On the relief of excessive and dangerous tympanites, by puncture of the abdomen : a memoir / by John W. Ogle.

The Relief of Tympanites by Puncture of the Abdomen

John W. Ogle

ON THE RELIEF

OF

EXCESSIVE AND DANGEROUS

TYMPANITES,

BY

PUNCTURE OF THE ABDOMEN.

"I could never bring my mind to the point of actually ordering the operation to be done. But I now wish that I had done so in some cases, for I have subsequently found, from the experience of others, that it is a safe one, and may give immense relief."—*See pages* 85, 86.

"Etiam planè censeo ad officium medici pertinere, non tantùm ut sanitatem restituat, verùm etiam ut dolores et cruciatus morborum mitiget: neque id ipsum solummodò, cùm illa mitigatio doloris, veluti symptomatis periculosi, ad convalescentiam faciat et conducat; immò verò cùm, abjecta prorsùs omni sanitatis spe, excessum tantùm præbeat e vitâ magìs lenem et placidum."—*De Augmentis Scientiarum*, Lib. iv. F. Bacon.

"T'adulce man's miseries."—Herrick.

ON THE RELIEF

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TYMPANITES,

BY

PUNCTURE OF THE ABDOMEN.

A MEMOIR,

BY

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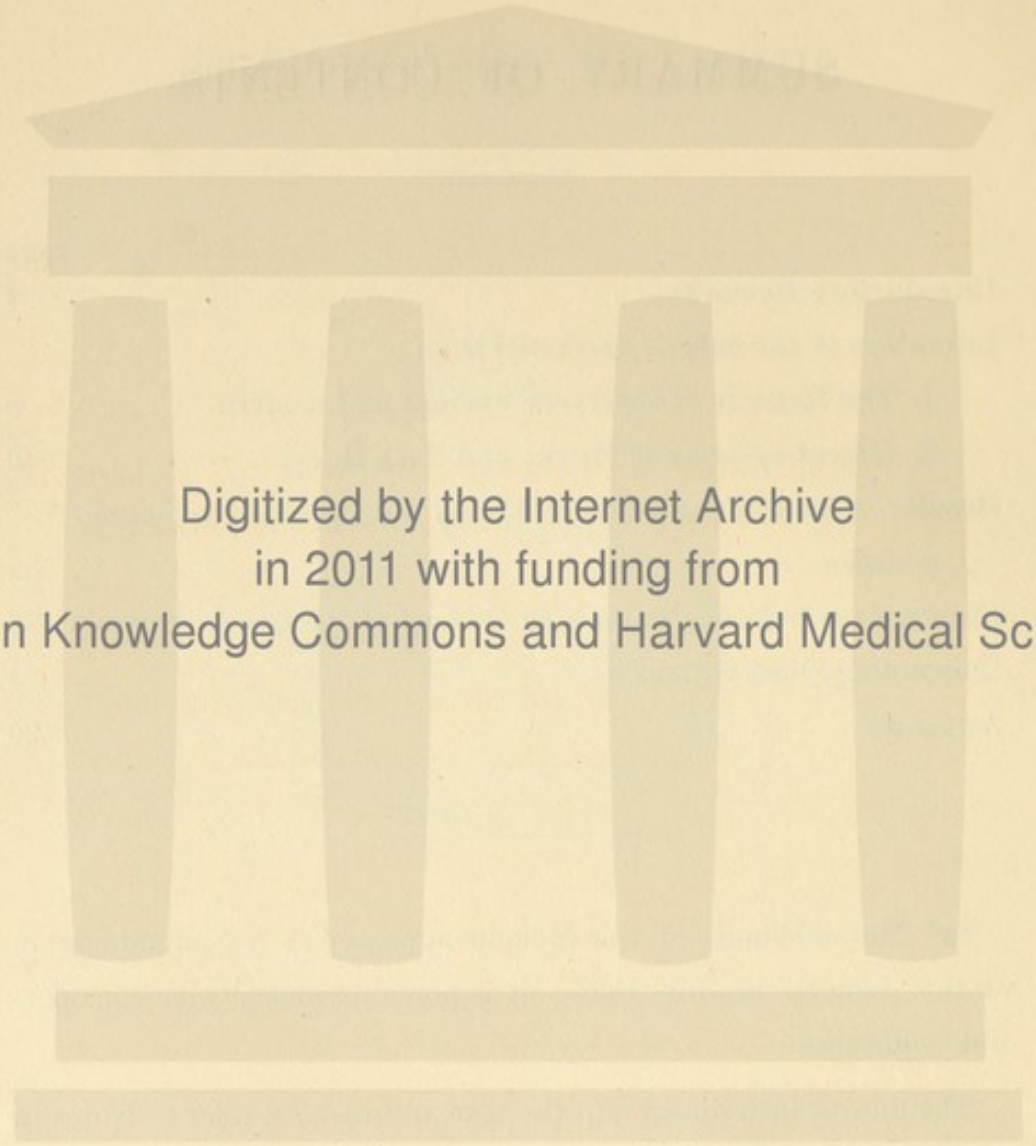
SUMMARY OF CONTENTS.

*** The substance of this Memoir appeared as a communication to the 'Lancet,' in July, 1887. It is now reproduced with considerable additions.

The figures introduced into the text, in brackets, refer to Notes in the Appendix.



THE RELIEF OF TYMPANITES

BY

PUNCTURE OF THE ABDOMEN

The inconvenience and discomfort of even moderate flatulent distension of the stomach and bowels, of which most people have personal experience, are so great, that it may be easily understood, upon reflection, how highly distressing and painful, and indeed how fatal, excessive and unrelieved distension, and consequent atony, of the same viscera may prove (whatever the cause). For what is the purport, the signification, of unwonted and protracted gastro-intestinal inflation? It means, of course, interference with the contraction, and, therefore, the descent, of the diaphragm, the "great inspiratory muscle"*— *i. e.* interference with the movements of the lungs, and with the action of the heart, which rest upon

* That chief or special agent by which the cage of the thorax is vertically increased, and by which also the transverse diameter of the lower part of the chest is found to be enlarged. The diaphragm was designated by the great Haller as a muscle "post cor, facile princeps" [1].

the diaphragm ; and no doubt serious damage, by pressure on the various nerves, eminently the sympathetic system, and upon the blood-vessels, as well in the abdominal [2] as the thoracic cavity [3]. The likelihood of unwonted pressure on the sympathetic system by over-distended stomach and bowels, and the consequent evils, will be apparent on considering the relation of those viscera to the grand solar plexus and to the various ganglia which exercise such important influence upon the circulation, and upon the numerous secreting organs whose action, reflexly, on the heart and lungs, is so conspicuous. This excessive gastro-intestinal distension possesses the significance of that paralysis, more or less complete, of the diaphragm which arises from lesion of the phrenic or "internal respiratory" nerves, division or interference with the direct influence of which, as we know, ere long produces death * [4]. And, of course, interference with the inspiratory descending movement of the diaphragm, limiting the due and proper expansion of the chest cavity, quickly limits the exchange of the respiratory gases in the blood, and leads to swift disaster.†

* "Those threads on which our lives hang," as Mr Hilton says.

† This limitation will be the more serious if there be, in addition, disease of the lungs or heart, such as emphysema. Sir T. Watson, in his lectures, alludes to the further encroachments on the office and capability of emphysematous lung by a distended abdomen. Some interesting observations by Dr G. Harley appear in a communication to the 'Lancet' (March 24th, 1888, "On the Effects of Moderate Drinking, &c.") regarding the evil effects of wind-distension of the stomach in organic disease of the heart. He adduces cases tending

In a communication to the 'Transactions of the Provincial Medical and Surgical Association' (vol. xii, 1844), my friend Dr Sibson, with whom, later on, I often and pleasantly worked, described the "changes in the situation and structure of internal organs" under various circumstances. After noticing the "terrible anxiety," "dyspnœa, and interruption of circulation," existing in many cases of diseases of the abdomen, wherein the circulating and breathing apparatus are thrust up by the diaphragm, he remarks that the deadly symptoms are not due so much to the disease within the abdomen as to the clogging of the heart and lungs.

One of the most graphic descriptions of the symptoms produced by extreme tympanites is given by a French writer (Mothe), to whom I shall allude later

to show "that a mere extra distension of a stomach by wind may suffice to fatally arrest a diseased heart's action, and is therefore a very dangerous complication." He thinks that "most of the cases where patients labouring under heart disease are found dead in bed, after having retired to bed apparently in their usual state of health soon after partaking of a heavy meal, are due to the effects of pressure upon the heart—probably the result of the combined action of a distended stomach and falling asleep on their left side."

Referring to the above statement of Dr Harley, Dr Goodridge observes (see 'Lancet,' April 21st, 1888) that he believes a fatal result in over-distension by flatus may arise from the flatus being suddenly discharged, entailing a sudden fall of pressure in the vascular system, and with it fatal cardiac syncope, as in the case of the rapid evacuation of fluid in ascites. Surgeon-major W. Curran, in the 'Brit. Med. Journ.,' April 28th, 1888, p. 859, alluding to the above statement, states that he had, in former years, published in the 'Indian Annals of Med. Science,' cases of sudden death after meals, as a result of pressure upon the heart.

on (p. 13). After enumerating the distressing eructations, the loud noises of the flatulence, and the pain following their cessation, the vomiting, the heat, the quick and strong pulse, this writer describes the laboured respiration, the impossibility of taking food, and the constipation attendant, and he proceeds: "Successivement viennent les anxiétés, l'accablement, les défaillances, les extrémités froides," &c. Well may the symptoms connected with obstruction or occlusion of the bowels warrant the designation of "miserere mei" which it has obtained. Ambrose Paré declares that *rupture* of the bowel may be the result of over-distension by flatulence, and Dr Church, of St Bartholomew's Hospital, tells me he has seen the same resulting phenomenon, *most likely from there being ulceration of the inner surface.** He observes: "There are few points in the practice of medicine of more importance than this—to remove, or prevent, flatulent distension of the abdomen." In 1848† Dr Sibson pointed out that a highly distended stomach also pushes up the liver, which is so

* Baumès, in his work, 'Traité des Maladies Venteuses,' when treating of the many grave effects of flatulent distension of different parts of the gastro-intestinal tube (2nd ed., 1837, p. 85, &c.), quotes from Van Swieten a case in which an enormous flatulent dilatation of the colon had so pressed on the iliac vein as to produce symptoms of gangrene of the leg. During life the pressure was attributed to a deep-seated abscess. He adduces instances of rupture of the bowel from violent flatulent distension, not only when the walls of the bowel are diseased, but when they are healthy, quoting illustrations from Lieutaud and Gendron, &c.

† 'London Medical Gazette,' vol. vii, 1848, pp. 104—8.

compressed between the stomach and diaphragm that "an additional amount of blood from the hepatic vena cava is directly thrown into the right cavities of the heart at the very time that the heart's action is embarrassed by the upward pressure of the stomach." The extent to which the diaphragm may be pushed upwards by abdominal distension is well illustrated by a diagram, which shows the upper convex boundary of the muscle to be behind the third intercostal space on the right side, and behind the fourth one on the left side. Dr Sibson observes that when gastro-intestinal distension accompanies acute disease, such as peritonitis, it is often the immediate cause of death.* In 1873 that physician gave a clinical lecture at St Mary's Hospital† on the "Influence of Distension of the Abdomen on the Functions of the Heart and Lungs."

Quite recently attention has been drawn, in the 'Lancet,'‡ to the subject of relief of such flatulent distension as I have mentioned, in *puerperal* cases, by means of puncturing the abdomen; but this method of procedure has been adopted in many instances of tympanites in connection with other forms of disease than child-bed fever, with which both the physician and the surgeon have to do, and

* He points out how to distinguish whether the stomach alone is distended, or the colon.

† See 'British Medical Journal,' Aug. 2nd, 1873.

‡ See note by Dr Priestley in the number for April 9th, 1887; by Dr Barnes, April 16th; by Dr Braxton Hicks, April 23rd; and by Dr Nesfield, April 30th.

it is to its adoption in such cases that I venture at this time to draw special attention.

The subject was mooted in the year 1871, in several communications to the 'British Medical Journal,' soon after which I saw, at least, two cases in which death was apparently the direct result of unrelieved excessive tympanites (no other serious affection being discovered after death; instances as it were of "mors sine morbo,"), which determined me (remembering the adage, "primum est ut non nocere") not to lose any opportunity of suggesting relief in such momentous cases, after all other means had been tried, by the simple and readily performed operation of puncturing the abdomen.* Somewhat later such an occasion presented itself in the case of a lady suffering from a tumour (afterwards removed by Sir Spencer Wells successfully) which, by pressure on the bowel, had apparently produced such an amount of tympanites that the descent of the diaphragm was so interfered with as seriously to threaten life. In the middle of the night she was—

> "Her hands abroad display'd, as one that grasp'd
> And tugg'd for life." * * *

Intense dyspnœa, failure of circulation, and extreme

* And the remembrance of my experience, as curator of the pathological Museum at St George's Hospital, when having to superintend post-mortem examinations, supplies me with many instances in which pain and death might, seemingly, and according to more recent observation, have been obviated by abdominal puncture; cases of obstruction, of fever, &c. ("hypochondriacis inclusa meatibus aura").

prostration came on, when it proved impossible by ordinary means "decantare loca dolentia," and nothing remained to be done but to give alleviation, if so it might be, by puncturing the abdomen. Accordingly, Sir James Paget was invited in consultation, who assented to the suggestion, and who, by means of a fine trocar, punctured the prominent transverse colon in two or three places. This measure gave prompt and decided relief.* A large amount of very fetid gas was rapidly evacuated, continuing to rush out with a loud hissing noise for the space of some seconds [5]. The swelling of the abdomen at once subsided to a very considerable extent, thus averting, at once, collapse and death; the ease procured to the patient reminding me forcibly of the absolute and almost instantaneous repose, and not infrequently sound slumber, which follow the operation of tracheotomy in cases of croup or diphtheria. The patient entirely recovered. This personal experience aroused in my mind so great an interest in this operative procedure that I resolved to make some excursions into our medical literature, and to ascertain what views had been transmitted by predecessors and what had been recommended or achieved by contemporaries in connection with the matter—one, it must be allowed, of grave and urgent practical importance.

