

would fulfil the above physical signs; but such a state of things is very rare, and would probably be preceded by a history of pain and febrile symptoms. In fact, one is reduced to the conclusion that there is a sac containing fluid within the chest-wall, slowly enlarging, causing little or no pain or local irritation, not the result of any inflammatory effusion, but foreign to, though growing in, the thoracic viscera. A hydatid cyst alone combines all these characters, so that the diagnosis may be reduced almost to a certainty.

The reader must bear in mind that all this refers only to a cyst of *moderate size.* Should the disease progress without interference until the pressure on the surrounding tissues is more than they can bear, or if the enlargement takes place much more rapidly than usual, very serious effects are produced, which greatly complicate the diagnosis. Patches of pneumonia, with rusty or bloody sputa, sometimes even gangrene, obstinate bronchitic symptoms limited to the affected side, occasionally effusion into the pleura, or perforation of that membrane or even the diaphragm, as related by Laennec. But such are rare in this colony, as the disease is almost always recognised at an earlier stage. When a cyst has attained a large size without relief, and degeneration of its wall ensues, with rupture into a bronchus, the symptoms become distressing indeed, though the diagnosis is unmistakable. Intense prostration, hectic, the ceaseless

expectoration of blood, pus and half putrid acephalocysts of excessive fœtor, and often portions of gangrenous lung tissue, go on sometimes for months, till the patient in most cases sinks from exhaustion. The physical signs in such a case are those of pulmonary abscess, or large tubercular vomica, which need not be enumerated.

I have recently had under my care, in the Alfred Hospital, a case in which the ruptured cyst and the still untouched and growing animal coexisted in the same lung, presenting in each case the characteristic physical signs in a very instructive and probably unique manner. The patient was a woman thirty-six years of age, in previous good health, and who had lived in one of the immediate suburbs of Melbourne for many years. In the lower lobe of the left lung the outline of a cyst of moderate size could be mapped out very accurately, as described above. It was nearly circular, the diameter being about four and a-half inches, the locality the infra-axillary region. Clear percussion and respiratory sounds were audible all round the line of demarcation as usual. In the upper scapular region, and for about three fingers' breadth below the spine of the scapula, were the gurgling and cavernous sounds of cavity, and the patient was expectorating the characteristic hydatid sputa. This cyst appeared to have been ruptured by an effort of coughing some few days before admission, and, as the symptoms were not

urgent and the patient was advanced in pregnancy, the usual internal remedies only were given, any operative interference being postponed till after her confinement. Both these cysts were comparatively small in size, and the patient's general health was not much affected. The distinction between cases of hydatid expectoration from cysts in the lung, from those where a liver hydatid bursts into the lung, is generally easy, from the previous hepatic symptoms and the staining of the sputa with bile.

The diseases most likely to be mistaken for hydatid of the lung are:—

(1). *A cyst in the liver high up and far back on its convex surface* may not be distinguishable from one in the base of the lung immediately over the liver, or one in the cavity of the pleura. I treated such a case in the Alfred Hospital, in May, 1871. The tumour was diagnosed as hepatic, and I introduced the trocar under the cartilages of the right ribs, in an upward and backward direction. More than four pints of the usual clear fluid escaped. The operation had to be repeated, and the patient died suddenly of hydatid of the heart. The liver was found to be small and healthy, and had not been wounded by the trocar. The acephalocyst had occupied the cavity of the pleura.*

* See *Medical Times and Gazette*, August 9th, 1873. The condition of the heart, as described by Professor Halford, is interesting, and worthy of republication:—"Hydatid cysts occupy the whole of the outer surface of the heart, extending from the upper surface of the auricles, surrounding the large

