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ON
(21)
CYSTIC ENTOMOZOA

IN THE
HUMAN KIDNEY.

WITH AN ILLUSTRATIVE CASE.

BY

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CYSTIC ECTOPY

HUMAN KIDNEY

WITH AN ILLUSTRATIVE CASE

BY HENRY ALBERT M.D.

NEW YORK: G. P. PUTNAM'S SONS, 1895.

PREFACE.

THE accompanying Essay was read before the Medical Society of London, on December 15th, 1855. Since that date I have noticed the reports of two cases somewhat similar to that which came under my own observation. One is recorded by Dr. Sieveking, in the *Lancet* of September 10th, 1853, in which no Echinococci were found, owing it is supposed, to their entire disintegration; and the other by Mr. Simon, in the *Lancet* of September 24th, 1853, in which the cysts were passed entire, and were found to contain swarms of perfect Echinococci in different stages of growth, together with innumerable hooklets of parasites dead and decomposed at some earlier period.

I am indebted to Professor Quekett, of the Royal College of Surgeons, and to Mr. R. S. Stedman, of Sharnbrook, for the microscopic preparations, and to Dr. Thudichum for the excellent drawing from which the accompanying lithograph has been prepared.

Bedford, January 17th, 1856.

EXPLANATION OF THE PLATE.

Figs. 1, 2, 3, and 4.—Cysts of various shape and size.

Fig. 5.—Hooklets of various shapes, magnified 600 diam.

Fig. 6.—*a*, crystals of triple-phosphate of magnesia: *b*, uric acid: *c*, oxalate of lime.

Fig. 7.—Crystals of phosphate of soda: single spiculæ, crossed at various angles: *a*, *b*, feather-shaped crystals.

Fig. 8.—Piece of a cyst, showing, *a*, the inner granulated surface, *b*, the cut surface of the mass, exhibiting a striated appearance, caused by the lamellous arrangement. The five outer layers are of more uniform thickness, the inner layer much thicker and stronger.

Fig. 9.—A well-formed Echinococcus from the inner surface of a cyst, with two rings of hooklets.

Fig. 10.—Another Echinococcus from the same cyst in its retracted state. The rings of hooklets are seen in the interior of the body of the parasite.

*Fig. 11.**—An Echinococcus dead and decomposing. A beautiful ring of hooklets is shewn.

* *Figs. 6 to 11* are magnified 400 diam.

ON THE DEVELOPMENT
OF
CYSTIC ENTOZOA IN THE HUMAN KIDNEY.

(With an Illustrative Case).

SINCE the time when the distinguished Rudolphi, to whom we owe the name and definition of the Cystic Entozoa, finished his interesting researches, the subject of the development of these animal growths in the human body has attracted some attention in the pathological world. Considering, however, the great importance of the subject as a practical study, it has not, I conceive, received from scientific medical observers that amount of careful attention which it so richly deserves.

This neglect or omission in pathological science arises possibly from two causes :—first, from the fact that, comparatively speaking, the discovery of the presence of entozootic cysts, either in the dead or living body, is of rare occurrence, at least in this country and on the continent of Europe ; and, secondly, from the circumstance, that any inquiry into the origin and nature of these cysts involves the consideration of various details, facts, and theories, belonging almost exclusively to the domain of Natural History—a department of science which, as yet, has never been brought into any very intimate alliance with pathology.

Content with pointing out these possible causes as having led to a certain amount of barrenness in this department of pathology, and without at all assuming to myself any intention of filling up a gap in pathological literature, I have thought that it might prove of interest to the members of the Medical Society of London, and at the same time prove useful to some after and more elaborate enquirer, to place on record a case in which the principal symptom was the emission from the urethra of large numbers of one of the cystic entozoa.

A. F., aged 28 years, plumber, glazier, and painter, came under my care on 17th December, 1853, with dull heavy pain in the loins, particularly on the left side, frequent desire to pass urine, and slight difficulty in voiding it. The urine was not particularly high coloured, and contained no deposit on cooling. The specific gravity was 1020. Treating the case as one of

common lumbago, which at first sight it closely resembled, I prescribed simply ten minim doses of potash water, with thirty minims of sweet spirits of nitre in camphor mixture, together with an aperient of calomel and jalap, and an embrocation for the loins of ammonia, laudanum, and soap liniment. On the 22nd December he observed to me, that during the early part of the past night he had experienced greater difficulty than ever in passing urine, and that for some hours he had been unable to pass a single drop. Early in the morning he passed some little jelly-like masses, four in number, which he called "bladders," and the emission of which gave him instantaneous relief. They were hydatid cysts. Subsequently, he sufficiently recovered to follow his occupation during the summer of 1854, suffering nothing more than an occasional frequent desire to void urine.