I here propose therefore to offer some fruits of my inquiries, and to chronicle, and set forth a "catena"

* A French writer, when describing the successful issue of the operation, speaks of the relief obtained as "soulagement miraculeux."

of the main illustrations which I have encountered, calculated, as data, to shape conviction on the subject.

As no investigation into the history of any point of medical interest would be complete without reference to Sprengel's 'Histoire de la Médecine,' I find it there stated* that in 1617 P. Pigray, and, somewhat later, Ambrose Paré, recommended, in cases of strangulated herniæ, the process of pricking the intestine with a needle for the purpose of assisting the reduction. Later on, Corneille de Soolingen, P. Dionis, and Heister, &c., at the beginning of the eighteenth century, did the same. It is possible, as Dr Saunders (to whom I shall allude later on, see p. 30) suggests, that puncture for relief of tympanites may have been suggested, originally, by the necessity which the older surgeons felt themselves under, of puncturing strangulated bowel, which they did with round or triangular needles.† The wisdom and utility of this procedure is fully discussed in modern English surgical works (see Travers' 'Inquiry into the Process of Nature in repairing Injuries of the Intestines,' &c., and other more recent works). On this subject see various references to foreign authorities, in 'Ziemssen's Cyclop.,' op. cit., p. 659, vol. 7.‡

* Tome ix, p. 107

† It may here be noted that the word "trocar" is derived from the French, their word having been originally "trois-quart," from the triangular shape of the point of the instrument.

‡ When relating two cases of strangulated hernia which were only reduced after puncture of the herniated bowel, the eminent French

Commencing now with some of the older medical writers whose works I have found in our libraries,

surgeon, Dr Chauveau, forcibly urges the utility and necessity of this proceeding in the following words. He remarks, "Pour moi, c'est un point de pratique désormais établi d'une manière incontestable, que, dans l'étranglement herniare récent, il faut ponctionner l'intestin avant de songer au débridement" (see 'Journ. de Méd. et de Chir. Pratiques,' 1872, p. 312).

About this date several cases of strangulated hernia, treated by aspiratory puncture, appeared in French medical literature; in many cases the puncture of the strangulated coil being considered the most efficacious auxiliary to the taxis. Dieulafoy contends that, with few exceptions, the *treatment of every case of strangulated hernia should commence by the use of aspiratory puncture.* For a report which is favorable, on Dieulafoy's memoir, by M. Dubreuil (and discussion following), see the 'Proc. of the French Academy of Medicine,' 1873. Dubreuil shows how largely success had attended the operation, and how innocuous it is: he says of it "qu'il constitue un progrès chirurgical sérieux." At the Société de Chirurgie (Dec. 11th, 1873) Dieulafoy had read a communication based on twenty-four observations, showing the utility of aspiratory puncture in helping to reduce strangulated hernia of all kinds. In the 'Indian Annals of Medical Science,' May, 1873, appeared a paper by Dr M'Connell on pneumatic aspiration, with cases of abscess of the liver treated thereby, and at the end of his remarks are some cases showing its use in other abscesses, and in retention of the bladder, and reference is made to the puncture of strangulated herniæ by Dr Labbè, of Paris, Demarquay, and Bryant. In the same journal for 1875, vol. 17, p. 87, are two cases related by Surgeon John Duke, of inguinal hernia treated by Dieulafoy's pneumatic aspirator. The use of the syringe in these cases was suggested by the above paper on pneumatic aspiration, by Dr M'Connell. In one case the trocar appeared not to have entered the bowel, only the terminal sac, but still the relief of tension was immediate, and the reduction greatly assisted; in the second case fluid was drawn off from a thickened sac. Speaking of the simplicity and innocence of the operation, the author anticipated that "tapping" a hernia would eventually "be placed in the same category as tapping a hydrocele or an abscess."

those "cemeteries of departed reputation," I will allude, firstly, to the observations of Harvey who, in his work on 'Generation,' 1651, speaks of the fleshy or muscular diaphragm in animals as being necessary to depress the stomach filled with food, and the intestines distended with flatus, "so that the heart and lungs shall not be invaded, and life itself oppressed in its citadel." Could we have read Harvey's 'Medical Observations,' we should most likely have found therein more detailed and important reference to the serious results of unrelieved flatulent distension. De la Font, in his 'Dissertatio Medica de Hydrope Tympanite'* (Geneva, 1697), after quoting various authors on the subject, and especially controverting the opinions of Willis, that tympanites was convulsive in its nature (himself contending that it was fermentative), alludes to its cure, if other means fail, by *puncture*. He also quotes Duretus as being in favour of the "compunctio seu punctura" in tympanites. In passing, I may say that he alludes to the statement of Paulus Ægineta (a view held by many more recent writers), that by means of cupping glasses the air can be drawn through the walls of the abdomen, "per poros cutis," "et quasi incantamenti vice, ut loquitur Galenus."† The brilliancy of imagination

* In many of the old writers, what we call tympanites, was considered a form of "hydrops," and was often called "hydrops sicca," in opposition to "hydrops ascites."

† De la Font remarks upon a somewhat quaint way of evacuating the air from the distended bowels recommended by others—viz. the

which is here apparent is also shown by Galen, who thought that the ethmoïd bone was pierced by holes in order to permit communication between the brain and throat, and for purging the brain from superfluities.

Boerhaave, writing in the early part of the eighteenth century, upon wounds of the abdomen (see his 'Praxis Med.,' i, p. 592), alludes to the necessity of puncturing the intestines with a needle, to evacuate the air, and then observes: "Quod nihil nocet, quia quando intestina sunt difflata, tunc se retrotrahentia illas puncturas claudunt." And in his Aphorisms, writing of tympany as "dry dropsy," he says that paracentesis never cures, but has sometimes given ease.

About the middle of the same century, F. de P. Combalusier, in his "Pneumato-Pathologia, seu Tractus de flatulentibus humani corporis affectibus," has a section entitled "Num peragenda in Abdominali Tympanite Paracentesis," followed by another, "Cautelæ in Tympaniticorum Paracentesi observandæ."

In the year 1756 Cheselden (see 'The Anatomy of the Human Body,' 7th ed., p. 161), after speaking of

exhaustion of it by the rectum. He observes (see p. 277): "Sunt qui putant *fistulâ clysteris* in podicum immissa sine ullo liquore, et frequenter agitato instrumento illo impulsorio dicto magnam flatuum copiam educi, modo flatus in intestinis contineantur, vel *follis fabrilis* clausus ano adaptatur, et deinde elevatur, sic enim flatus in intestinis contenti, modo pertinax aliqua obstructio in ipsis non adsit, in follem vel fistulam clysteris prædictam impellentur, quæ omnia experiri licebit."

relief, by puncture, of flatulent distension in animals caused by food, observes that the same operation might be done in man (but in them the necessity rarely arises) with ease and comfort, and with the same instrument which is used for tapping in a dropsy.

In 1761 Morgagni in his celebrated work, 'De Sedibus et Causis Morborum,' &c. (see lib. iii), in writing of the diseases of the abdomen (Epist. 38, § 25), remarks, when speaking of the difficulty of curing tympanites, that men of eminence have devised the use of paracentesis. He says that although alleviation may arise by letting out the air from the bowel, yet the fæcal contents may escape into the abdomen and bring on a fatal result.

Later in the same century (1788), W. Trnka, in his 'Historia Tympanitidis (Vindobornæ)' has a chapter headed "Paracenthesis," in which he presents and compares the views of many recent authors on the subject; and also one styled "Antlia Pneumatica," in which he suggests that with due caution an antlia (that is a suction or air pump) might be applied to the anal orifice, for the purpose of drawing out the gas contained in the bowel.* In the former section, he refers to certain experimenters (especially Ballonius) who had found that in the case of those who had died with excessive tympanites, upon piercing the abdomen with a very small instru-

* Dr Laycock, in his "Treatise on the Nervous Diseases of Women," quotes Kerr as saying that Dr Osborne and Dr Graves had continued the practice of using the air pump for abstracting the gas.

ment, air rushed out, and the whole abdomen suddenly collapsed:* and who consequently asked, "An non viventi metu repentinæ mortis ista punctio fieri et potuit et debuit? Audendum hercle (ait) desperatis maxime rebus."

At the beginning of the present century, Callisen, a Danish author, in his 'Systema Chirurgiæ,' &c., in a section upon Tympanites, writes: "Exclusio aëris punctione abdominali simplici, insigna quidem levamina beare solet miseros." He then proceeds to say that the relief is not permanent, owing to the re-accumulation of air.

In 1812, M. Mothe, of Lyons, published a rather lengthy memoir on Tympanites, in a work entitled 'Mélanges de Médecine et Chirurgie," in which (tome i, pp. 352—422), after enumerating seven varieties of tympanites (according to the classification of Sauvage's Nosology),† and quoting from many authors as to what was known of the disease (such as Lieutaud, Stwart, Pomme, Levrat, Littrè‡), and showing how they differed respecting the utility of abdominal puncture for its relief, he gives precise information as

* An experience very familiar to those who are in the habit of conducting post-mortem examinations.

† Tome x, Cachexies.

‡ Who stated that he had seen the colon so distended as to be equal to the thigh in diameter, and the whole intestine four times its ordinary volume. See Note 6 in Appendix, p. 101, for reference to a remarkable case of distended bowel. Baumès (op. cit., see p. 16), when referring to dilatation of the digestive canal, cites a case mentioned by Merbroéck, in which, after death, the *duodenum* was found to be dilated to the size of the ordinary stomach (see p. 83).

to its performance, the time and the locality most suitable for its use, and the kind of instrument to be used. He distinctly states that the over-distended bowel may recover its tone after the evacuation of the air, in the same way as the over-distended urinary bladder does, after relief has been obtained by discharge of retained urine. He concludes that in "essential" tympanites—that is, when the affection is not merely a symptom or accident of some disease—it would be in the highest degree inhuman and culpable, when other means have failed, to abandon the patient, and not to resort to puncture as a last resource.* And he quotes the practice of relieving

* He would thoroughly endorse the views of Bacon, who blames physicians for not making the *εὐθανασία* a part of their studies, as quoted by Halford, by the first Heberden, and by Watson. Heberden, that "Medicus vere Hippocraticus," as the Germans styled him, speaking of the duties of physicians, remarks: "They should try to disarm death of its terror; and if they cannot make him quit his prey and the life must be lost, they may still prevail to have it taken away in the most merciful manner." But the counsel to ease the dying, to be found in medical writers, was much more ancient than Bacon, as Aretæus, in his writings on the 'Therapeutics of Acute Diseases' (book ii, chap. 5), when treating of the cure of ileus, had said as follows. After stating that it was not permitted to the respectable physician to hasten the death of people suffering extreme pain, he proceeds to observe, "But at times it is permitted, when he foresees that present symptoms cannot be escaped from, to lull the patient asleep with narcotics and anæsthetics" (Adams' trans.). On this subject the reader may consult a little volume lately published by Dr Munk, termed 'Euthanasia, or Medical Treatment in Aid of an Easy Death.' In the chapter on "General Medical Treatment," the author adduces apt quotations from such authorities as Sir H. Holland, Heberden, Hufeland, De Quincey, Gregory, &c., alluding to the subject. The reader may remember an interesting reference to this question of

tympanites in cattle (so often the result of eating wet "lucerne"*) by puncturing the abdomen, thus only preventing death.

In 1818, C. B. Zang, in a work published at Vienna, on Surgical Operations,† has a chapter in which he gives detailed notice of "Paracentesis Tympanites."

In 1825, Portal, in his 'Mémoires sur la Nature et le Traitement de plusieurs Maladies,' tome 5, p. 219, writing of the general treatment of tympanites (pneumatie), speaks of acupuncture as an empirical remedy. He says that owing to the closing of the orifices of puncture after withdrawal of the needles, there is little chance of escape of air; and, again, he alludes to the danger of *wounding the nerves of the intestinal walls*, which may give rise to pain or even convulsions, or of *producing hæmorrhage* by wounding of blood-vessels.

In 1835, Dr Roche, writing in the 'Dict. de Méd. et Chir.,"‡ though considering the operation to be a dangerous one, quotes certain cases which were attended by success.

mitigating the pain and distress of humanity's last struggles in a footnote to the 'Life of Harvey' as given by Dr Willis (see Ed. Syd. Soc., p. lxxxvi). Alluding to the rumour that Harvey had desired Sir Charles Scarborough to shorten his life by giving him opium, a rumour protested against by Aubrey, Dr Willis observes that such requests as Harvey *may be presumed to have made, are frequently enough preferred to medical men: it is needless to say they are never granted.*" Arbuthnot said the kindest wish of his friends was euthanasia.

* The sainfoin (*Medicago sativa*).

† Theil iii, p. 308. ‡ Art. "Tympanite."

In the 'Bulletin de l'Acad. Royale de Méd.,' 1843—44,* a case is related by M. Levrat in which intestinal tympanites was cured by puncture of a part of the small intestine with a trocar of the size of a knitting needle.