(2). *Phthisis.* Dr. Walshe observes that the diagnosis from phthisis is in many cases impossible, unless the sputa are characteristic of hydatid. Such would be the case when the cyst is only of moderate size, and does not impinge on the chest wall so as to give the physical signs of fluid; while at the same time general symptoms, common to phthisis and other wasting diseases, may be going on. But great care must be taken not to pronounce too authoritatively as to the diagnosis of one or the other disease, for they very commonly coexist, the tubercular deposit being a sequence of long continued pressure on the lung—for obstructed circulation, whether of air or blood, of course favours both the origination and deposit of tubercle in persons predisposed to that class of disease. I have in many instances seen the characteristic phthisical aspect, clubbed fingers and incurved nails, and genuine tubercular crackle, gradually supervene on a case of simple hydatid, and the latter disease appear to retire into the background, while the patient ran through the usual course of consumption. And here I must insist on the necessity for the early diagnosis and treatment of hydatid in the lung, in persons predisposed to tubercle, before the cyst shall

vessels, where some of them are of the size of small oranges. They seem to me to have arisen in the visceral layer of the pericardium, not encroaching much into the muscular substance. The cavities of the heart are untouched by the parasites. The visceral layer of the pericardium is much thickened, and studded with little cysts. It may be said that the echinococci occupied the cavity of the pericardium."

have time to grow large, and, by its pressure on the lung tissue, bring about that chronic engorgement which is most likely to offer a *locus standi* to constitutional tendencies which are only waiting, so to speak, for such an opportunity. I will here instance two cases illustrative of this. A young lady of highly nervous temperament, and exactly the subject for active tuberculous degeneration, to which she had also an hereditary title, was brought to me about eighteen months ago with an unmistakeable hydatid cyst in the upper lobe of the left lung. It was indolent, but slowly enlarging; painless, like most hydatids, and causing but few symptoms. I urgently pressed on the parents the necessity of at once tapping the cyst—not that it then threatened life in any way, but that the constant and gradually increasing pressure on the lung tissue must eventually cause local mischief, and wake up the patient's latent constitutional tendencies. The advice was wisely taken, the cyst was tapped, the usual internal remedies given, and the lady is now fat and well. A similar case in a young man, twenty-two years of age, in which the patient declined operation, gradually developed phthisis, which I am convinced might have been averted, had tapping been resorted to in time. The fact that the stasis of the blood in the pulmonary capillaries and minute veins, which is the necessary result of continuous pressure, must favour the deposit of any morbid element which may be hatching in the consti-

tution, will hardly be denied; and our yearly recurring experience of the harmlessness of tapping these cysts often renders such a proceeding an imperative necessity to the practitioner as a prophylactic.

(3). Localised pleuritic effusion, probably purulent, an uncommon condition, but occasionally met with, will give physical signs identical with those of a large hydatid cyst impinging on or originating near the chest wall. I recently saw two cases with Mr. Hewlett, which turned out to be pleuritic on tapping, though the physical signs exactly corresponded with those described as characteristic of hydatid. Curiously enough, both were children of about the same age, living near each other; and in both the respiratory murmur and percussion sounds were normal below and above the level of the dulness, which corresponded to about the area of the palm of the hand between the axillary folds. There was no distinct history of pleuritic inflammation, but the fluid, which was sero-purulent, showed none of the microscopic signs of hydatid.

(4). Circumscribed abscess of the lung may present most of the general features of hydatid; but the condition of the neighbouring lung tissue, and the previous general symptoms, will usually render the distinction easy.

(5). Mediastinal tumour or abscess may be very difficult to distinguish from hydatid. I have seen a cyst in the anterior mediastinum present symptoms

so similar to chronic pericardial effusion as to be mistaken for it by several competent observers.

(6). A solid tumour of the lung, generally malignant, may possibly somewhat mimic the physical signs of hydatid; but the previous history and venous engorgement which usually accompany such cases must be looked to. In any doubtful case, a puncture with the fine trocar can do no harm.