On September 10th, he passed six of these cysts, but with less pain and difficulty than on the former occasion—a result which he attributed to ten drops of the oil of turpentine, which had been recommended to him, and which greatly increased diuresis. The urine, after the passage of the cysts, being somewhat tinged with blood, I recommended merely a continuance of the medicine I had previously prescribed, adding only to each dose half a scruple of the sesquicarbonate of soda.

On November 16th, he passed four of the cysts, the urine not being bloody afterwards. The passage of these cysts was, however, preceded by severe pain in the region of the left kidney, by the passage of several pieces of clotted blood, and by considerable difficulty in voiding urine. Indeed, for two entire days he passed no urine. On this occasion he took nineteen drops of turpentine within two hours, but in divided doses. Shortly after taking the turpentine, the pain in the left kidney suddenly ceased, with a sensation which, to use the patient's own words, seemed to indicate that "something had suddenly broken in the kidney." He then complained of pain along the left iliac region, which continued for several hours, and ceased as suddenly as the previous pain had done. After this, all attempts to void urine were accompanied with pain along the urethra, premonitory to the expulsion of the cysts from that passage. The cysts passed on this occasion were larger than before, and, after their emission, all pain ceased; and he continued in good health, with the exception of an occasional dull aching pain in the lumbar region, especially on the left side, from the date I have named (November 16th), until the 9th December of the same year.

On December 9th, he passed five cysts, but all of smaller size than those referred to in the preceding paragraph, and the passage of no others was observed until December 31st, when he awoke in the morning with acute pain in the loins, and all the other symptoms described previously as occurring on November 16th. During the day he passed not fewer than twenty cysts—one at

8 a.m., eleven at 1 p.m., five at 7 p.m., and three at 11 p.m. He had never previously passed so many as eleven with one effort; nor has he since. The cysts passed in rapid succession, and some were of a size as large as a small walnut. He felt tenderness in the urethra for a few days after this date, but considerably less pain in the loins.

On January 1st, 1855, a single cyst was passed in the morning; on the 2nd, two others also in the morning; on the 3rd, one in the afternoon; and on the 10th, two in the morning. From that date (January 10th) until July 23rd, the peculiar class of symptoms to which he had been liable never left him entirely. He had frequent attacks of pain and difficulty in passing urine, followed often by the expulsion of cysts, between seventy and eighty of which he has brought to me on various occasions. He passed one large cyst on the 23rd July. On the 9th November, he passed what appeared to be a portion of a very large cyst, and on the 11th November, he passed an entire cyst of moderate size. Since the last date to the present time (December 8th), he has passed no other cysts. He continues to take the diuretic medicines, and occasionally, when the pain is more severe than usual, a dose of the turpentine. Before the 23rd July, he frequently experienced an immediate cessation of the pain in the iliac region, upon what he called the "dropping" of something which he distinctly felt, and which, as I take it, must have arisen from the escape of a cyst from the ureter into the bladder. These sensations were always confined to the left side. The relief has not been so frequent or decided since that date, and he is daily expecting to pass more cysts. Latterly, he has also complained of pain in the region of the right kidney. Careful examination has failed to detect any abdominal enlargement.

While these remarkable and well-marked symptoms were thus progressing, my attention was often directed very naturally to the urine, which was examined on various occasions. I have already remarked on the passage of blood in small quantities after the expulsion of the cysts; but as this was only a mechanical result, arising from slight lacerations in the canal, from the distention caused by a cyst, and the violent efforts made to expel it, the mere presence of a few blood-globules, which were often found in the urine, is easily accounted for. In addition, the urine was often loaded with the lithates and phosphates, and occasionally I detected microscopically the crystals of lithic acid. The same crystals were not unfrequently found attached to the outer surface of the cysts themselves.

The man's general health having suffered but little interruption while the events now described were taking place, I have really already written a complete history of the symptoms presented, as well as of the treatment pursued.

For special reasons, to which I shall refer in the sequel, it is right to record the diet of the patient. For some years past he has rarely eaten either beef or mutton, having a natural aversion to these meats, and for one year, six years ago, he was a vegetarian. As an ordinary rule, however, he has lived on pork, and thinks that, on an average, he has taken "pig's fry," consisting principally of the liver, at least twice weekly. He has on more than one occasion eaten "measly" pork, and pig's chitterlings (the intestines of the animal) has been a frequent dish. He is also very fond of sheep's head, and especially of the brains, but does not know whether the brains he has thus taken were those of "sturdy" sheep. He has likewise been accustomed to take in the morning herbal bitters, such as decoctions of horehound, wormwood, and agrimony. He is fond of coarse brown sugar. He does not remember ever having eaten meats badly cooked, and has not suffered from other forms of entozoa, except ascarides, which troubled him greatly in early life. His wife (since their marriage) has lived on the same diet, but has not shown symptoms of the same disease.