In 1837, Baumès, in his 'Traité des Maladies Venteuses' (see Seconde Lettre, p. 12), speaks of the mechanical treatment of "gaseous flux" in the intestines by extracting the air by the mouth, by the anus, and even by an operation *on the walls of the abdomen*. Again, at p. 207, he speaks of pumping out the gas by means of a cannula or sound having a syringe or a "pompe aspirante" attached, applicable either to the rectum or œsophagus; but in desperate cases he counsels puncture of the distended bowel through the abdominal walls by a fine trocar, or by fine needles, and this not only to procure immediate easement, but to prevent that *rupture of the bowel* which may be threatened by the over-distension.

In the year 1845, Mr Teale, sen., of Leeds, in his address before the Provincial Medical and Surgical Association, observed that paracentesis of the intestine for tympanites, by a fine trocar, had been successfully adopted by Sir H. Marsh and by M. Levrat; and Dr Littleton, of Plymouth, in a communication later, pointed out that about this time Sir P. Crampton and Mr Cusack (of Dublin) had sanctioned the operation.†

* Tome ix, p. 9.

† 'Brit. Med. Journ.,' November 4th, 1871. With regard to the

In January, 1851, Dr Little and Mr Callaway brought before the Pathological Society of London (see 'Trans.,' iii, p. 106) the case of an imbecile, in whom a remarkable degree of distension and hypertrophy of the colon, especially the sigmoïd flexure, had existed (see engraving at p. 103). Shortly before death, the distension of the abdomen and the constitutional disturbance were so great (displacement of the apex of the heart, as high as the third intercostal space, orthopnœa, restlessness, depression of pulse and temperature) that the abdomen was punctured with a fine trocar. "Copious volumes of fetid gas were discharged by the puncture, and after repeated re-accumulation, by the tube." Hopes of recovery were entertained, but were disappointed. After death, "the most careful investigation failed to discover the situation where the trocar needle had penetrated the intestine." The puncture in the abdominal parietes had healed, and was faintly indicated by a minute black point. There was adhesion of the intestine to the abdominal walls.* Messrs Little and Callaway

practice of these eminent Irish surgeons, I have been given to understand by others that Sir H. Marsh was in the habit of relieving excessive distension of the abdomen from flatus without any bad effect, by pricking with a small trocar; and that Mr. Cusack operated several times in this way, in consultation with Sir H. Marsh and Sir P. Crampton, and each time with great relief. Of any association between these gentlemen and the operation I regret to say I can find no written record.

* This case is quoted by Duchaussoy in his elaborate and classical memoir on the 'Pathological Anatomy of Internal Strangulations' (see 'Mémoires de l'Acad. Imp. de Méd.,' 1860, 237).

attributed the death of the patient "to the disturbance of the vital powers, in consequence of the mechanical injury of the intestine resulting from its extraordinary distension." A very interesting fact connected with this case was the absence after death of any apparent cause of obstruction, or of the enormous hypertrophy of the muscular wall of the bowel [6].

In 1852, Labric published a thesis ("De la Ponction abdominale dans la Tympanite') in which he put together the various facts which he had met with in connection with the operation, and relates his conclusions deduced from them. He recognises the two varieties of tympanites, *peritoneal* and *intestinal*, and gives their causes, symptoms, and treatment, quoting especially Chomel* and Piorry† as to the source of the gas in the former variety. He notices that the operation is often resorted to, successfully, by veterinary surgeons, in the case of cattle on the point of death, after they have eaten large quantities of moist food, especially trefoil. He observes that, in man, not only does the operation, when necessarily resorted to, give relief to distressing symptoms, but that it renews to the distended and enfeebled intestine its contractile power, and enables it to discharge its contents, in the same way as, in retention of urine, the bladder's power of contraction is restored by drawing off the contents,†† and as the contraction

* 'Dict. de Méd.' Art. 'Pneumatose.' † 'Dict. des Sciences Méd.'

†† In a note to his memoir alluded to above (p. 13), M. Mothe remarks

of the parturient uterus is facilitated by removal of part of its contained fluids.* Labric quotes Levrat and Maisonneuve as having seen a return of the peristaltic action of the bowel, upon the free evacuation of flatus following puncture; and he remarks that peritonitis is almost the only accident which one has to anticipate from the intestinal puncture; and this, he observes, has caused many to look upon the operation with disfavour. This peritonitis, he says, does not seem to be owing to injury to the peritoneum by the instrument, but is the result of escape, into the cavity, of fæcal matter. In this he is supported by Jobert, who, in his treatise on 'Wounds of the Intestinal Canal,' says that when sharp instruments penetrate, directly, the intestine, without tearing it, the edges of the orifice close, and the space produced disappears when the instrument is withdrawn; and he considers acupuncture of the bowels to be free from danger. In a case of typhoïd fever in which the intestinal puncture was made in order to relieve the tympanites, no traces of an opening in the walls of the bowels were ascertainable after death. He quotes Mérat, Paré, Law, and v. Swieten, who practised acupuncture of the bowels in cases

that he knew a woman who had had retention of urine for *fourteen* days, the urine during this time only escaping by overflow. The bladder eventually recovered its natural powers.

* The practical surgeon is conversant with the fact that in cases of obstruction of the bowels, free alvine evacuation by the natural outlet is wont to occur, very shortly after removal of the pent-up fæces above the obstruction, as a result of colotomy.

of strangulated hernia. In puncturing the abdominal walls, Labric recommends the trocar, in preference to acupuncture, as by means of the cannula the gas may continue to escape; and he gives important surgical directions as to the mode of conducting the operation, incision of the skin being often required before the plunging in of the trocar. Considering what grave evils may be caused by excessive distension of the abdomen, the author gives a warning *against delay* in operating. Of course, he observes, if the distension is from gas in the stomach or lower bowels, an œsophageal or long intestinal tube may give relief. He has never seen any case of puncture for *peritoneal* tympanites, but quotes some instances of this affection from various sources.

In 1858, a case was published in the 'Moniteur des Hôpitaux'* wherein death, which appeared inevitable, was averted by puncture of the bowels, which were enormously distended by flatus, after other means had failed. Three or four litres of gas escaped by the puncture, with a loud noise.

In 1860, Dr. Olivieri published in the 'Gazz. Lomb.' a description of twenty cases which he had met with in Bolivia, South America, of acute tympanites caused by improper food, in which he had punctured the stomach. Of these, eight recovered, the others dying, " probably from not having

* 'Medical Times and Gazette,' p. 539.

been submitted to treatment until too late."* And in 1868, Bricheteau, after alluding to the discussion on the merits of the operation by Fonssagrives and Ripoli, reported, in the 'Bull. Gén. de Thérap.,' vol. lxxiv, p. 327, an interesting case in which Dr Bouley had ordered it to be done at the Necker Hospital. The punctures were made on three separate occasions; they were attended by absolute relief to the patient, and were followed by free alvine evacuations.

In the 'Guy's Hospital Reports,' 1868, I find that among the cases illustrating Dr Hilton Fagge's well-known paper on 'Intestinal Obstruction,' 1868 (see vol. xiv, 3rd series, p. 272), one or two instances are recorded of piercing the bowel in order to relieve over-distension. Thus, in Case 55, one of volvulus of the cæcum, in which an operation for opening the abdomen was thought inadmissible, "as it was impossible that the man could live long, it was proposed to prick the abdomen with needles, to see if any peristaltic action could be, or if any gas could be removed. As this operation produced no effect, a very fine exploratory trocar was thrust in. A quantity of gas escaped, which gave the man much relief. Afterwards, a little fæcal matter passed through the cannula, which was fixed in, and was not removed until after death. He lived much longer than had been expected." After death it was found that the

* 'Syd. Soc. Year-book,' 1861, p. 213, and 'Schmidts' Jahrb.,' vol. iii, p. 308.

trocar had entered the distended cæcum, "but had done no injury." No extravasation of fæces had taken place.

Again, in Case 56, also a case of volvulus, a small trocar was thrust into the distended abdomen, owing to difficulty of breathing. Some air, and a thin serous fluid exuded, but no further particulars of the procedure are given.

In Case 40, one of fatal chronic obstruction of the lower end of the small intestine by contraction from old peritonitis, Mr Birkett passed a fine trocar and cannula into the bowel for relief of urgent symptoms, when a mixture of air and fluid immediately came out with a whiz, and much relief was obtained. At the conclusion of his paper, Dr H. Fagge in drawing attention to the above three cases in which the intestine was tapped with a trocar to relieve distension, observes, "The operation is one which has, I think, been less practised in this country than on the Continent."

In 1869, Dr Braxton Hicks recorded four cases, in the 'Transactions of the Obstetrical Society,'* of puncture of the abdomen for flatulent distension; and he alludes to the discussion of the question which had lately taken place in Paris when this treatment was commended, twenty cases, he observes, of the procedure having been included in the paper read. (I have not as yet been able to find any further account of this discussion.) Dr Hicks says

* See vol. x, pp. 47—48.

that he thinks there is not much risk of extravasation into the peritoneal cavity, as, if the smallest exploring trocar be used, the tissues of the bowel are rather separated than cut, so that the opening is closed as soon as the instrument is withdrawn.* He alludes to extreme tympany as one of the dangers of peritonitis, as pressure of the gas on the sympathetic nerves, and the tension of the tissues which they supply, must add to the collapse and vomiting.

In 1869, also, appeared a case in the 'British Medical Journal,' of August 21st, described by Dr Davey (then of Bristol), of tubercular peritonitis in a child for whom puncture was performed by Mr Salmon, of Thornbury, for relief of painful distension by flatus. Large quantities of fetid gas were let out, with great ease to the patient, and this continued, from time to time, to pass off, until the death of the child ten days afterwards. It was found, after death, that ulcerative communications existed between the bowel and the peritoneal cavity. Dr Davey quotes from the 'Medical Press and Circular' of April 7th, 1869, two cases in which Dr Fonssagrives, of Montpellier, had lately punctured the abdomen several times with marked success, when the patients were in extreme peril from tym-

* Professor Gross, in his work on 'Wounds of the Intestines,' observes that if the punctures be very small, amounting rather to a puncture than a wound, the escape of gas or fæces will scarcely take place, owing to the protrusion of the mucous membrane forming a sort of valve, which opposes escape of the bowel-contents.

panites.* He also states that he was informed by Mr N. Leigh, veterinary surgeon at Bristol, that he had often performed this operation with a trocar or pocket-knife, chiefly on cows, more rarely on horses, and with good results.

In 1869, Dr Clifford Allbutt recorded in the 'Practitioner'† the case of a man with pneumonia attended by fæcal obstruction and most painful and extensive tympanites with hiccough, in which, after the unsuccessful adoption of other remedies, he had the abdomen punctured by Mr T. P. Teale, who plunged a No. 1 exploring trocar into the distended transverse colon, "by which," he says, "a large quantity of highly offensive air was let out, and then again into the descending colon, with the same result. The abdomen became quite soft, the greatest relief followed, and the patient soon sank into sleep." Shortly afterwards the bowels recovered their activity. The patient sank from the pneumonia. Post-mortem examination showed no trace of peritonitis, nor "had air entered into the peritoneal cavity." No traces of the punctures which had been made could be discovered, except on the surface of the bowel. After dilating on the good effects of such a painless operation giving great and ready relief by emptying the bowel and allowing it to contract upon, and expel, accumulated fæces, Dr Allbutt remarked, that if the medical attendant, on an emergency, has not a fine trocar

* See 'L'Union Médicale.' † February number, p. 109.

at hand, he may use the needle of his morphia syringe.

In the same year (1869), Mr Thomas Smith communicated to the Clinical Society* the particulars of a case of ruptured intestine, in which the bowel was punctured for relief of distension by flatus. This was done by a fine trocar through the linea alba, half-way between the pubes and umbilicus. "The effect of the puncture was immediate, and the relief to the boy's sufferings very great. A large quantity of offensive flatus escaped, the vomiting was less urgent, and he soon afterwards fell asleep. Three hours after the puncture the bowels acted freely, not having before been moved since the accident, seven days previously." Mr T. Smith quotes a case, from the 'Bulletin Gén. de Thérapeutique' for 1867, of obstruction of the bowels, in which, as a last resource, the small intestine was punctured with a fine trocar. A large quantity of gas escaped, and on the same day the bowels acted twice. Fifteen days afterwards, and again later on, the puncture was repeated, and on each occasion with the same good result. He also quotes M. Lafargue, of Toulouse, who had employed puncture for tympanites in two cases.† In one case the puncture was repeated six successive times with great advantage.

In 1870, Dr H. Wathen, then of Fishguard (now

* 'Trans.,' vol. ii, p. 64.

† 'L'Union Médicale,' Oct. 23rd, 1867, and 'Brit. Med. Journal,' 1867, November 16th. These are obviously the cases alluded to by Dr. Davey, see p. 24.

of Clifton), communicated a case to the 'Practitioner,' * in which a woman, with acute peritonitis, accompanied by distressful tympanites, had the puncture performed. A No. 1 trocar was plunged firstly into the transverse, then into the descending, and lastly into the ascending, colon. Relief was at once afforded. The patient, however, sank, the next morning.

In the following year (1871), Sir Risdon Bennett (then Dr Bennett) communicated to the 'Practitioner' of February, 1871, a short paper on "Mechanical means of Relief in certain Cases of Inflammatory Effusions," founded on a highly interesting case of peritonitis which he had seen at Christiania, wherein large quantities of inflammatory products were withdrawn from the abdomen by trocar, and a drainage-tube was long worn;† and in which also the colon had been punctured for tympanites, apparently, and in the patient's opinion, preserving life by relieving the accumulation of flatus. Dr Bennett, in addition to valuable suggestive remarks on the case, stated that he was quite in favour of

* Vol. v, p. 252.