Treatment.—This naturally resolves itself into *operative* and *medicinal.* And here, again, we must more than ever rely on our colonial experience, for European authorities hardly do more than hint at any remedial measure in lung hydatid. For example, Dr. Walshe: "Of the specific treatment of pulmonary acephalocysts, or of those otherwise localised, little is known. Chloride of sodium and iodide of potassium, presumedly deleterious to echinococcal life, should be tried. . . . Should the external swelling appear, it seems advisable to open it. Mr. Freteau (*Ann. de Montpelier*, t. xi.), sixty years ago, opened a sac in the right dorsal region. Upwards of 400 fragments of hydatids were discharged by the wound, and fifty expectorated. The patient, a male, recovered." Dr. Fuller says that, "If left alone, half the cases will probably survive. . . Treatment is of little avail in cases of intra-thoracic hydatid. We know of no means of destroying the acephalocyst, or ensuring its expulsion." Dr. Tanner does not mention treatment at all, in his short notice of this affec-

tion under the head of intra-thoracic tumours; nor do the Icelandic writers. All other European writers on diseases of the lungs, if they touch the subject at all, state that treatment is not of any avail. It was not till 1873, after many similar cases had been published in the *Australian Medical Journal*, over a period of ten or eleven years, that Dr. Dieulafoy, in his work on "Pneumatic Aspiration of Morbid Fluids," mentioned hydatid of the lung as a condition in which the needle might be introduced for the purpose of deciding a diagnosis. He mentions no such case, however, but one, in which he had already performed many tappings in the liver. On October 3rd, 1871, in the Beaujon hospital, he noticed that "the dulness, before observed on the right side, increased sensibly; there was diminution of the thoracic vibrations, without ægophony. There was no doubt that a fluid collection existed at this spot; but of what nature? A puncture was made with needle No. 2 in the sixth right intercostal space, a little behind the axilla, and I drew off 800 grammes of a fluid as limpid as that which was drawn off from the first hepatic cyst. Had we to do with a cyst of the pleura, or of the upper surface of the liver?"* Pneumo-thorax, great dyspnœa, and incessant cough followed, with the expectoration of bloody and purulent mucus mixed with the *debris*

* A Treatise on the Pneumatic Aspiration of Morbid Fluids, by Dr. Georges Dieulafoy, Gold Medallist of the Hospitals of Paris (*London:* Smith, Elder and Co., 1873), p, 79.

of false membranes. The case ultimately made a complete recovery. This is the only instance for sixty years that I have been able to find in European medical history of any operation suggested or attempted on an intra-thoracic hydatid cyst, both operators being Frenchmen. The case is evidently considered unique and extraordinary, though familiar as a household word to ourselves.*

The only treatments by operation that we propose to consider as appropriate to hydatid of the lung, are, immediate tapping with the fine trocar as soon as the diagnosis is determined on, while the cyst is still entire and undisturbed; and, in exceptional cases of old standing, when there is a thick adventitious external wall to the cyst, which is generally closely adherent to the ribs, free incision.

For tapping the lung, the trocar should be not

* It may here be interesting to European readers, and an act of justice to Victorian practitioners, to set at rest any doubts as to the priority of the cure of hydatids in the liver by immediately tapping with a fine trocar instead of "painful applications of caustic, followed by gaping wounds and injections of every kind," as described by Dieulafoy in 1873. On February 5th, 1861, Dr. R. F. Hudson, now of Ballarat, but then resident physician to the Melbourne Hospital, read a paper before the Medical Society of Victoria, which appeared in the April number of the *Australian Medical Journal* for the same year, on the subject of Hydatid. After calling attention to the rapid increase of this disease in the colony, and giving details of cases, and views of the etiology and pathology of the disease, he recounts the treatment in vogue in Europe by the injection of iodine, electricity, and caustics, and sums up his own views on the subject as follows:—"My own mode is tapping with a very fine trocar and canula 1/64 inch in diameter, and the subsequent use of iodide of potassium. These have produced such beneficial results as perfectly satisfy me." I arrived in Melbourne from England myself the day before this paper was read, and on going round the Hospital with Dr. Motherwell, one of the honorary physicians,