CHARACTERS AND EFFECTS OF THE CYSTS.

From the commencement of the symptoms until the present time, upwards of 150 cysts have been passed. Their size has varied considerably, from that of a large pin's head, or very small pea, to a small walnut. They have generally been thrown off in clusters, or rather one after another in quick succession, often leaving long intervals of time between; and the amount of pain which has been induced by them has, *cæteris paribus*, varied in proportion with their size, their number, and the rapidity with which they were expelled. It is scarcely fair to say that they ever gave rise to retention of urine to a degree which might be considered dangerous, since the force of the urinary current, under the expulsive power of the bladder, set up an amount of mechanical pressure, sufficient sometimes to rupture, and always to expel, the largest cyst after a time. The cyst also modelled itself to the urethral tube, and after it had passed from the ureter (where the force for pushing it onward was much less) into the bladder, the main difficulties were over, and the after expulsion from the urethra was speedily, though very painfully, effected. Watching the case, as I did, very closely, nothing could be more evident to my mind than that the cysts proceeded from the pelvis of the left kidney, along the ureter into the bladder, and so, by mere continuance, into the urethra. I could, in fact, trace the course of the cysts by following out the symptoms in detail. First, there was the dull aching pain, accompanied with sensation of fulness in the loins, and so essentially indicative of congestion of the kidney, and obstruction to the immediate escape of its secretion; next, the sharp, lancinating, descending pain, indicative

of the obstruction, whatever it might be, in the ureter; thirdly, the immediate sense of relief, accompanied with the sensation of "dropping" already described, incident upon the cyst finding its way into the vesical cavity; and, lastly, the well-known straining attempts to micturate, accompanied with pain along, and particularly at the termination of the urethra, so strikingly indicative of an obstruction in that canal, and terminating abruptly on the emission of the foreign substance.

I have referred to the varying sizes of the cysts, the next step was to discover its internal character. In common parlance, the cysts were hydatids; but as an improved knowledge of the nature of cystic formations has now rendered the term "hydatid" a generic, and scientifically an obsolete name for a variety of forms of cystic developments, I shall only use it hereafter in this general sense. The cysts (several of which are now before the Society) consist of two coats, the contents being generally expelled prior to their being thrown off, from rupture. A few smaller ones, however, passed entire, and these contain a greenish albuminous fluid. Anxious to ascertain more accurately the nature of their contents, I sent several of the cysts to Professor Quekett, who found them to contain the cystic entozoon, known as the *Echinococcus*, and which has been accurately described by Professors Owen, Müller, and Quekett. These *Echinococci* of the human subject differ, according to Owen, from those found in the hog, in having suctorious cavities external to the circle of teeth, and thus closely resembling the head of a *Tænia* appended to a small cyst. The *Echinococcus* was only developed in the larger cysts; and a remarkable circumstance connected with the inner surface of all the cysts was, that it was covered with crystals, having all the characters of the triple phosphate. For the following more accurate description, I am deeply indebted to Professor Quekett:—"The cysts sent to me for examination varied in size from one-sixth to half an inch in diameter; their external surface had a semi-opaque granular appearance; two of the smaller ones were more transparent and of globular figure, the others being flattened and shrunk, as though they had lost a portion of their fluid contents. On opening two of the larger cysts, a quantity of fluid, containing a considerable amount of granular matter, escaped. This last, on microscopic examination, was found to exhibit fragments of *Echinococci*, amongst which the minute but characteristic hooklets could be readily discovered. The wall of each of the cysts was easily separated into two layers, which, under a more careful manipulation, could be farther separated into several laminae of semi-transparent and nearly structureless membrane, which, in some situations, was covered with minute granular matter. In the larger cysts, the innermost layer was covered with numerous minute prismatic crystals, having the general appearance of triple phosphate. In one of the larger cysts, similar crystals were found

adhering to the outer surface. The crystals were best seen in the newly-opened large cysts, but neither crystals nor Echinococci were visible in many of the small ones. When an attempt was made to mount a portion of the inner membrane between glasses, in order to show the crystals, they were found to be so readily detached that the greatest care was necessary to keep them *in situ*. I have never before had an opportunity of examining entozoa of this kind voided with the urine, and the only way in which I can account for the presence of the crystals within the cysts, is by supposing that a certain portion of urine must have gained entrance into them by endosmosis."