† I may say, in passing, that the natural evacuation of purulent fluid through the umbilicus in cases of peritonitis (analogous to the process which sometimes occurs in pleurisy) has been several times observed. Such instances are mentioned by Dr West in his 'Lectures on the Diseases of Infancy and Childhood,' 3rd edit., pp. 88 and 505. See case described by Mr Lediard in the 'Lancet' for August 6th, 1887, p. 262. Mr Lediard makes some interesting quotations from various authors regarding umbilical fistulæ and peritoneal abscess. I would here allude to a case related in the

puncturing for excessive tympanites, and believed that great advantages were likely to be derived from its practice, though it was "not devoid of danger."

In July, 1871, Professor Fonssagrives, of Montpellier, communicated to the French Academy of Medicine (see 'Bulletin de l'Acad. de Méd.,' t. xxxvi, p. 485) a paper on this subject, showing that the operation, in France, had first been performed by Nélaton, at the suggestion of Récamier. Since 1866 the author had performed the operation several times, frequently with a hydrocele trocar, and always without any evil effect. He thinks that an exploratory trocar is the best instrument for use. He mentions one case in which the puncture had been resorted to fifty times in the same patient. On his communication a discussion arose at a later meeting (see op. cit., p. 522), when allusion was made to the expe-

'Lancet' for April 14th, 1888, by Dr R. T. Smith, of encysted serous peritonitis, the apparent result of old inflammation; acute purulent peritonitis set in, in which abdominal section and drainage were resorted to, and was followed by recovery. The case also of encysted peritoneal effusion in the upper part of the abdomen, relieved by operation, related by Dr Roy, in the 'Indian Medical Gazette' for November, 1883, is worthy of note. In this case tapping with a fine needle let out 128 ounces of fluid: again 16 pints, again 14 pints, and again 12 pints of semi-puriform fluid. Eventually a drainage-tube was inserted, and this was worn for six months, during which time the peritoneal cavity continued contracting apparently; after that the case ceased to be under observation. Dr Freind, in his 'History of Physic,' vol. ii, p. 154, alludes to the fact that in an ascites the water may burst out at the navel or other part of the abdominal wall, either by a casual wound or by its own force, as it were, by "way of crisis."

rience of veterinary surgeons such as Bernard, Charlier, and Chabert. M. Depaul spoke strongly in favour of the operation, and quoted a case in which life and health had been restored to a woman dying asphyxiated by gastro-intestinal tympanites.

The experience of Barth, Blot, Giraldès, and others are in favour of the operation. M. Huguier described an instrument which he had contrived for the purpose of preventing the escape of gas and other contents of the bowel into the peritoneal sac, viz. a very sharp needle working in the cannula of a trocar, which separates, without dividing, the intestinal fibres; an instrument very useful in strangulated hernia. In a case of Cæsarian operation Blot had found puncture of the bowels of great use in enabling him to replace them, as in cases of strangulated hernia. M. Verneuil was somewhat doubtful as to the advisability of this procedure. Richet and Barth spoke of cases of essential peritoneal tympanites in which the puncture had been practised. Gueneau de Mussy and Huguier referred to cases of internal strangulation in which the coils of intestine are bent and so disposed that if one is emptied by puncture, the neighbouring ones, which are isolated, are not so emptied. In such cases puncture of one coil does not empty the gas contained in the others. At page 34 I mention Dr Cameron as making a like observation. See also the cases on pages 34 and 78.

In the same year (see the 'Bull. de l'Acad. de

Méd.,' t. xxxvi, p. 943), among certain "Lectures," appears a communication by Prof. Piorry relative to the collection of gas in the abdominal cavity, and to its evacuation by puncture. The author vigorously impugns the conclusions of Fonssagrives (above recorded) as regards the alleged harmlessness in most cases of abdominal puncture. Recognising the immunity with which many operations involving the peritoneum are performed, he believes that perforation of the stomach and intestines for evacuating contained gases is a highly hazardous proceeding, owing to the septic inflammation of the peritoneum set up by escaped gases and fetid materials, especially sulphuretted hydrogen gas. He remarks that these cases of over-distension, owing to obstruction, &c., cannot fairly be compared with those cases of over-distension in some of the lower animals from vegetable food, as in the latter the gases from fermentation are so much less dangerous than the sulphuretted hydrogen resulting from animal substances.

In the same year (1871), Dr Wathen communicated a paper to the 'British Medical Journal' (October 21st), in which he gathered together some of the English cases of which I have given an abstract, and registers another—a case of dysentery in the practice of Mr Thomas—wherein puncture of the ascending and transverse colon was performed with the best results. Dr Wathen alludes to the puncturing of cattle for tympanites, as used by graziers,

and concludes with the following weighty remarks: "When I picture to myself the immense distress and suffering present in an intensely tympanitic patient, whatever may be its cause, and then recall to mind the ease and quiet, if not anything more, which we are enabled to afford our patient by what I am bound to describe as a simple, harmless, and painless operation, I feel drawn to the conclusion that it is a proceeding not only justifiable, but urgently demanded at our hands." In a letter which I afterwards received from Dr Wathen, he says that he has not had further occasion to puncture the abdomen for tympanites, but that he had been called upon, along with Dr. Howard of Newport, Pembrokeshire, to puncture a large hernia with the view of reducing its size [7]. Subsequent to Dr Wathen's communication, Dr Saunders, resident physician at the Devon Asylum, sent a memorandum to the 'British Medical Journal,* in which he gives an interesting *résumé* of what had been advanced by authorities in the last century regarding the proceeding in question. To this communication I have elsewhere alluded.†

In the same year (1871), the same journal (Nov. 4th) contained the details of a case, related by Mr Brown, of Ealing, of a boy suffering from tubercular peritonitis. Collapse came on, in spite of remedies; but entire recovery followed puncture of the abdo-

* November 18th, 1871.

† See p. 8.

men, which was performed on two occasions by means of a small trocar, liberating large quantities of fetid air, followed by a drop or two of pus.

In 1872, Dr Bristowe brought before the Pathological Society (see 'Trans.,' vol. xxiii, p. 119) the case of a man with complete stricture of the descending colon from colloïd cancer, &c., in which puncture of the abdomen was made in two places, the one apparently corresponding to the central point of the transverse colon, the other corresponding to some part of the small bowel. A small quantity of gas only escaped, and from the second puncture a little liquid fæcal matter oozed out. Slight relief only followed, and within a short time peritonitis set in of which the patient died. After death, fæcal matter was found in the peritoneal cavity; the fatal peritonitis had been caused by perforation of the floor of an ulcer situated in the lower parts of the ileum. Dr Bristowe thinks that the ulceration and perforation of the intestine were caused by the long-continued extreme accumulation of fæces which occurred; and that the possible fretting of the bowel by such accumulation affords an argument in favour of an early operation for artificial anus, in cases of obstruction.

In the year 1873 (February), Dr H. C. Cameron read before the Medico-Chirurgical Society of Glasgow* a paper on what he termed "Colo-puncture." In this he described the case of a man

* 'Glasgow Medical Journal,' May, 1873 pp. 289, 424.

who, after an operation on the leg, had rigors, and pain and swelling of the abdomen. As the abdominal distension became extreme, after fruitless resort to other means, puncture of the colon was performed; and this had to be done on eight separate days,* with the greatest relief, and at the urgent desire of the patient, who got well, no increase of the peritonitis taking place.

When the over-distension of the bowel arises from mechanical obstruction, Dr Cameron thinks that the operation has, very often, many advantages over the use of the long tube passed into the bowel. It is, if properly done, he says, not more risky, inasmuch as some danger, and often difficulty and great discomfort, attend the use of the tube, and its success is by no means uniform. The undesirability of repeating the passing of the rectal tube is great. Dr Cameron closes his paper by indicating the precautions necessary to be taken in performing the operation—viz. that the cannula should fit very accurately around the collar of the trocar, that the trocar be of sufficient length—that is, three or four inches long—that any great amount of pressure on the abdomen should be avoided (for fear of squeezing out fluid from the bowel), that the puncture should always be at the most prominent part of the abdo-

* On one occasion relief was not obtained, as the instrument did not pierce the bowel. This points to one possible source of failure in the operation. Already, in 1871, Piorry had shown that the trocar may pass between the convolutions of the bowel, not hitting the intestine (see 'L'Union Méd.,' 1871, No. 109).

men, as the patient is lying. To meet the risk from fluid being squeezed out of the bowel, it is suggested that a small syringe should be used with warm water to wash back any fluid fæces which may exude through the trocar. This precaution is obviously a highly valuable, if not always necessary, one. In the discussion upon Dr Cameron's paper, Dr Lyons said that, in a case of his, fæcal matter was found, on post-mortem examination, in the peritoneal cavity, but that this might have escaped after death. Dr Buchanan had, since 1819, seen half-a-dozen cases of puncture for tympanites. He advocated the plan of puncturing the bowel with an aneurysmal needle threaded with wire, drawing the needle through the opposite side, and leaving the wire forming a loop inside the bowel, which could be moved daily, thus allowing escape of the gas and avoiding the necessity of repeated puncture. Dr E. Watson doubted the advisability of puncturing the abdomen in cases of inflammation. At a later date,* Dr Cameron suggested colo-puncture in a case of intestinal obstruction arising either from paralysis of the walls of the bowel or from bands of lymph (of nine months' standing) under the care of Dr McGown, which was completely successful. In this case liquid fæces, which were escaping through the trocar, were washed back by tepid water. Three hours after the operation the bowels had copious relief, and the patient recovered quickly. In the

* 'Glasgow Med. Journal,' 1880, p. 444.

discussion at the Glasgow Medico-Chirurgical Society upon this case, Dr Glaisher and Dr J. Coats said they had performed the operation. In a private letter Dr Cameron informs me that he has performed the operation in many cases of over-distension by flatus. He considers that, when done with proper precautions, it is quite devoid of danger, and in many cases is very useful. He remarks that "gas seems occasionally to exist in compartments in the intestine, even in cases in which the entire abdomen appears greatly and uniformly distended." "I suppose," he says, "sharp bends and turns of the gut may thus subdivide the gas into separate collections. At all events, it often happens that immediately on the withdrawal of the trocar, gas whistles through the cannula with as much force as might blow out a taper, but in a minute or two stops, even although much tightness and distension continue. In such cases I do not hesitate to puncture in a second spot." He tells me of the case of a lady, five months pregnant, having obstruction of the bowels, which were enormously distended, no evacuations having taken place for five days, in which he lately punctured the abdomen in two places. He observes that "only a small quantity of gas escaped: still she soon began to pass flatus 'per anum;' a movement of the bowels followed, and she recovered. At the time of the operation she was within a very measurable distance of death." In another case, one of obstruction of the bowels following fracture of the leg, Dr Cameron

punctured on two successive days, and as a result flatus began to be passed per rectum; the bowels were moved, and the man recovered from the obstruction. He died of pneumonia later on, and at the post-mortem examination it was found that there had been intus-susception of the bowel.

In 1874, Dr Martyn, of Bristol, related in the 'British Medical Journal' for February 7th the following most satisfactory case of "Intestinal Obstruction in Colic" in which flatus was evacuated by puncture. The patient was a man, æt. 60, with chronic bronchial irritation and a weak heart, in whom, on the fourth day of illness, the abdominal tension had increased to a most painful extent, the respirations being 33 per minute and the peristaltic movements of the bowel being apparently arrested by the tympanitic distension. The descending colon was punctured by a small trocar, and again a second time, opiates and enemata being used, on the day but one following, in two places corresponding to the transverse and ascending colons. On this day the patient was in great danger, the pulse being thready and irregular, the face dusky. After the puncture the abdomen became softened and the peristaltic action was soon established. The pulse and breathing improved at once and the patient called out for more punctures. He quickly recovered. Dr Martyn noticed that each puncture emptied the part only in its immediate vicinity, probably up to the nearest flexure. Thus the ascending colon remained

perfectly distended after the transverse had collapsed.

In the same year (1874) Dr J. W. Martin, of Portlaw, published in the 'Dublin Med. Journ.,' vol. ii, p. 383, some interesting cases of ileus and strangulated hernia treated by opium, in one of which he also resorted to the puncturing of the abdomen with a fine trocar and cannula, with almost immediate relief from extreme suffering, and eventually entire recovery. Dr Martin tells me that he had had two cases in which the puncture was performed with entire success; in a third it was done too late.

In 1876, Dr. E. Evrard published in the 'Journal de Médecine et de Chirurgie Pratiques,' &c. (t. xlvii, p. 158), the following case which he had seen, in 1869, in Algiers. A man, æt. 32, the subject of malarial poisoning, became affected with symptoms of paralysis of the large intestine. Along with constipation, excessive "meteorism" came on which, in spite of all treatment, became aggravated and dangerous. "Il y avait menace d'asphyxie et d'arrêt de cœur." As a "dernière ressource" puncture of the transverse colon by an exploratory trocar was resorted to, and the liberation of the gas gave immediate relief. At the end of two days the symptoms were as dangerous as ever, and the patient was dying. For some reason or other not given, further puncture was refrained from, and death occurred. On post-mortem examination no traces of peritonitis were found, and the puncture

in the colon was cicatrising. As regards the probabilities of peritonitis the author writes as follows: "L'expérience montre que cela ne se produit pas: l'élasticité des parties molles, revenant sur elle-même, obture suffisamment le pertuis de ponction; il faut peu de temps pour que l'adhérence se produise dans de pareilles plaies; aussi, lorsque la tension intérieure se reproduit, cette adhérence est-elle assez forte pour résister efficacement." Dr Evrard alludes in his paper to the observations upon the utility of puncturing the bowel in certain cases of strangulated hernia, by Demarquay, Verneuil, Trélat, and Dieulafoy.