less than six inches in length, and of the smallest diameter that is made, always providing that it is strong enough to bear the strain of a firm pressure. The point of the stylet must be very sharp, so as to pierce at once through any adhesion of the pleura, or a cyst unusually tough. The length of the instrument is an important item, as the cyst may be deeply seated, or the chest wall thickly covered. The needles sold to be used with the aspirator by European instrument makers would not reach many cysts in the lung and liver which are tapped in this country. Having decided on the diagnosis, the portion of the cyst presumedly nearest the surface should generally be selected, and this will in most cases be near its centre. A very small incision in the skin is advisable to save space and avoid any unnecessary strain on the long fine trocar, which should be fairly introduced with a firm and fearless

and Dr. Hudson, was shown several cases treated as above by these gentlemen, and shortly afterwards it appears to have been generally adopted by the profession in Victoria. Whether the operation was practised by others previous to Dr. Hudson's paper it is difficult to ascertain, but it is the first published mention of such a proceeding. By the way, the use of the aspirator does not seem to produce any better results in the liver than simple tapping, the sac often refills in either case, and if its contents degenerate a large trocar is required, and the peculiarities of this addition to the fine canula are rendered inoperative. I have only heard of two cases where fatal results followed tapping hydatid of the liver with the fine trocar. In one the stylet merely pricked the cyst, being too short to allow the canula to enter it, and fatal jaundice followed; in the other the evacuated fluid was tinged with bile (by no means an uncommon occurrence); no symptoms followed for twenty-four hours, when peritonitis came on and caused death in two days. Such results are exceedingly rare, probably not more than ½ per cent. of cases operated on for the first time.

hand till fluid is reached. Of course, care must be taken to avoid the neighbourhood of the main vessels and bronchi, but, with this exception, I believe the length, strength, and sharpness of the instrument, if it be at the same time as fine as possible, is of more importance than the locality at which it is introduced. I have several times seen in my own practice and that of other Victorian medical men, exploratory punctures made in several localities with the view of reaching a supposed hydatid of the lung, the last of which only has reached it; excellent results have followed, and not even a local soreness has been felt at the site of the other wounds in the lung.

The question now arises as to the utility of the aspirator in these cases. They always do so well if tapped early enough with the simple trocar and canula, that the evidence in its favour is not very positive. I have seen it used on two occasions: both cases did well as usual, but recovery was not quicker than if the ordinary instrument without the suction apparatus had been used. Theoretically, however, the more complete emptying of the cyst, and possibly its dislocation from its nidus, should aid in destroying the vitality of the parasite.* If the

* The sudden disruption of the cyst from its bed by the forcible suction power of the aspirator is not, however, devoid of danger. Since the above was written, Dr. Macgillivray has described to me a case in which this instrument so dislocated the cyst that in an effort of coughing it became impacted in a large bronchus, and death resulted.

cyst is tapped early, and has not been much irritated or interfered with till then, the limpid fluid will flow freely through the fine canula, and the expansion of the lung, which commences immediately the pressure of the fluid is removed, is generally sufficient to empty the sac, especially if aided by efforts at coughing, which indeed are generally involuntary.

The cyst being successfully tapped and emptied, we must consider the best means of keeping it from refilling. It has been proposed—(1). To retain the canula or a piece of gum elastic catheter in the cyst. Such a proceeding may be well enough in old cases, as we shall see presently, but is quite inappropriate to those we are now considering, as it adds a decidedly serious operation to a comparatively safe and harmless one. (2). To inject some irritating or parasiticide fluid, such as tincture of iodine, or kamela. To this the same objections apply. A far safer, and in my experience an uniformly successful treatment, is to employ internal remedies, the bromide or iodide of potassium and kamela, and to tap again with the fine trocar if the cyst refills, but this will be exceptional. I have seen many cases—so many, indeed, that I have long ago ceased to take special notes of them—in which, in both liver and lung, a single tapping was sufficient, and the prolonged after-administration of these remedies completed a permanent cure. I have never had the opportunity of examining a case of hydatid of the