Some of the cysts were found to contain crystals of uric acid, of oxalate of lime, and of phosphate of soda. In one of the cysts, my friend, Mr. Stedman, discovered several entire and well-formed Echinococci, with two rows of hooklets in each.

I do not know of many recorded cases of a strictly similar kind to this. One is described by Professor Müller, where an echinococcus was developed in the urinary bladder, and was passed off by the urethra. In another case, which Professor Quekett has described and figured, the same entozoa was found in the liver of a patient under the care of Mr. Curling.

In an excellent report in the Medical Times and Gazette for February 17th, 1855, nine or ten cases are given, in which hydatids passed by the urethra; three of these cases occurred under the observation of Mr. Gay. In commenting on these cases, the reporter takes pains to prove that the cysts were not necessarily, and even not probably, connected with the kidney originally, but rather that the hydatids found their way to the urinary canals from adjacent structures. However that may be, I think there is not the least doubt that in my case the developments took place in the pelvis of the kidney, where, I suspect, they were long detained, and were then thrown off *en masse*. This idea receives some confirmation in the discovery of the triple phosphate in the interior of the cyst. As the triple phosphate when formed is insoluble, we cannot suppose that it was absorbed directly into the cysts by osmotic action; but it is not impossible that, while these were retained in the pelvis of the kidney, or in the bladder itself, the urea and phosphate of magnesia, both of which are highly soluble, were thus taken into the cysts by endosmosis, and that the crystalline salt was chemically formed there by the decomposition of the urea into ammonia, and its combination with the phosphate of magnesia.

In the following case, kindly communicated to me by J. J. Evans, Esq. of St. Neot's, there were some points analogous to those occurring in my patient:—

"M. S., aged 26, single woman, a dressmaker, of short and delicate stature and swarthy complexion, and whose parents both died at an early age, first consulted me in November, 1847, having been

for some time most unsatisfactorily treated by another practitioner. She complained of acute pain in the right side, just below the margin of the ribs; she described the pain as of a severe character at one moment, whilst at another time it was more obtuse, of a forcing character. She suffered from almost constant sickness, and could not bear pressure either on the side or *scrobiculus cordis*. From the trifling examination she was able to bear, and from the quantity and character of the secretions, I thought the case might be one of biliary obstruction, and therefore prescribed mercurial purgatives, with *empl. lyttæ*. I could only detect a trifling enlargement in the side affected. In a day or two, having been much relieved of the pain and sickness, she left her bed and took to her ordinary occupation: the following day she had much difficulty in passing her urine, which had been for some days less copiously secreted, and she observed that it was slightly opaque when passed, and contained flakes of membrane. On examining these flakes, I immediately detected several portions of the cysts of large hydatids, whilst numbers of smaller ones floated in the urine. These latter were entire, and varied from the size of a pin's head to that of an ordinary grape. They were perfectly unconnected to each other. From the size of the fragments which had been passed, I should consider that some of the large ones had equalled the size of an egg. The patient now seemed tolerably well, and I left off my attendance, having satisfactorily explained to her the nature of her case, and that she would scarcely be fortunate enough to escape a repetition of the disorder. In February, 1848, she again sent for me, but I fancied that she had rather anticipated an attack, as she got well without anything unusual occurring. In February, 1850, I was again called in, and found her suffering from very severe pain in the side. I now imperatively carried out my examination, and detected a lobulated tumour, measuring, as felt through the abdominal integuments, about 8 inches by 4 in breadth and thickness, immediately in the region of the right kidney. I prescribed anodyne and demulcent medicines, and in a day or two the tumour gradually dispersed, the pain, at the same time, subsiding. The following day a large quantity (many hundreds) of hydatids made their appearance. In May, 1851, she had another attack, but passed only a few small ones. She relapsed again in March, 1853, also in February, 1854, as well as in the following July. At the last-named period she passed a large number, some of considerable size, one of which so obstructed the urethra as to require manual removal. The tumour in the side had entirely subsided, and has not at present (November, 1855) reappeared. From the foregoing notes there can be no doubt as to the nature of the case—the only question is as to locality. If the hydatids had formed in the pelvis of the kidney, would they not have been earlier destroyed by the action of the urine; or, if not, could they have produced the lobulated

tumour which I have described, as if felt through the parietes of the kidney? I do not question the latter, as I have seen kidneys so extenuated in their walls by distention as to admit of distinct manipulation of their contents. With regard to the destructive action of urine upon living hydatids indigenous to it, I can only say that it admits of question; besides, I should certainly expect, if examining such a subject, to find the hydatids enclosed in a cyst derived morbidly from the structure in which they were situated, in which case they would not be in contact with the urine. If the cyst had been external to the kidney, I think the hydatids could scarcely find their way into the ureter, since, to effect their passage when large, a force is required which I can only discover in the accumulated urine within the pelvis of the kidney.