In 1876, also, an interesting case was published in the 'Lancet,'* by Dr Finch, of the Leicester Borough Asylum, showing the use of the aspirator in relief of excessive tympanites attended by vomiting, constipation, and abdominal pain, which seriously embarrassed the heart's action. The instrument was introduced half-way between the pubes and umbilicus, and a large amount of flatus withdrawn, with immediate good result. Two days later the patient was worse as to vomiting, &c., and she appeared to be moribund. As a last resource the aspirator needle was again used, being passed into the cæcum, when a large quantity of gas and a little feculent fluid escaped. Action of the bowels followed, and there was no further use for the puncturing. No inflammatory action arose, and the patient recovered.

* October 7th.

In 1877, a paper was read at the annual meeting of the British Medical Association (see 'Journal,' Jan. 26th, 1878) by Dr Coupland and Mr Morris, on "Stricture of the Intestine," in which acupuncture of the bowel for relief of gaseous and fæcal distension was considered. Cases mentioned by Mr Bryant, Dr Silver, and Dr Bristowe, in which fæcal extravasation had occurred, were alluded to; and a case was quoted in which, though no extravasation from the puncture was caused, yet the puncture seemed to determine fatal perforation of the bowel *at parts where ulceration existed*, apparently from increased strain, and from the violent contraction and peristalsis induced by reason of the displacement of their contents.

In the same year Dr Godlee brought three cases before the Clinical Society of London,* in which gas was contained *in the peritoneal cavity*, without any perforation of the bowel existing. These were adduced as drawing attention to an incident which may happen in the course of the operation of colotomy. In one case there was ulceration of the colon, in the second one colotomy was performed, but the amount of gas which was met with in the peritoneal cavity for a time prevented the colon being found, as the peritoneum was protruded by the gas in the cavity. In the third case (as in the second) colotomy was performed by Mr Heath.

In 1878, Mr W. W. Wagstaffe, senior assistant

* 'Transactions,' vol. x, p. 115.

surgeon to St Thomas's Hospital, published in the 'Reports' of that Hospital (vol. viii) "A Case of Intestinal Obstruction, with Remarks on Tapping the Intestine as a Means of Cure in Certain Cases." In this case no post-mortem examination was attainable, but the cause of the obstruction seemed most probably to be adhesions about the lower end of the ileum, probably the result of typhoïd ulceration with, possibly, contraction of the scar, so as to produce narrowing of the tube by internal stricture, as well as by the pressure of the external adhesions. The attacks of obstruction producing most painful symptoms had been several in number. At last one occurred which resisted all remedies, and operative interference was deemed necessary. Before resorting to more serious measures Mr Wagstaffe determined to puncture the abdomen with a fine trocar. This was done four times, and *was followed by complete purging, which began six hours after the last tapping, and lasted for nearly three days.* In three out of the five tappings fæcal matter was drawn off through the tube.

The patient recovered so as to resume his ordinary work. Subsequently another attack of obstruction was relieved by the use of belladonna, but he died three months later, apparently from an overdose of belladonna. Mr Wagstaffe alludes to another case of intestinal obstruction from scirrhus of the large intestine, in which temporary relief from tapping was produced. After death no local effects of the

tapping could be traced, although, as in the other case, some fæces had escaped from the punctures. To prevent fæces escaping into the peritoneal cavity and setting up inflammation, it is suggested that before withdrawing the cannula the end should be stopped by the finger so that no air can get in; in this way, from absence of atmospheric pressure, the non-escape of fæcal contents is ensured.

Regarding the permanency of the relief of obstruction by puncture, a case related by Dr F. Taylor, of Guy's Hospital, is quoted, in which the tapping of distended bowels was followed by regular motions, although there had previously been chronic and slowly increasing, but definite, obstruction from cancer, with all its symptoms. The mechanism of such relief, Mr Wagstaffe thinks, may be found in the removal of pressure above a valvular closure of the intestinal tube. Mr Wagstaffe observes that in cases of obstruction by growth or stricture the occlusion is rarely complete, and "in many cases the cause of obstruction is a knuckly mass of scirrhus, where the upper part of the mass can be pressed down into the lower, very much like the lid of a box or a conical plug, and the more it is pressed upon the tighter it is shut; or there may be adhesions binding down one part of the intestine, and over-distension of the gut above may throw the tube of the intestine out of a continuous line, and a fold or a bend in it may act just like a flap-valve, and the more it is pressed upon from above the tighter it will be closed.

If, however, pressure be removed from above, the course of fluid fæces will be continued along the original track. The removal of pressure may be by tapping gas, or by opening the gut more freely and letting out fæces, as in colotomy; and therefore one would anticipate that sometimes after colotomy or enterotomy for permanent obstruction, the passage of fæces by the natural channel would be re-established. This is certainly the case. I have seen it over and over again."*

In a private letter kindly sent by Mr Wagstaffe he says that his contention in publishing the paper alluded to was that relief of obstruction may sometimes be obtained, and thereby a more serious ope-

* In illustration of the view taken by Mr Wagstaffe as to the *modus operandi*, in such cases of permanent relief brought about by letting out gas above the obstructed part, I may instance a highly interesting case related by Dr Aitken in his 'Science and Practice of Medicine,' ii, p. 814, which was under the care of Dr Osborne and Dr Bullar. The case was one of extreme invagination, the volvulus almost presenting externally. To the finger the invaginated part felt very much like the os uteri. On the supposition that the trouble was owing to the impaction of a florin with which the child had been amusing itself, an elastic bougie was passed through the orifice of the inner or contained portion of bowel, which was discovered with some difficulty, and by degrees the bowel was pushed up some distance, with the result that the intussuscepted part began to recede. "This seemed not to be the consequence of any direct force from the pressure of the bougie, as the latter had met with no obstruction or point of resistance; but it appeared rather as if the restoration of the canal to a rectilinear direction had afforded the condition necessary for the withdrawal of the volvulus by some natural action of the bowel itself." The volvulus became quite unfolded, the child's strainings ceased, and she made a good recovery.

ration avoided. His own experience has been "that the puncture is rarely attended with danger, and the less so when the distension is very great." Referring to the local effects of puncturing, he remarks that "in only one case operated on by a colleague have I ever seen any mark of inflammation about the points of puncture at the post-mortem examination, and then there was no general peritonitis."

Dr Goodhart, in a clinical lecture published in the 'Brit. Med. Journal,' Sept. 27th, 1879, expresses himself very strongly as opposed to the operation, and remarks that he is "not in the least inclined to recommend it." The danger is, he says, "that the distension is in the majority of cases, but little relieved—that alone is an objection fatal to its adoption—and the bowel remaining full and its walls tightly stretched, fæcal matter leaks out into the peritoneum after the withdrawal of the cannula from even the smallest puncture."—"So, do anything rather than this." After noticing the fact that small wounds of the bowel are comparatively dangerless owing to the eversion of the mucous membrane closing the aperture, the bowel being contracted, he observes that when the bowel is full the rugæ are obliterated, and there is nothing to evert. Under these circumstances the smallest hole "becomes a vent, and a vent, however small, in such a position, is fatal."

In 1879, Mr G. Brown brought before the Clinical

Society* a case of typhoïd fever, in which an accumulation of odourless gas took place *in the peritoneal cavity*, without any perforation of the bowel occurring. Puncture, with absolute relief to urgent symptoms, was resorted to; the respirations fell at once from 50 to 36, and the heart regained its natural position. This change enabled a greatly distended condition of the urinary bladder to be recognised. Mr Brown's account contains some interesting speculations as to the origin of the gas formed within the peritoneal sac.

In 1879, Dr Broadbent described in the 'British Medical Journal' (September 27th) a case of intestinal obstruction, owing to the pressure of a pelvic tumour, successfully treated by repeated puncture of the small intestine, by means of a long aspirator needle. He mentions some necessary precautions to be observed in performing the operation.

In the year 1882, Dr McLeod brought before the Calcutta Medical Society, July 1st (see 'Indian Medical Gazette') a case in which herniotomy and laparotomy had been performed. In the course of the case the gaseous distension of the bowel was so considerable that the heart and lungs were under great difficulty from the compression, and began to "flag or fail." Four punctures with a fine trocar were made, and a large quantity of gas escaped, with subsidence of swelling and tension and with some relief; but this was only temporary. Subsequently,

* 'Transactions,' vol. xii, p. 235.

after the abdomen was opened, in order to allow of search for the obstruction, the distended small intestine was punctured with trocar and cannula, and gas emptied, and this procedure was repeated. The author remarks that he "noticed that the track of the puncture remained open for a few minutes in each case, and emitted air and feculent fluid, though I took care to introduce the instrument obliquely and valvularly. This incident suggests an obvious risk in puncturing inflated intestine." He concludes from this case that the puncturing of the abdomen to relieve tympanites is useless and dangerous, and invited discussion on these points.* Of the members of the Society who discussed the question, Dr Harvey observed that he had pricked a hernia with the small aspirator needle without evil consequences, and that the hernia went back after the puncture. Dr Wallace had frequently punctured the bowel in strangulated incarcerated hernia, and had never seen any harm result, and Dr Brannigan said he had seen the bowel punctured by Dr Bell in Edinburgh, with great relief and ultimate recovery.

In the 'Indian Medical Gazette' for 1882 (see p.

* The author infers from this and other cases that the severity of operations for strangulated hernia depends rather on the paralysed condition of the bowel than on the gravity of the operation. This paralysis or immobility of the bowel, in his opinion, enhances the risk of a plastic peritonitis by allowing adhesions to take place which would be impossible in the case of actively moving intestines.

211), the case is related by Mr A. Tomes, of a man, æt. 40, with an irreducible scrotal hernia, in which, after other means had failed, tapping as well of the abdomen in two places, as of the hernial tumour, by a fine aspirator trocar was resorted to. Through one abdominal puncture several ounces of liquid fæces, as well as gas, escaped. "The operation was followed by relaxation of the abdomen, cessation of vomiting, and relief from pain," and later on, the hernia was reduced, and the patient got quite well. The author observes that the operation of tapping "certainly spared the patient the more formidable one of herniotomy with its attendant convalescence. The tapping doubtless effected recovery of tone of the intestine previously paralysed by over-distension, cessation of local spasm, and return of natural peristalsis."

In the same journal for the following year (1883, see p. 43), a case of intestinal obstruction successfully treated by aspiration, after failure of other means, is related by Surgeon Nrittogopal Mittra. It is stated that the aspiration was "followed by distinct relief, and apparently enabled the muscular fibres of the bowel to recover their peristaltic power, so that the dose of castor-oil given next morning acted at once and gave immediate relief." The writer had been informed by Dr O'Brien that he had tried aspiration in several cases of obstructed bowels, and that the operation had never been attended by evil consequences. In one case Dr

O'Brien, at the request of the patient, aspirated the tympanitic intestine every day for more than a week.

Again, in the 'Indian Medical Gazette' (July, 1883, p. 194), Dr McReddie related a case of intestinal obstruction with recovery, in which, after other means had failed, an acupuncture needle was introduced into three of the most resonant places in the abdomen, and this procedure was followed by free action of the bowels.

In 1884, Dr Hunter brought before the Obstetrical Society of New York* a case in which, following peritonitis, tympanites was so urgent that the patient appeared moribund. The use of the long rectal tube proved insufficient for relief, and the abdomen was punctured by a long hypodermic needle, when gas escaped, and continued to do so for half an hour. The patient recovered. The gas was not offensive, and had accumulated in the peritoneal cavity. In the discussion, Dr Nicoll, Dr Murray, and Dr Polk related cases showing the good results of the operation. In a subsequent meeting the latter gentleman quoted another case in which death was averted by the operation.

In 1884, also, in the course of a discussion at Liverpool upon intestinal obstruction (see 'Lancet,' Dec. 20th) Dr Rich stated that he had often punctured the bowel with great benefit for relief of flatulent distension. The utility of it was urged

* 'Trans.,' June 3rd.

also by Dr Crawford and Dr Archer.* *À propos* of this discussion Dr C. Macmillan published in the 'Lancet' of Dec. 27th a case showing the good effects of the procedure.

In 1887, Mr W. Furner brought before the Brighton and Sussex Medico-Chirurgical Society† two cases of abdominal puncture for flatulent distension. In both instances fæcal escape took place, and in one case it was found, after death, that it was the small intestine which had been pierced.

In the 'Lancet' for July 23rd, 1887 (p. 699), Dr Webb, of Stroud Green, recorded a case of occlusion of the bowels in which extreme symptoms, unrelieved by other treatment, were met by puncture of the abdomen in two places. Immediate relief was followed by action of the bowels and recovery.

On March 28th, 1888, Dr R. J. Ryle brought before the Hunterian Society (see 'British Medical Journal,' April 14th) the case of a man, æt. 46, with urgent symptoms from obstruction of the bowel. As colotomy was declined, puncture of the abdomen was resorted to. Eight punctures were made, with great relief to the distension. Violent peristaltic action was, however, set up. Three days later, puncture was again made; the following precautions being taken to prevent peristalsis, viz. hypodermic injection of morpho-atropine, and the use of a large

* Dr Archer spoke of the production of paralysis of the intestines in corpulent people, as resulting from fatty degeneration of their walls.

† 'British Medical Journal,' May 5th.

aspirating needle. A considerable quantity of gas was let off, no peristalsis followed; and forty-eight hours afterwards the bowels opened. After two weeks symptoms again returned, and the same operative treatment was adopted. In the course of the following three weeks puncturing was, four times, repeated, and great temporary relief was gained, but the patient subsequently sank and died. After death, the obstruction was found to be owing to stricture of the first part of the rectum; but no sign of peritonitis or of escape of fæces from the intestines was found.