lung after death which had been tapped, but some years ago was present at the autopsy of a lady whom I had seen tapped by Mr. Fitzgerald for hydatid in the liver three years before to the extent of four or five pints of fluid. The above medical treatment was persevered in for some months, and the tumour never recurred; three years afterwards, however, she died of apoplexy. The sac was found far back in the right lobe of the liver, dense, leathery and shrivelled, without a drop of fluid in it.

In the operation of tapping the unbroken cyst in the lung with the fine trocar, there are two circumstances that I have observed to occur, which may considerably embarrass a practitioner who is not much used to these cases. For example, being quite assured of the accuracy of one's diagnosis, the trocar is introduced to a requisite depth, but only a few drops, or perhaps an ounce or two of fluid flows from a cyst which you are convinced, from its outline, mapped on the surface, must hold a pint or two; the physical signs being meantime unaltered. The explanation of such failure is doubtless that the cyst has progressed to maturity quite unhindered, and is stuffed quite full of daughter-cysts. I am accustomed in such cases to re-introduce the stylet, and endeavour with its sharp point to stir up and break down the smaller cysts as much as possible. This is frequently followed by cough and rupture, and the death and expectoration of the parasite, but

if not, a second operation should be performed within a few days, the bromide and kamela being sedulously given in the meantime. Echinococcus finding the hitherto even tenor of his way thus rudely and persistently interfered with, will, in most cases, give up the struggle for existence. The other complication in the operation is sufficiently alarming, though rarely met with. This is the unavoidable piercing of a small bronchus by the stylet, in its passage through the condensed layer of lung-tissue. At first, all goes on as usual, and the fluid flows freely through the trocar; but as the pressure is removed, the bronchus becomes pervious, and violent paroxysmal cough comes on. I have seen only two such cases, one in the Alfred Hospital in the case of a servant girl, in whom I tapped a cyst of considerable size below the clavicle. Only about five ounces of fluid had flowed from the canula, when the cyst gave way into a bronchus, and violent cough came on, each expiratory effort being followed by a gush of hydatid fluid and portions of cyst. This went on for many hours, till the patient was very much exhausted, but the cough could not be stopped, for very obvious reasons. The separation and expulsion of the whole parasite occupied many weeks; suppuration took place to an unusual extent, with complete anorexia and rapid wasting, the gangrenous odour of the sputa being with difficulty overcome by antiseptic inhalations. The case ultimately did well, and the

girl came to show herself to me not long since, having got fat and strong. The breath-sounds are perfect all over the lung, a very remarkable fact which I have noticed in several of these cases, although from the great interference with the lung necessitated by the size of the cyst, a complete recovery could hardly be predicted with probability. The other case was a patient of Mr. Fitzgerald, a powerful, healthy man of about thirty-eight, in whom a large cyst of the left lung had been growing for some months. After consultation, he was tapped by that gentleman between the fourth and fifth rib, midway between the folds of the axilla, that being about the centre of the cyst. After a few ounces of the usual clear fluid had flowed, most alarming symptoms came on, paroxysmal cough of a most violent character, with gushes of hydatid fluid from the mouth. The flow through the canula having ceased, it was removed. At each fit of coughing the man's countenance became livid, and the external veins about the throat and chest gorged. Meanwhile the affected side was distended and motionless, pneumo-thorax having evidently taken place. For three days the patient was unable to alter his position, half reclining on the affected side, the whole breathing being carried on by the other lung. The symptoms gradually subsided, the whole of the echinococcus was spit up, and the man sailed for England in about six weeks in excellent health.