"In regard to diet," Mr. Evans further writes, "I have ascertained from my patient, that, about seventeen years since, she, as well as the whole of the family, were much in the habit of eating pig's brains in large quantity, as well as occasionally pig's fry; but that, since her first symptoms of disorder, now ten years ago, she has lived principally on mutton. The statement she made was, that her father, being a waggoner, was in the habit of bringing home large pigs' heads. Her mother usually put the brains into a pudding with seasoning, to constitute a meal for the family, and they individually ate heartily of it. No other instances of hydatids were known in the family. My patient is now so far well, that she is contemplating matrimony. The side on which disease existed being now less than the other, and giving her the sensation of being drawn inwards."

NOTES ON THE ORIGIN OF CYSTIC ENTOZOA.

It is not my intention, on this occasion, to enter into any wide generalizations on the interesting subject of the origin of these organic forms in the human subject, and in the bodies of animals inferior. The subject is one which is at the present moment fully engaging my attention experimentally; but the facts thus gathered are as yet not fit for the scientific garner. It may, however, be of interest to sketch out briefly a history of such facts as have been arrived at on the subject by other authorities up to the present date.

In regard, then, to the natural history and pathology of the cystic entozoa, great light has been thrown since the time of Rudolphi, by Professor Von Siebold, Küchenmeister, Goodsir, Owen, Quekett, and, more recently still, by Dr. Allen Thomson of Glasgow, to whose admirable paper on the Entozoa, in the Glasgow Medical Journal of July last, I am indebted for much information. Dr. Thomson has very properly pointed out that the various forms of cystic entozoa, including the *Cysticercus*, *Cœnurus*, and the *Echinococcus*, are nothing more than the various

larvæ or early stages of the complete or mature entozoa belonging to the order Cestoidea, of which the common tape-worm affords the best illustration; and that these cystic entozootic developments are all non-sexual and incomplete animals, so long as they are parasitic. The same writer has also demolished most effectually the old and peculiar theory of spontaneous generation, and has shown, by a reference to the experiments of Von Siebold, Küchenmeister, and others, a fact which some further experiments of my own tend strongly to substantiate, that all forms of entozoa found in the body arise from the taking in of some larvæ or ova; and that the various developments thus induced are subject to certain fixed laws of transformation, which are at once as interesting to the pathologist as to the natural historian.

It would seem that some of the entozoa are developed from ova, that others undergo metamorphosis, and that a third class go through an alternate generation, or metagenesis. Dr. Thomson remarks, that all the cystic entozoa inhabit the shut cavities, or the structure of organs, and consist of the tænia-head, with a circle of hooklets and four oscula; the head being united with the vesicular body by a neck. In the specimens I lay before the Society, these hooklets are very prominently marked. The *Echinococcus* (the form peculiar to the case I have described) differs from the *Cœnurus cerebralis*, in that the budding heads become detached (I am quoting Dr. Thomson's words), and remain suspended and alive in the fluid of the vesicle. This was the case in my specimens.

But the most curious point connected with these inquiries relates to the transformations which these entozoa may undergo in the body, and includes the fact that, under favourable conditions, the various forms of cystic entozoa become converted into the cestoid variety, that is to say, into tape-worms. I do not apologise for repeating to the Society that part of the author's paper to whom I have above referred, which details some of the experiments upon which this fact is based.

Küchenmeister of Zittau found, by direct experiment, that when young dogs were made to eat along with their food a number of the *Cysticercus pisiformis*, so common in the rabbit, these entozoa were converted in a few weeks into the *Tænia serrata*. He also found that, by giving the *Cœnurus cerebralis* of a sheep to a dog, the same result ensued. Thirdly—and this is the most telling experiment with regard to the human subject—he (Küchenmeister) gave a number of *Cysticerci*, taken from the hog and rabbit, to a condemned criminal, at periods varying from 130 to 12 hours before execution. After death, a number of young *Tæniæ*, in different stages of development, were found in the intestines. After proving his position so far, the same experimentalist varied his experiment. Having produced a *Tænia serrata* in a dog, by feeding it with the *Cœnurus*, he caused

lambs to take the *Tænia* joints, and obtained, in the short space of 18 days, a development of the *Cœnurus* in the brain, in the muscles, and under the skin of these animals.