In the 'British Medical Journal' for April 28th, 1888 (p. 900), Dr A. Wilkinson, of Tynemouth, states that, since 1875, he has resorted to abdominal puncture in tympanites several times. The first case in which he used it (with a hypodermic needle) was one of peritonitis. The patient was apparently dying, the pulse being almost imperceptible, the breathing hurried, the heart's action tumultuous, the countenance pinched and the skin cold and clammy. In a few minutes after the operation the patient began to improve, and entirely recovered. In no case had the writer experienced unfavorable symptoms from the procedure.*

* Dr A. T. Myers has been so good as to give me the following bibliographical references to the subject:—Brogniez, "Nouveau Procédé d'Entérotomie ou le Ponction Intestinale" ('Bull. Acad. Roy. de Méd. de Belge,' Brux., 1842—43, ii, 151—158); Augnet "Ponctions capillaires de l'Intestin" ('Bull. Méd. du Nord.,' Lille, 1875, xiv, 125—130); Fronmüller, G., jun., "Ponction der Gedärme" ('Memorabilien,' Heilbr., 1876, xxi, 208—210); Laub, "Tilfaelde af

Having gathered information from books, old and new, which record the results of varied observation—information, which, though not unanimous, on the whole, shows, undeniably, the utility of the operation in many cases—respecting the value of puncture of the abdomen for dangerous tympanites, I will occupy a little space by an exposition of the teaching on this subject, not barren or unprofitable, to be gathered from a few of our systematic works and text-books. For this purpose I will commence by noticing the observations of the late Sir Thomas Watson (πολλῶν ἀντάξιος ἄλλων), whose opinion may well be considered to be of the greatest weight. In his lectures on the 'Principles and Practice of Physic,'* writing of mechanical occlusion of the intestinal tube, he quotes the rough-and-ready custom which obtains amongst farmers of piercing, with a hay-fork, the distended abdomen of cattle, when they are, as it is said, "blown" by over-feeding on wet clover, and says that if he himself were "the subject of such pressing and prolonged torment [caused by distended intestine], I should try to have the inflated bowels eased by puncture with a fine trocar." †

Ileus helbredet ved Punktur af Tarmen og Klysoplumpe" ('Hosp. Tad. Kypbenh.,' 1869, xii, 157, and 1870, xiii, 41); E. W. Lee, "A Case of Puncture of the Intestines for the Relief of Over-distension with Gas" ('Chicago Med. Jour. and Exam.,' 1877, xxxv, 381—383); A. Tomes. Others might no doubt be found, if the prolific literature of the day were ransacked.

* Vol. ii, 5th ed., p. 548.

† This strong recommendation of the operation is much in con-

Romberg, in his 'Manual of the Nervous Diseases of Man,'* in one section treating of intestinal paralysis† from arrested action of sympathetic centres, speaks of cessation of peristaltic movement; the intestine, possessing no power of resistance, becomes distended with liquid and gaseous fluids. He states that "tympanites puerperalis sometimes threatens danger, even without antecedent affections of the bowel." He remarks that the stomach may be so much distended as to fill the abdomen.

Dr Flint, in his treatise on the 'Principles and Practice of Medicine' (1868),‡ alludes to "the formation of gas resulting from over-repletion of the stomach to such an extent as to cause sudden death. Two instances of this kind have fallen under my observation."§

In Ziemssen's 'Cyclop. of Pract. Med.' (English edit., 1877, vol. vii, p. 658), the operation is alluded to, and if properly performed it is described as being

trast with what Watson says, with his usual wise caution, of the operation of opening the colon, and establishing an artificial anus. Of this procedure, he observes that in an appropriate case he should think it his duty to mention, but he should be slow to recommend, this "anceps remedium."

* Syd. Soc. edit., vol. ii, p. 347.

† Romberg observes that "intestinal paralysis occurs secondarily to other diseases, first of the intestinal canal itself, as in enteritis, in the most marked form in gangrene of the intestines in peritonitis intestinalis, and dysentery; in blood diseases, typhus, phlebitis, and inflammatory or septic puerperal states."

‡ 3rd edit., p. 412.

§ Reported in the 'Boston Medical and Surgical Journal' for March 10th, 1841.

quite without danger, and bringing relief which, if only temporary, is still very considerable. The author, Leichtenstern, alludes also to puncture by *larger trocars* (as by Fonssagrives) of "*non*-resonant parts" to remove liquid fæces; at a later time aspiration of the intestinal contents was used along with the puncture. He refers to the "paunching" of cattle, as practised by farmers.

In Dr Bristowe's 'Theory and Practice of Medicine' (p. 696), this operation of puncturing the abdomen is alluded to as being one of little or no danger; it is stated that distension may be relieved by puncturing the distended gut with a grooved needle or fine trocar and grooved cannula. And in Quain's 'Dictionary of Medicine,' Dr F. Roberts observes that "in extreme cases it is allowable to puncture the large bowel in several points by means of a very small trocar, and thus afford an exit for the contained gas."

In J. Greig Smith's 'Abdominal Surgery' (2nd ed., p. 93) it is stated that, in tympanites associated with abdominal operations, tapping with a fine trocar may give temporary relief; but this is so slight and so evanescent as to be, practically, of no account. The author regards tapping for tympanites as dangerous trifling.

Mr Erichsen, in his 'Science and Art of Surgery,'* speaking of the operation in question, observes that by means of the trocar or aspirator it "has been

* Vol. ii, p. 841.

frequently performed, sometimes with great relief to the patient;" but he gives cautions against moving the cannula about—needlessly—in the gut. He remarks that the puncture is rarely followed by any escape of gas into the cavity of the abdomen. In some apparently helpless cases, he says, relief of the obstruction has been known to follow the paracentesis of the intestine.

The above citations, embrace all the experience from systematic authors which seemed to me desirable to gather and collate for the purpose of enabling the reader to judge of the value to be attached to the operation in question; and perhaps already I may have been prolix, and the same reader may remind me of the adage, "L'auteur se tue à allonger ce que le lecteur se tue à abréger."

I will now proceed to marshal the results of some inquiries which I have made of friends, colleagues, and others, as to their individual and personal knowledge and estimate of the use of puncture in tympanites. These results, not being in any way arbitrarily selected, represent a tolerably comprehensive range of observations; and will be influential in reinforcing the view already expressed.

Of my colleagues at St George's Hospital, Dr Dickinson, Dr Whipham, and Mr Holmes, inform me that they have resorted to the operation. Dr Harper performed the operation in 1875, when

house surgeon at St George's. Mr Dent tells me that he has a strong disbelief in the utility of puncturing, in tympanites. Mr Henry Lee thinks that, in cases where it is attempted under proper guidance, the trocar ought to be left in until adhesion has taken place between the peritoneum covering the intestine and that lining the walls of the abdomen. He has had no experience of the procedure, but supposes that, if any means could be discovered of preventing extravasation of fluid into the peritoneal cavity, it might become a recognised operation. Dr Montague H. Jones, of St Mary's Hospital, has practised it, though not with much advantage, in two cases of typhoïd fever and one of intestinal obstruction. Mr Christopher Heath's "impression is against the operation."

Sir William Jenner informs me that he has had the intestine punctured in several cases of extensive tympanites, and that in no case has any evil result followed. In one case, in which there was malignant disease of the sigmoïd flexure of the colon, with obstruction, "two interesting facts followed the operation—one was that the gas which escaped through the tube caught fire, and the other that the removal of the flatus was followed by action of the bowels, as though the great distension of the gut had interfered with its full action." This case was in consultation with Mr Adams, who has kindly sent me the history of it, which is as follows, and which, owing to its interest, I will give in full.

"The patient, a lady, æt. 67, came under my care in October, 1872, for abdominal pain with constipation. She had lost flesh and strength from the beginning of the year. In November the bowel difficulty increased, and on one occasion ten days elapsed without any action, and then an evacuation was obtained, of thin yeasty consistence and colour. In December there was the same difficulty. Small quantities of fæcal matter passed from time to time, after oil and other aperients were given, accompanied with much distension of the bowels and tormina. The outlines of the distended intestine could be clearly defined through the thin abdominal walls, and on friction were felt to contract, as if struggling to overcome an obstruction, and no tumour or any induration could be felt in any part of the abdomen. Towards the end of the month the symptoms became very urgent. She could take no food. Nothing had passed the bowel for many days and the tympanitic distension became intense.

"In this state I decided to aspirate the colon by a small trocar. This was done late at night, and as artificial light was required, one of the attendants held a candle near to the patient while the operation of tapping the ascending colon was performed. The trocar being withdrawn, the flatus rushed out with great force, and took fire from the flame of the candle.* For a moment I felt a little alarmed at

* See Note (5) in the Appendix regarding the inflammability of intestinal flatus.

this, and immediately extinguished the flame by putting my finger upon the mouth of the cannula, but on reflection I felt sure that no internal combustion could take place, and again applied the flame of the candle and re-ignited the flatus, allowing the whole to be consumed in this way. Gentle pressure was kept upon the abdomen, and a steady flame of a *bluish green* colour was maintained for about two minutes. All uncomfortable distension was overcome, and soon afterwards she passed, *per anum*, about a quart of thin yeasty fæcal matter with a further sense of relief.

"Two days after this the tympanitic distension returned, and I again resorted to aspiration of the ascending colon, but very little relief was obtained by this operation. Again, two days after this, the distension became extremely urgent, the heart's action became very irregular, and the face cyanotic. I again, for the third time, used the aspirator, but on this occasion I punctured the descending colon, which afforded the patient great relief, and, as after the first operation, she had a free action of thin fæcal matter from the bowel. No inconvenience or inflammatory action followed either operation. The patient lived two months after the last operation in comparative comfort. With gentle laxatives the bowel was kept free, and no tympanitic distension recurred to any great extent. There was a total loss of appetite for many weeks before her death, and she wasted to a skeleton.

In February she had a sudden violent pain in the abdomen, and soon after died.

"Post-mortem examination revealed a cord-like contraction of the sigmoïd flexure, which was narrowed to the size of an ordinary quill pen, which, with a little force could be made to pass through the stricture. The bowel above this was much distended and sacculated. The mucous lining was *ulcerated for several inches*, and the other coats were much attenuated. Rupture had taken place at one spot immediately above the stricture, and fæcal matter had escaped into the peritoneum. This was the immediate cause of death. The bowel below the contracted part was perfectly healthy. I looked for, but could not discover, the punctures in the intestine.

"This is the only case in which I have ever performed the operation of aspiration for the relief of intestinal flatus."

In another case of cancer in which Sir W. Jenner had sanctioned puncture of the bowels, each puncture of the bowel was found, after death, to be surrounded "by recent formation of cancer nodule, as if the irritation of the puncture had caused afflux of blood, and in place of ordinary lymph cancer had been formed."

Sir George Paget, of Cambridge, has had only one case of tympanites requiring the puncture. The operation gave relief, but the patient died.

Sir James Paget has recently told me of a patient between sixty and seventy years of age, very feeble

in body and mind, whose abdomen became distended to the utmost, after many days of complete obstruction or inaction of the bowels. "She appeared to be dying," he observes, "and I had no hope of doing more than relieve her distress by puncturing the intestines at the tensest places. I did this with a small trocar and cannula near each ilium, and at the upper part of the abdomen. Air escaped in large quantities, and the abdominal wall sank down. Some weeks afterwards I heard that the patient was in comfort, and that her bowels were acting."

Sir W. Gull has never advised the operation "though he has discussed it for many years."

Mr Teale, to whose use of the operation I have before referred (see p. 24), tells me that he has had no recent experience of puncture of the abdomen for flatulent distension. He says that he believes the operation to be "most effective when the large intestine is the seat of puncture. A puncture of small intestine only relieves a few inches, and is not entirely free from danger, as I have heard of fæcal leakage into the peritoneal cavity from such a puncture. It is most likely to be useful, and will be most free from risk in functional tympanites, especially of the large bowel, and to be of least use, and most dangerous, in obstruction of the bowels when the intestines are full of churned-up yeast-like gas and liquid."

Mr Hussey, of Oxford, informs me that he has punctured the intestine during the operation for

strangulated hernia, and that when he was a pupil his master suggested puncture of the stomach in cases of excessive tympanites.

Dr Church tells me "he distinctly recollects several cases of tympanites being treated by puncture, in all these with the intention of promoting 'euthanasia' rather than cure, and that, at least in one case after death, there was a small area of what looked like fæcal staining on the peritoneum round the puncture, which made me shy of trying it further." Dr Samuel West has resorted to the operation.

Dr Oliver, of Newcastle-on-Tyne, has given me the details of four cases, in which he had the operation done for tympanites with, excepting in one case, the greatest relief. All but one were cases of mechanical obstruction. Dr Oliver regards the operation "as not in the least dangerous, and as one almost certain to give 'relief.'" In one case he tested the gas which escaped by the puncture, but did not find it inflammable. The cases were as follows:

1st. A man, æt. 78. Obstruction of the intestine. Tympanitic distension owing to old inguinal hernia. Death followed a few days after the puncturing. No relief, but no bad symptoms followed. 2nd. A man, æt. 56, with chronic intestinal obstruction. Very few symptoms, and none urgent until the fourth and fifth week, when extensive tympanites set in. Great relief from several punctures of the

distended bowel, which were made daily. In the seventh week colotomy was performed. Death, preceded by rigors, followed on the day afterwards. 3rd. A man, æt. 50, with acute intestinal obstruction, great distension. Puncturing on the seventh day several times, only slight relief. Death four days afterwards. 4th. A man, æt. 48. Peritonitis associated with cirrhosis of liver and ascites. Enormous distension of bowel, pains severe. Numerous punctures made by aspirator needle; the gas issuing with a loud hissing noise, followed by the greatest relief. The patient survived. Had subsequently to be tapped for ascites. Later on, the puncture of the bowel was again had recourse to.