These accidents, though unavoidable, are very rare; these are the only two cases I have seen or heard of during my colonial experience, out of some fifty or sixty cases of operative interference with hydatid of the lung in my own practice and that of others*. I think an early operation would very much lessen the probability of such an occurrence as a pierced bronchus taking place, as the lung tissue before it has undergone much compression would, from its natural elasticity, resilience, and sponginess, be less open to such an accident, the more or less cartilaginous rings of the bronchus having lateral room to slide away from the point of the trocar.

We have hitherto been considering more particularly operative interference with the unbroken cyst, regarding which my own experience has been that the danger has been, not in tapping, but in delaying the operation until the lung-tissue has become compressed and almost hepatized, and the whole relations of the parts within the thorax have accommodated themselves to the presence of a large foreign mass, and therefore will have all the more difficulty in returning to their normal relations. The question now arises, is it advisable to interfere when the natural rupture of the cyst has taken place, and the echinococci are being expectorated? As a rule, I

* Since the above was written, I have heard from Dr. Macmillan that a similar accident occurred to him when tapping a patient's lung in the Alfred Hospital. The case ultimately did well.

think not; except the cyst is very large, very old, and in close proximity and probably adherent to the chest-wall, especially if the patient is becoming exhausted by the constant drain of pus and blood and the wearying cough. In such case the cyst should be treated as an abscess, and an opening of sufficient size made between the ribs to allow of the evacuation of its contents, when the constitutional symptoms will at once be relieved. I saw such a case with Dr. Motherwell four years ago. The patient, a woman, was fast sinking from the fatigue and drain of constant expectoration of pus, blood, and fragments of putrid hydatid from an enormous sac in the right lung. There was every probability of close adhesions between the sac, pleura, and chest-wall. A full-sized trocar was introduced between the fourth and fifth ribs, and the opening enlarged laterally with a probe-pointed bistoury. Half a basinful of the contents of the sac was discharged in a few minutes, to the patient's great solace. Her appetite and strength returned, the hectic left her, and there seemed every probability of a favourable termination; but with the contraction of the sac the external and internal openings no longer corresponded, the discharge ceased, and the cough returned. The patient, dissuaded by foolish and ignorant friends, would not allow any further cutting operation, and she eventually sank from exhaustion. A free opening is necessary in such cases, as the quantities of cyst and dense

and sometimes mortar-like masses cannot pass readily through a small one.

Mr. Fitzgerald had last year a similar case in the Melbourne Hospital, in which the whole parasite was got rid of by a free incision between the ribs, and rapid recovery followed.

We now come to the medical treatment, which must be regarded more as an aid or adjunct to operative treatment than as likely to do good independently. There has been much scepticism indeed, both here and in Europe, concerning the power of any agent given by the stomach to influence the vitality of these parasites. Experience, however, shows that the bromide or iodide of potassium, combined with kamela, given continuously for several weeks, have a distinctly sickening and irritating effect on the acephalocyst, although it is obvious that a remedy that must work through the blood to influence an entozoon embedded in the solid viscera, cannot have nearly so rapid an effect as it would in a case of tape-worm, for example, where the animal is lying exposed and bare in the intestinal canal. Recent observations, however, have led me to believe that these remedies have more influence than I had formerly been disposed to think. The following cases furnish examples:—An elderly man had been tapped twice or thrice by another practitioner for hydatid of the liver, but without a permanent cure resulting. He came to me with the cyst very palpably refilled,

apparently to the extent of 30 to 40 ounces, but declined to have any further operation performed. I prescribed 20 gr. of bromide of potassium, with 1 fl. dr. of tincture of kamela (4 oz. to 20 oz. of rectified spirit) in infusion of serpentary, three times a day regularly. Under this the tumour gradually subsided, and in six weeks was not perceptible. Nearly two years have now passed, and the patient has suffered from other disorders, but the hydatid has never recurred.