Similar experiments have also been performed by Von Siebold, who found that, when the cyst and caudal vesicle of a cystic entozoon were given to an animal, the cyst was dissolved in the stomach, but that the entozoic larvæ passed, unaffected by the digestive process, into the duodenum, giving rise there, as in Küchenmeister's case, to a development of a cestoid entozoa, or tape-worm. After this, therefore, he gave the larvæ without the cyst, and with the same result. In the short space of two or three days, the head and neck of these larvæ introduced into the duodenum, and to the walls of which they attached themselves, were seen to enlarge, the head and neck undergoing but little change, but the body elongating, and the transverse grooves appearing and dividing the body into segments. From further experiments it seemed, that in the course of two months these *Tænia* attained the length of from 10 to 12 inches. Siebold also, like Küchenmeister, performed converse experiments, and produced cystic entozoa by the administration of the *tænia*-head.

Another fact came out from these experiments, namely, that the *Echinococcus* entozoon produced, when administered to a living animal, a special form of *Tænia*, in which the number of joints was never more than three, and these small, with the reproductive organs confined to the two last joints. This peculiarity is rigidly marked, and has fairly given rise to a specific name to the *Tænia* thus produced, namely, the *Tænia Echinococcus*.

On the other hand, the *Tæniæ* produced by the administration of the *Cœnurus* and the *Cysticercus* are identical; they are long, and contain many joints.

Dr. Thomson has very practically observed how intimately the subject of the development of the entozoa is linked with the origin of these products in the human subject, from the imbibition of foods. He thinks the *Tænia* in the human subject is dependent on the swallowing of the larvæ of the *Scolex* with the food, and that the *Scolex* itself has its most common source in the *Cysticercus cellulosæ* of measly pork. This, he says, agrees with the general idea, that in many cases of *Tænia* the people are accustomed to take uncooked animal food. The origin of the cystic entozoa in the human subject is not yet known, but its cause is possibly the same as in the lower animals. The *Cœnurus* of the sheep seems to proceed from the larvæ of the *Tænia* thrown off by the dog, and *vice versâ*. The same author remarks, that the inhabitants of Iceland are at this moment suffering from a prevalent hydatid disease, which Von Siebold thinks is occasioned by the people swallowing, accidentally, the ova of *Tænia* thrown off by dogs, of which immense numbers are kept in that island.

He further states, that *Tænia* is common among the Abyssinians, who, it is well known, are accustomed to take uncooked animal food. I would notice, incidentally, that this part of our inquiry has an interesting though indirect bearing on the subject of the propagation of cholera, as suggested by the learned and indefatigable President of the Medical Society of London, Dr. Snow.

From the facts I have already stated regarding the patient who came under my own care, it is worthy of observation that his diet has certainly been very peculiar. At the same time his wife, who has lived on the same diet, has had no symptoms of a similar character. This fact it is interesting to note, since, in one of the cases under Mr. Gay, a man and his wife were both simultaneously the subject of hydatids, as though from a common cause; and in the inferior animals grouped together, as the writer in the *Medical Times* observes, the hydatid disease generally develops itself in the whole flock at the same time.

On the supposition that the ova of certain forms of cystic entozoa are capable of leading, in the human subject, to the development of other forms of cystic growths, one might infer that this patient had ample opportunities of becoming impregnated with the *Echinococcus*, and might thus trace his disease to a dietetic source; but at the present time, and in the absence of further experiments, it would possibly be going too far to consider this matter otherwise than as a probable hypothesis.

MIGRATIONS.

However originating, it becomes an interesting question how the entozoa reach the different parts of the organism. Dr. Thomson, to whom I have so often referred, enumerates three ways of migration:—1st, By being introduced into the bodies of animals by food or drink; 2dly, by piercing the integuments or other tissues; and, 3dly, by piercing the membranes or parenchyma of organs entering the blood-vessels, travelling along them with the blood; and ultimately, by piercing these coats, to gain other situations.

The organs or tissues of the body where these entozoa are most frequently located in man, are the liver, the cellular tissue, the muscles, the chambers of the eye, and the abdominal cavity. Mr. Goodsir has related several cases, in which the *acephalocyst* was found in the peritoneal cavity, as well as others of the cystic entozoa. Thus situated, these cysts sometimes gain an enormous size; but I think it an open question, whether the special forms of entozoa do or do not require special organs for their development. At all events, it is certain that all the mature entozoa, as the *Cestoidea*, require a larger cavity; and that it is only the immature or cystic variety that will exist in a close cavity.

EFFECTS OF CYSTIC ENTOZOA ON HEALTH.