Dr Gray, physician to the Radcliffe Infirmary at Oxford, tells me that his only knowledge of punc ture for tympanites is derived from a single case. The patient was a lad of fourteen or fifteen years of age, suffering from severe typhoïd fever. He observes: "One morning I found him to all appearance on the point of death from asphyxia, the upper half of his belly being so enormously distended that the diaphragm and lower thorax were fixed and motionless. I directed the house surgeon immediately to thrust a small trocar into the most prominent part of the swelling (believed to be the stomach); and this done, the gas slowly blew off, the tympanites quite subsided, and the patient's relief was complete. He died, however, about three days afterwards of uncontrollable diarrhœa." After

death ulceration of the ileum was found, but no peritonitis. The only trace of the puncture-wound (and that rather a doubtful one) was a little pink spot on the peritoneal surface of the stomach; no mark on the inner mucous surface of the stomach corresponding to the faint one on the peritoneal surface, could be detected. Dr Gray proceeds to observe that "the harmlessness of the puncture made much impression upon me. The cause of this probably was: 1. Thinning of the structures from extreme dilatation. 2. The small size of the trocar. 3. The urgency of symptoms requiring bold and rapid thrust-in of the trocar."

Sir Joseph Fayrer has had no experience of the operation, but considers that "it might be useful, and would not hesitate to recommend it in a case where the symptoms were urgent, and relief by simple means was not obtained."

Sir Spencer Wells has punctured the tympanitic transverse colon with temporary benefit, but he thinks "he has seen as much relief from faradisation."

Sir Joseph Lister tells me that his experience of the operation is confined to one case. This was not favorable for the trial, but, still, death would have occurred earlier had the operation not been done. He does not regard the operation as absolutely free from risk, as "the valving of the puncture, which occurs when the distended bowel collapses, may be undone by subsequent extreme distension." Dr

Morgan, and Dr Leech, and Dr Dreschfeld, of Manchester, have sent me several cases illustrating the benefits obtained by the operation. Dr Morgan says that he has had recourse to the procedure in three cases; in all it was followed by relief, and was not attended by any untoward results.

Dr Dreschfeld's cases, to which I have alluded above are, in abstract, as follows:

Case I.—*Acute Intestinal Obstruction.*—A man, æt. 54, previously healthy and not suffering from chronic constipation, was suddenly seized with pain. Five days afterwards the bowels had not been opened, in spite of aperients and enemata. There was stercoraceous vomiting. No abdominal tumour could be felt on examination, but the abdomen was tense and very distended uniformly. Puncture of the abdomen by means of one of Southey's trocars produced some relief, and this was repeated a few hours later. Three or four hours after the second tapping the bowels acted. The patient eventually quite recovered.

Case II was one of malignant disease of the sigmoïd flexure. A man, æt. 60, had suffered for some time from constipation and abdominal pain. Obstruction had lasted for seven days. The abdomen was uniformly distended and there was persistent vomiting. Puncture of the abdomen produced great relief, and a few hours afterwards the bowels acted. The patient went on well for six months, when obstruction again occurred, which

again yielded to puncture. The patient died three months later from cancerous cachexia, but had no return of obstruction.

Case III.—A man, æt. 27, had always had good health, and had not been subject to constipation. When seen there was great pain in the abdomen, of some days' standing, and vomiting, and the belly was greatly distended. The vomiting was not stercoraceous. The patient was in the hospital for about three weeks. The tympanites was very great, and puncture of the abdomen was resorted to every two or three days with great relief. After death a cicatrix of a simple ulcer was found above the sigmoïd flexure. The punctures of the bowel had healed, and no traces of peritonitis at the places of puncture were to be found.

Case IV.—A boy, æt. 14, had had for four days, acute abdominal pain, constipation, and vomiting. When seen there was marked distension of the abdomen, and pain all over the abdominal surface, and considerable rise of the general temperature. Aperients and enemata had been tried in vain. The case was diagnosed as one of simple peritonitis. The abdomen was punctured in several places, and puncture was repeated on the following day. It did not appear that much good followed the puncturing, but no harm resulted. The vomiting stopped on the sixth day of illness, and the bowels were moved on the seventh day; the boy entirely recovered.

Dr Dreschfeld observes that although no bad

results, such as collapse or peritonitis, followed the puncturing in any of these cases, he repeatedly saw specks of fæcal matter squirted out from the punctures along with the gas.

Dr Leech's cases were as follows:

Case I.—A woman, æt. 45, with symptoms of obstruction of the colon. The abdominal walls were thin, and the distended bowel could be distinctly felt through them. The patient refused colotomy. To relieve discomfort the bowel was punctured with the needle of a subcutaneous syringe. So much relief was felt that the patient begged for a repetition of the operation, which was performed seven times in the next four days. On two occasions traces of liquid fæces were expelled through the needle.

On post-mortem examination a fibroïd stricture was found eighteen inches above the anus. There was reason to believe that both the small and large bowel were punctured, but no evidence of peritoneal mischief was found after death.

Case II.—A woman, æt. 65, also suffering from obstruction of the colon, probably malignant. Puncture was made which gave slight relief to the great discomfort resulting from distension, but was not sufficient to encourage a repetition of the operation. Faradisation was afterwards tried, and during its performance sudden collapse occurred, and the patient died in a few hours.

Case III.—A woman, æt. 40, suffered from what

proved, subsequently, to be malignant disease of the upper part of the descending colon. Long-continued chronic constipation was eventually followed by complete cessation of the action of the bowels, with enormous abdominal distension. Puncture, doubtless of the distended large intestine, gave little relief. Colotomy was performed on the right side, but the height of the obstruction caused it to fail. The colon was then opened on the left side. The enormous distension of the ascending colon was in this case a source of perplexity.

Case IV.—A woman, æt. 30, suffered from obstruction, somewhat sudden in origin, and probably due to the bowel being caught between old adhesions. Puncturing the distended bowel gave some, but not great, relief. She seemed, however, to improve; all sickness ceased. Under the slightly improved condition, and as the diagnosis was doubtful, laparotomy was deferred. Collapse set in suddenly, and the patient died. No post-mortem could be obtained."

On consideration of these cases Dr. Leech remarks that the operation itself seems to be free from risk. He writes, "Only in one of the four cases have I found very considerable relief—in none has it seemed of service in saving life, but these all were cases in which, perhaps, nothing but opening the abdomen or colotomy could have been more effective.

"In one or two discussions which have occurred at our Medical Society on the advisability of puncturing the bowel to relieve dangerous or painful

conditions, I note that the surgeons opposed the operation as dangerous, and all the physicians who spoke were of opinion that it might be done without much fear of evil."

Sir William Mac Cormac considers the operation dangerous because of the risk of subsequent escape of fæcal matter, which would set up septic peritonitis. Dr Habershon, though he has seen great relief follow the operation, would hesitate, owing to the possibility of fæces escaping, to recommend the procedure. My friend, Dr Fox, of Clifton, has been in the habit of advising the operation, and states that he has never found anything but relief from it. He thinks it is very rare to be able to find the intestinal puncture after death.

Dr Henry Lewis, of Folkestone, formerly house surgeon at St George's Hospital, has sent me the particulars of the following highly interesting case. He had under his charge a young lady, about fifteen years of age, with "perityphlitis." "The abdomen became enormously distended, and death was apparently imminent, chiefly in consequence of the respiration being embarrassed by pressure upon the diaphragm, from the extreme distension. After a consultation with my brother," he says, "it was decided to relieve present distress by the use of Hensley's exploring aspirator. This was done freely in several places, and enormous quantities of fetid gas escaped into the room. This was, in subsequent operations, deodorised by passing it through a solu-

tion of carbolic acid. The following day the abdomen was again distended, and life was once more in immediate danger. The abdomen was again freely punctured, with the same instant relief. For two or three times more the same series of phenomena occurred, after which the patient very slowly, but surely, recovered. The punctures were made into the most prominent portions, freely and deeply, quite irrespective of any possible consequences." Dr Lewis thinks that the mitigation afforded to the system by the evacuation of so much poisonous gas is as important as the mechanical relief obtained.

Dr Ransome, of Manchester, has only had one case in which puncture of the bowel was used for relief of tympanites (obstruction). It gave great relief, and though the patient died, it did no harm. He says that he would not scruple to resort to it again if other means failed.

Dr Pye-Smith has twice performed the operation: once with complete (subsequent rather than consequent) recovery; and the second time with very marked relief. In neither case with ill effects.

Sir Edward Sieveking tells me he has never used the operation, and scarcely remembers a case in which it might have been suggested, or in which he should not consider that he increased the patient's danger by ordering it. "Where relief is urgently required," he says, "the muscular coat is likely to be so much weakened that it would probably not contract after a puncture of sufficient size to allow

of the escape of gas; and besides, in these cases the cause of the condition would probably involve a fatal issue by itself."

Dr Wilks has seen the operation done a few times at St Thomas's Hospital, and generally with temporary relief. After referring to one or two cases in detail he observes, "As regards any harm which may accrue, I have not yet heard of any; and I well recollect the first case which I saw punctured, about twenty-five years ago. Mr Stocker, our late apothecary, asked me to see a case he had taken in, of obstruction, and one in which no surgeon would operate. He proposed puncture and I acceded. We put a fine trocar and cannula into a prominent coil, and much gas came out, to the relief of the patient, and this was followed, to my horror, by some fæcal matter. On the following day the man died, and I expected to find acute peritonitis resulting from fæcal extravasation. There was none, however, and after the most diligent search we could not find the puncture which we had made." He remarks, "The inquiry in which you are employed is one of great practical importance."

Mr Jonathan Hutchinson states that he has known the operation give much relief, though he has but little experience of its use. He thinks it is more or less "dangerous," and "is not fond of it."

Mr Barwell writes as follows: "I have not of late years punctured the intestine for excessive tympanites, but the late Dr Silver and I gave it a

somewhat full trial. I cannot without a good deal of labour get at the complete notes, but my small 'mems' of cases give this. I performed the operation seven times—in two cases I punctured in two places, in one in three places, in four in one only. Of these seven a certain relief was obtained in six, but in all it seemed merely temporary. Three cases survived, but it would be difficult to say if the operation was or was not an efficient cause in the survival. Four cases died of peritonitis and obstruction combined. Of these, one showed more extreme peritonitis about the punctures than elsewhere, with some suspicion of extravasation.

"One difficulty in the matter is this,—it is necessary to use a fine needle. Out of this a certain quantity of gas escapes; it bubbles up, generally, together with certain semi-liquid or quite liquid intestinal contents, which, as a rule, after a time, block the needle.

"These are the kind of cases to which I believe you allude, and not to gas in the peritoneal cavity itself, a condition which may, I believe, be diagnosed, but for which puncture would hardly be an efficient treatment."

Mr Lawson Tait has in many instances tapped intestine for the relief of over-distension. He believes that in fatal cases of peritonitis it gives great relief, and he has obtained in "severe cases such extension of time as to be enabled to pull the patient round the corner into safety."

Mr Davies-Colley has never had occasion to perform the operation, but has no doubt that in some cases it is beneficial; and he tells me (March 16th, 1888) that recently he heard of a patient with intestinal obstruction who only a few days ago had been several times punctured for tympanites, and had received much benefit from it. He had refused the operation of colotomy. Mr Davies-Colley remarked that in one case in which the operation was performed, extravasation of fæces through the puncture into the abdominal cavity caused death.

Dr Southey had a patient dying with intestinal obstruction who was suffering such tortures from flatulent distension that he asked Mr T. Smith to see her, and she was punctured in two or three places with great temporary relief, but died between twenty-four and forty-eight hours afterwards. Dr Southey says that fæcal matter had exuded at the points of puncture.

Dr Mitchell Bruce says he is opposed to puncturing for tympanites. He thinks he has seen it do harm, "and the relief, though great, may not last long. I had quite recently a case of tubercular peritonitis, with constant tympanites and attacks of most distressing aggravation of the same. We could not puncture, and we succeeded in giving wonderful relief by means of the Enema Assafœtidæ of the Pharmacopœia. This did not act *at once;* but in a few hours there was always much relief, lasting more than twenty-four hours."

Dr T. K. Chambers has only had experience of one case in which the operation was performed, and that was not successful.

Dr Ringer has had experience of one case (one of cancerous obstruction of the bowel), in which the operation gave immediate relief. The patient, however, died not long afterwards. He thinks the operation "should be useful in partial obstruction, by lessening distension, and so removing the weakness caused in the intestine by the over-distension, acting like bleeding in an over-distended right side of the heart."

Professor John Wood says, "I have in only a few cases employed puncture of the bowel for tympanites. In all cases in which I have employed it the relief, *although distinctly expressed*, was only temporary. It can only, I think, be useful *in extremis* for the sake of 'euthanasia.'"

Mr Charles Jennings informs me that he has seen several cases in which the intestines have been punctured with a fine trocar and cannula to permit the escape of flatus. He thinks the operation gives relief where the abdomen is much distended, and if the tympanites be due to intestinal obstruction caused by peritonitis, or bands adhering, &c.; the punctures, by permitting the escape of gas, may permanently relieve the strangulation. But, he says, in most of these cases an exploratory operation is both preferable and actually safer. In 1886 Mr Jennings saw a man suffering from tympanites with

peritonitis and obstruction. Puncture of the intestines was proposed, but he insisted upon an exploratory operation instead, although the man was apparently dying. There was acute peritonitis, the convolutions of the intestine were matted together, and the portions of gut between the adhesions were inflated. With his fingers he separated the various coils from one another, from the stomach down to the rectum. Subsequently he performed right lumbar colotomy, and the patient eventually recovered rapidly.

Mr Charles Clay, whose reputation is deservedly so high in connection with the subject of ovariotomy and obstetric medicine and surgery, is not so favorable to the procedure as many others. The information which he has been so good as to communicate to me on the matter will be seen in the following letter, which will, I am sure, be read with much interest. Mr Clay writes as follows:

44, Queen's Gate,
Claremont Park, Blackpool;
March 31st, 1888.