The other case was that of a girl, fourteen years of age, who had a hydatid of the liver of great size and probably very tough and thick-walled, for the point of the stylet being a little blunted, failed to pierce it, and a dry tapping was the result, as the patient refused another trial. The bromide and kamela were administered sedulously for some months with occasional intervals, until the tumour completely disappeared. The trifling injury to the acephalocyst by being pushed before the stylet could hardly of itself account for the cure; it is more probable that the drugs, though possessing but little influence over the untouched and healthy parasite, do seriously disorder its nutrition when at all enfeebled by interference. I allow, of course, the possibility and occasional occurrence of spontaneous death of an acephalocyst, without rupture or operation; but this is excessively rare, and the mass of experimental evidence, the only test of truth in estimating the

value of the effects of drugs on the diseased human subject, weightily bears down the scale in favour of the above proposition. It might be worth while to atomise weak solutions of kamela or santonine, and cause the patient to inhale them. They would pass into the blood more directly than when given by the stomach, and in early cases there might be a possibility of endosmosis through the walls of the sac.

As we have seen, the risk of operative interference with hydatid cysts in the thoracic and abdominal viscera may be reduced to a minimum by the early use of the fine trocar, but the question naturally arises, What are the risks of non-interference? These may be remote or immediate; the former we have already alluded to as arising from the results of prolonged pressure on the lung substance, and its blood-vessels and bronchi. If the cyst bursts of itself, a tedious, exhausting, and dangerous process of expulsion has to take place, attended with severe constitutional symptoms, from which probably not more than 30 or 40 per cent. of cases recover. But besides this, there is a risk of sudden death from the bursting of a large cyst in the lung, of which the following case is a good example:—A large-framed and powerful man of middle age and sanguine temperament consulted Mr. Fitzgerald and myself for a hydatid cyst of the lower lobe of the right lung. The general symptoms were principally hæmoptysis, gradually increasing dyspnœa and cough, but the general

health was good. Tapping was urgently advised, as the hydatid was of large size, and the lung a good deal compressed; he consented, but at the last moment, when the trocar was about to be introduced, his courage failed him, and he refused to have anything done. About a month after this he was sitting on the back seat of a car, which was being driven over a rough bush-road. A sudden jolt threw him off, and he fell on his side, but was not hurt, for, as appeared in evidence at the inquest, he jumped up at once, saying that there were "no bones broken." A few seconds afterwards, however, paroxysmal cough came on, with gushes of frothy fluid from the mouth and nose. He turned black in the face, and died in a few minutes of asphyxia. The cyst had, doubtless, been burst by the fall, and the man was suffocated by its wall and contents plugging the air passages. No *post mortem* was made, as the cause of death was obvious.*

The question of prognosis in hydatid of the lung is one which the practitioner is often called upon to answer. As we have seen, an early diagnosis and tapping with the fine trocar, with persistent appropriate drug medication, render the death of the individual parasite almost a certainty, and this being

* A well-known publican of this city died a few years ago under similar circumstances, in consequence of his refusal to have an enormous hydatid of the liver tapped. The cyst was burst by a trifling fall against the counter of his bar, and he died in a few hours of peritonitis.

accomplished, of course the danger is done with as far as it is concerned. But we have yet the possibility of other hydatids making their appearance on the lung or in other organs. Every day experience shows us, with regard to intestinal worms and other entozoa, and indeed parasitic animals in general, that some persons are particularly susceptible to the invasion of such creatures, or rather I should say to their development after entrance into the body. Weakness or strength of constitution seems to have little to do with it, but rather idiosyncracy. Some persons cannot drink a single glass of unboiled water in a district where tapeworm is endemic without shortly afterwards finding the symptoms of a lodger in their inside, while blood-relations, offering no contrast in visible physical development, never suffer. Some cannot come within speaking distance of a flea or a pediculus without their insisting on cultivating the acquaintance to the extent of intimacy, while the peculiarities of others seem to repel these unwelcome guests. An individual who has once had hydatid, thereby proves his title to susceptibility to such disease, and has, therefore, *cæteris paribus*, more chances of again contracting it than his neighbour, whose person is still in a virgin state, echinococcically speaking, though, of course, many persons do escape with only one attack. For example, a young lady, one of a family of five, was brought to me two years ago with a hydatid of the liver of considerable size. Tap-