With regard to the effects of the cystic entozoa on the economy, most writers are agreed that, in the human subject, fatal results rarely occur. We have evidence, however, in the inferior animals, that death does take place as a result of their presence. This is especially the case with sheep, which suffer from the hepatic "fluke;" but, in this case, it must be remembered that the cysts exist in great numbers. The *Cœnurus cerebralis*, when occurring in sheep, produces the peculiar symptoms of pressure on the brain, with giddiness, staggering (hence the common name which is sometimes applied, "staggers"), and sometimes a peculiar tendency to turn round. In these cases, however, the general health of the animal is often not impaired, and a skilful operator, in the person of the village blacksmith, not unfrequently effects a cure by trephining the skull, and removing a mass of the cysts.

Even in the human subject, in very rare cases, these cysts also form in large numbers in the liver and kidneys, without being destructive to life, an excellent example of which was brought forward in this Society by Dr. Richardson in the present session, and which occurred in a patient under the care of Dr. Mackinder of Gainsborough. In this case, the liver and kidneys were almost disorganized by these cysts; but in the kidney, the cysts were developed in the structure of the organ, and not in the pelvis, so that they were not observed to pass off with the urine; and the specimen, from having been long kept in spirit, does not indicate to what order of entozoa the cysts really belonged. As a general rule, then, we may lay it down that the development of cysts in the human subject is limited; that the ova from which they spring are accidentally swallowed, perhaps on one occasion only; and that, when situated in deep-seated structures, the further propagation of the entozoa is prevented, as Mr. Harry D. Goodsir opines by the circumstance that the rupture of the cyst is prevented, that decomposition takes place in the contents of the cyst, and the vitality of the entozoon is thereby destroyed. It would appear, also, that these cysts, when existing in the human body even in large numbers, do not abstract so much of the blood-plasma for their own existence, as to interfere materially with the health of the infected subject; but it is worthy of remark, that in very small animals, such as the hare, and rabbit, and rat, this effect is very speedily produced, a result which one might, *à priori*, expect.

Whenever the cystic formations seem to interfere materially with the human economy, it is by a mechanical process, as when they form in large numbers in the peritoneal cavity, and each cyst enlarges to a great extent, so as to produce pressure; or when they prevent the flow of urine, either by finding their way into the urinary passages, as in the case I have described, or where

they are so placed as to press upon some part of the urinary canal externally, as in a case which occurred under the late Mr. Callaway, and related in the Medical Times, where a large hydatid tumour existed between the bladder and the rectum, and, by pressing upon the neck of the bladder, caused a fatal retention of urine.

Dr. Allen Thomson refers to a remarkable example of the prevalence of cystic entozoa in the human subject, which has been recently described by Dr. Schleisner, in his "Medical Topography of Iceland." The hydatids affect the liver, peritoneum, and subcutaneous tissue. Eschricht writes to Von Siebold, that this disease has extended itself to such an alarming degree—about a sixth of the whole population being affected with it—that it is attracting considerable attention at Copenhagen. It produces a long protracted illness, and terminates with a painful death, no means of cure having yet been discovered.

TREATMENT.