ping, and the bromide and kamela, cured it as usual, but though great care with regard to the drinking water was taken, another cyst developed in the upper lobe of the right lung about a year afterwards. This also was tapped, and the same drugs given, with the result of a complete cure, no trace of either parasite being appreciable at the present time, and the young lady being in excellent health. None of the other members of the family have ever had any symptoms of the kind, nor any of the numerous servants on the estate. Such susceptible persons can but avoid drinking any water but what has been boiled or stone-filtered, the former being by far the safest; and if, in spite of this, they contract hydatid, it is their misfortune, not their fault. Then, being fore-armed as well as fore-warned, they should attack their enemy, both from without and within, with cold steel and poison while he is still in his tender youth, and nip the young colonist in the bud, before he has had time to frame his new constitution, and build a wall round his rising township. No Fabian policy will succeed with a hydatid, he must be crushed as soon as he is discovered, as Emperors crush revolutions, and Boards of Health stamp out pleuro-pneumonia.

The question of probability of recurrence of hydatid is one of special importance in reference to the selection of lives for assurance by Australian companies. Should an applicant be declined because he has formerly had hydatid of an internal organ? Not

absolutely, but he certainly requires considerable "loading" to bring him to the level of others, who have been unaffected; he has, as we have seen, proved his susceptibility, and should the disease reappear, no human foresight can predict that it will not be in the brain or heart, where it is necessarily fatal. A striking instance of the importance of a guarded prognosis occurred in my own experience in this city. An otherwise healthy man suffered greatly from hydatid of the lung, during whose expectoration he was reduced to death's door, and acquired a well developed phthisical appearance; he had been tapped in several parts of the chest. Eventually he got quite well, and for the last three or four years I noticed him about town fat and ruddy, and evidently in excellent health. One day I saw his death in the paper, and on inquiry of his medical attendant, found that though never having left Melbourne, he had been attacked with a simultaneous development of hydatid in several internal organs, and at last apparently in the heart, as he died suddenly. As a balance weight to this, I remember declining a well-known merchant in Melbourne, about nine years ago, for life assurance, on account of a former attack of hydatid of the lung, attended with hæmoptysis, but he is still in good health, and has had no return of the disease.

It is difficult to ascertain with any certainty to whom the credit of immediate tapping of cysts in the lung is due. The first recorded case I have been

able to find is in Dr. MacGillivray's paper in the *Australian Medical Journal* for August, 1865, where it appears that Mr. Cheyne, one of the surgeons to the Bendigo Hospital, on May 23rd of the same year, punctured a large cyst between the third and fourth ribs with an exploring trocar. The operation was, however, done on several occasions in Melbourne previous to this date by several local surgeons and by myself. The feasibility of such a proceeding was, no doubt, suggested by the harmlessness of tapping the liver, and proved by cases which were tapped for pleuritic effusion, the fluid turning out to be hydatid. I may mention that for the last ten years I have been in the habit of immediate tapping with a fine trocar in cases of pleurisy with effusion, and am convinced that this shortens the duration of the case by one half, reduces the chance of purulent degeneration to a minimum, and of course saves the lung from the consequences of pressure, and the system from the tedious process of absorption. I never saw any but the best effects follow this procedure. Considering the immediate relief it gives, and the facility with which it is done, it is strange that this operation is not recognised in the text-books. Even in cases of limited effusion to the extent of only a few ounces, I often tap at once, and find that the duration of the case is shortened from weeks to days, a matter of great moment to business men.

M'Carron, Bird and Co., Printers, 37 Flinders Lane West, Melbourne.