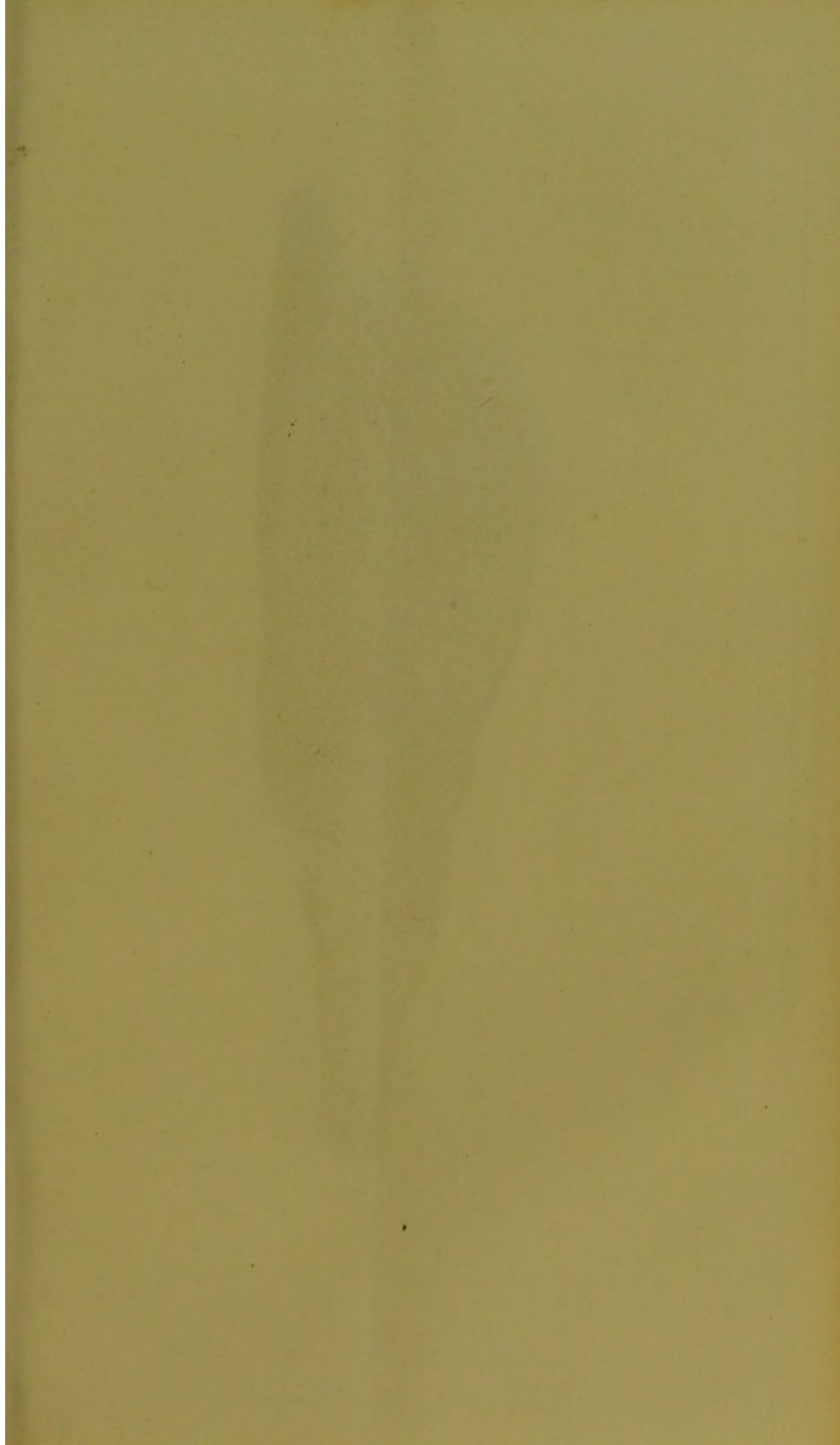
But little admits of being said in regard to the treatment of cases in which the cystic entozoa exist. The main point of practice which requires to be brought out, lies, in truth, in a more elaborate inquiry into the causes of the disease, and its effectual prevention. When existing in the structure of organs, as the liver, the diagnosis is well nigh impossible, and the treatment *nil*.

In other cases, where the cysts form large tumours within reach, as between the bladder and rectum, operative interference might be of first importance, if a clear diagnosis could be established. In cases such as that which occurred in my practice, where the cysts are passing by the urinary organs, the treatment obviously is, as in the case of cestoid entozoa in the alimentary canal, to hasten their elimination, by increasing the natural secretion of the part. For this purpose turpentine, in diuretic doses, answers as well as it does in purgative doses, when the entozoa infest the alimentary canal. At the same time, it is always advisable to make out any peculiarities in diet to which the patient may be subject, and to modify the diet-roll, if any suspicion exists as to the dietetic origin of the foreign product.

The subject thus briefly brought before the Society, opens, as I think most practitioners will admit, a wide and highly valuable field of practical inquiry. However much we may be in the dark as yet on many points, there can be no doubt that great advances have been made, and that we are at last on the true track towards discovering the origin of the entozoa; and as book opens book, and one science betrays the secrets of another, so it is to be hoped that this inquiry may lead us into spheres of pathological observation, which, at the present moment, may seem removed altogether from this special investigation.

Not many years ago, the whole question of the entozoa was a sealed and mystic volume, which, when broken into, was full only of hard sayings and speculations, partaking more of the character of old alchemy than of rational thought. Perhaps, indeed, no theory so entrapped the world for a time as that of spontaneous or equivocal generation, the utter and absurd fallacy of which is now so manifest. As time goes on, and experiments advance, it is not too much to suppose that we may consider the pathology of the entozoa in the light of a proved scientific problem, wrought out by the most rigid rules of the inductive philosophy.*

* The paper was illustrated by microscopic preparations, which had been kindly put up for the purpose by Professor Quekett, and by Mr. Stedman, of Sharnbrook, Bedfordshire. In these preparations, with the assistance of the powerful microscope belonging to Mr. Stedman, the Echinococci, with their hooklets, and the crystals of triple phosphate, were well shown.



SECONDARY PROSTATIC CALCULUS.