My dear Sir,—I shall feel glad if any information I can give will be of any service to you in your inquiries. Previous to my extensive operations on ovarian tumours I was somewhat shy in puncturing in cases of excessive tympanites considering the condition of the serous membrane was *in those cases* not favorably promising as to the result, and therefore avoided operating as long as I could. After

many cases of ovariotomy I changed my mind, and felt more inclined in such cases to puncture, believing that surgery of the serous cavities was not as far advanced as it ought to be, and that much remained to be done, opening a wide field of improvement to the operating surgeon. I must candidly confess, however, that puncturing in cases of excessive tympanites has not been any more successful than previously, and my experience in ovariotomy had not enlightened me. But I always did and ever shall maintain that a bold incision into the abdominal cavity is infinitely less mischievous than a puncture. It was this idea that carried me through my ovarian extirpations rather than a small miserable opening through which large masses had to be dragged with considerable force, doing unseen and serious mischief, out of the power of the operator to remedy. I therefore preferred a good-sized bold incision commensurate with the size of the tumour to be dealt with, with plenty of room to see and feel what is doing. You may infer from these remarks that I am not in favour of puncturing in excessive tympanites *if any other more promising means could be suggested.*

You will, I hope, excuse this wretched scrawl. A man in his eighty-seventh year cannot but feel it in his penmanship.

With kind regards,

I am, my dear Sir,

Yours sincerely,

Dr JOHN W. OGLE. CHAS. CLAY.

My friend Professor Da Costa, of Philadelphia, informs me that puncturing the abdomen for excessive tympany has often been done in his country, but what he has seen of it has only appeared to be temporarily palliative. He has known it done in five cases of typhoïd fever, not one of whom recovered.

With regard to the relief of flatulent distension of the bowel in typhoïd fever we had, many years ago, a very good instance of it at St George's Hospital. The case was that of our worthy apothecary, the late Mr Hammerton, who was attended by Dr Wilson, physician at the hospital, and Mr Fuller. At one part of his illness he was in great danger, evidently from the enormous tympanites which existed. Mr Athol Johnson, of Brighton, then about to become house surgeon at the hospital (to whom I am indebted for these particulars), assisted in passing a long tube up the rectum as far as it would go, and turning the patient on his stomach, and making pressure. In this way a great deal of gas was got rid of with immense relief, and entire recovery took place.

Professor Dill, of Belfast, has favoured me with the history of the following three cases:—He observes, "My first case was that of an old lady between sixty and seventy years of age whom I saw with Drs H— and K—. She had been suffering for over forty-eight hours from a large umbilical hernia, the size of a child's head. Every effort had been

made to reduce it but without effect. When I saw her there had been no proper action of the bowels, and there was some vomiting. Although there was great pain in the tumour Dr — made another attempt to reduce it, but had to give up, without any hope of reducing it by means of the taxis. I then suggested what I believed to be, under all the circumstances, the best and the safest treatment, viz. the introduction of the aspirator. This was acted upon, and with the most pleasing and satisfactory results. With the use of the aspirator a large quantity of gas escaped. The large tumour rapidly collapsed. Whatever else the sack contained glided back into the abdomen. The patient at once expressed herself greatly relieved from the pain. A pad and bandage were applied firmly round the abdomen, and the old lady made a good though a slow recovery.

"The second case was not so successful. It was that of a middle-aged dispensary woman whom I saw with Dr T—. She had been ill for nearly a week with an attack of peritonitis. I found the poor woman in, I may say, a hopeless condition. The abdomen was very much distended, and very tympanitic, and at the same time she was suffering from agonising pain, for which she entreated some relief, and as this was nearly all we could offer her I suggested that this might be attained by the careful introduction of a fine aspirator. But before this was done O'Brien's long tube was intro-

duced without doing any good, and as the pain was so excessive from the distension of the abdomen, it was thought advisable to introduce an aspirator, which was passed through the abdominal parietes at a point a little to the left of, and below, the umbilicus. A large volume of gas made its escape, and the patient soon expressed herself much relieved. Warm fomentations of Decoct. Papav. with a comfortable bandage, were applied and repeated, which contributed to her ease and comfort; and although this patient died in eighteen hours after I first saw her, yet I believe her life was prolonged by a few hours, and at the same time she was enabled to pass the time with comparative ease because of the relief given by the use of the aspirator.

"The third case was one of a young girl about sixteen years of age. She had been attended by Dr B— over a considerable time, for some obscure abdominal affection. Very painful distension of the abdomen set in, and as he had heard me speak of the benefit I had experienced in such cases by means of the aspirator he asked me to see this patient with him, which I did, and we agreed to its use. A quantity of air escaped by which she found a good deal of relief. In this case the aspirator was used a second and a third time, at intervals of a few days, with some little advantage, but the poor girl died within three weeks from the time I first saw her.

"I have no doubt from the fetid smell of the air

which escaped with the use of the aspirator in the second case that the intestine was punctured, but from its absence in the third and first cases I believe the intestines, in either case, could not have been penetrated.

"Be this as it may, in such extreme cases of distress I would not long hesitate before introducing the aspirator."

Dr Robert McDonnell, of Dublin, says his experience of puncture in intestinal distension is not favorable, but he thinks it well suited to give comfort and relief on a death-bed. He has not seen a patient saved by it, nor has he known one to die from it.

Mr Allingham tells me that in the great number of cases in which he has adopted the procedure he has found it useless; in many instances the post-mortem examination showed extravasation of fæces and acute peritonitis. He would not use puncture "unless the case is absolutely hopeless."

Professor Homans, of Boston, writes: "I have, in several instances, punctured the intestines with a clean needle of an aspirator. The relief has only been temporary. I do not recall any case of excessive tympanites, in which puncture of the bowel was done, that recovered. At the autopsies I could not discover that any harm had been caused by the punctures. I remember a case of obstruction and tympanites from cancer of the rectum, in which the attending physician had punctured the abdomen and drawn off the gaseous and solid contents of the

bowel as many as sixty times, by aspiration, without damage, except superficial abscesses in the skin in many places. I performed left lumbar colotomy, and the woman recovered and lived a year or two. I must say I do not like the practice, and resort to it very rarely, but I cannot say that I have seen it do harm."

Dr Matthews Duncan informs me that he has but seldom resorted to the operation. He records one case of peritonitis with enormous distension, in which "great relief" to distress, especially to oppressed breathing, was the result, the escape of very fetid air being very great, and the belly collapsing thoroughly. In other cases in which the operation was performed (chiefly of tympanitic distension in puerperal fever) the results were not great.

Mr Le Gros Clark remarks that he would have no hesitation, speaking surgically, in puncturing with a fine trocar, in very distended bowel; having perfect confidence in the subsequent closure of the opening.

Mr Cadge, of Norwich, remarks that he has had only a few cases, in his own experience, of puncturing the intestines for excessive tympanites, and these were cases of mechanical obstruction. He had not a favorable impression of the practice, the relief given not having been great; and there seemed to be evidence that the puncture permitted the escape of some bowel-contents after the withdrawal of the instrument; the change in the position of the bowel, when directly relieved by puncture, made it

difficult for more than a limited extent of gut to discharge itself, and twisted the trocar so as to endanger its slipping out of the intestinal canal. He considers that laparotomy in the present day will, and should, take the place, in almost all cases, of puncture through the abdominal wall.

Since writing the above, a highly interesting case in which remarkable relief followed puncture of the abdomen has been brought before the Clinical Society of London (January 27th, 1888) by Dr Angel Money and Mr Stephen Paget (see 'Lancet,' February 4th, p. 221). In this case, death from asphyxia threatening, puncture of the abdomen was practised with instantaneously good effect on three occasions (in one instance in more places than one); and, as in the case which I related at page 7, deep and refreshing sleep was observed to follow the operation.* On occasion of two of the punctures being made, it was noticed that, after the expulsion of gas, the inner end of the cannula was dragged up, as if by a loop moving upwards.† After death the descending colon was found to be so dilated as to measure a foot in diameter; and to be so twisted and kinked as to form two sacs lying side by side, of enormous size.‡

* Sleep is described as following the operation in cases adduced on pp. 24 and 25 (Dr Allbutt and Mr T. Smith).

† For an instance of a similar phenomenon, see, above, the case contributed by Mr Cadge.

‡ As regards this "pouching" or "sacking" of the bowel see cases reported at pp. 28 and 34.

As the position sought to be maintained in these pages will be strengthened by illustrations derived from the *pathology of the lower animals*, it will not be held superfluous if I adduce a few quotations from the writings of practitioners in veterinary medicine and others, as to the use by them of operative measures, in cases of tympanites. In the case of sheep and cattle, no doubt the stomach is especially the seat of flatulence and distension.

The earliest direct mention of injury to cattle from tympanites which I have come across is by Pomponius Mela, a Roman geographer,* who travelled in Ireland about A.D. 40, and who describes the climate, soil, and people of that unhappy country. He says that the cattle are wont to burst, from eating too much green food. He writes as follows: "Terra autem adeo fecunda herbis, non lætis modo, sed etiam dulcibus, ut se exiguâ parte diei pecora impleant; et, nisi pabulo prohibeantur, diutius pasta, dissiliant." This notice I quote from a polemical letter, headed "Ould Ireland," and signed "Viator," in 'The Times' of June 24th, 1887.

Sennertus, see his 'Opera omnia,' lib. ii, part ii, cap. vii, p. 353 (Lugduni), 1650, when treating "De seroso Humore et Flatibus," says that he was conversant with tympanites, and with its treatment. After giving the cause of flatulence in cattle,

* Described as the Arthur Young of his day; whose work, 'De Situ Orbis,' was a favourite with the famous Dr Johnson.

and the treatment of evils arising from it, he observes: "Rusticæ mulieres ut periculum ex flatibus et ventris inflatione præcaveant, ventrem arctis fasciis constringere; et abdomen fubulis perforare solent."* The above passage has been alluded to by one or two later writers when treating of tympanites in man.

No doubt, with more time to hunt up ancient authorities, many other accounts of this practice could be found. The next record of it, of which I have note, is in a work entitled 'Mémoires Littéraires et Critiques pour servir à l'Histoire de la Médecine,' 1775, as quoted by M. Barrière, who communicated a paper, in 1783, to the 'Journal de Méd. Chir. et Pharm.,' upon "Meteorismus" from indigestion, in the case of the horse, relieved by puncture. The paper was based upon the operation which he had successfully performed, after all routine means had failed. In this paper he particularly points out that the right moment for election of the operation must be judged of by the state of the pulse; as, if it is found to be more than twice as frequent as it is in health, death is near. In some remarks on this paper M. Husard alludes to the practice of cutting boldly into the stomach of cattle when over-distended, and, with

* Sennertus quotes Dioscorides as describing a special kind of grass which almost causes cattle to burst, and eventually to die. Cheselden (op. cit., p. 161), says that he had seen and heard of many cases in which cattle, sheep, and horses were treated for over-distension from green food, by the "running of a knife into their guts."

the hand, taking the food out of the stomach.* He says that one cow does not die, in twenty so treated. He mentions the names of Vitet, Paulet, Vicq d'Azyr, Bourgelat, and Chabert in connection with the operation, and speaks of the gas liberated *as being inflammable.*

Modern works on veterinary surgery make reference to the procedure in question, the majority, I think, approving. Thus, in a work entitled, 'The Horse in the Stable and the Field,' by J. H. Walsh, p. 506, it is stated that "sometimes the distension of flatulent colic goes on increasing, and the only chance of recovery consists in a puncture of the cæcum, as it lies in the right flank, where, according to French veterinary writers, it may often be opened when greatly distended, without dividing the serous covering."

Surgeon-General Cornish tells me that he has known farmers constantly practising the operation with good effect.

With regard to the tympanites or meteorism in cattle, Dr Martin, of Portlaw, to whom I have alluded at p. 36, tells me that he had formerly, when farming, been in the habit of relieving it by a "noggin" of spirits of turpentine in a pint of cold water; and in cases left too long for this he often operated with an old-fashioned trocar as thick "as a little finger." In only one case did this ever fail in his hands.

* I am told that this mode of giving relief is now resorted to in England.

In the posthumous extracts from the veterinary records of the late Mr John Field, I find notes of the case of a horse (p. 147) where death was attributed to the enormous swelling of the abdomen and to other symptoms caused by paralysis of the intestines. At p. 83 a case of tympanites in the horse is related, in connection with inflammation of the bowels, in which, owing to excessive dilatation, the flank was punctured with a trocar. This was done however, without relief. A different view is taken by the author of a 'Treatise on Sheep,' Mr Blacklock (Dumfries, 1840), who describes the death of sheep from suffocation, owing to their gorging themselves in green pastures (the affection being termed the "blown or blast"), and cautions against *sticking* the animals, as "recovery by this plan is almost hopeless." For treatment, he recommends the use of an elastic tube or a cane with an ivory or wooden bullet at the end. Mr Hussey, of Oxford, says that, forty years ago, he was told by the wife of a Scotch farmer that distension of the abdomen in cattle was very common when the cattle first went out to grass, and that they were often, for this, "stabbed" in the loin below the last rib, but that if the puncture was done "on the wrong side" it was likely to be fatal. Dr Aquilla Smith, of Dublin, informs me that in Ireland "our doctors practise puncture in cases of flatulent distension, and fasten a quill in the opening to give free exit to the flatus." He states that "some years ago a buffalo in our

Zoological Gardens was operated on by a cow doctor, and had a quill secured in the opening. The animal lived for some days, and in the meantime I delivered her of a shoulder presentation, which was a difficult task."* The late Professor Robertson, Principal of the Royal Veterinary College in Camden Town, informed me that puncturing the rumen of cattle and the colon or cæcum of the horse, in cases of serious tympany, is an operation regularly resorted to by veterinary surgeons, and that the results are generally satisfactory. It is unattended with dangerous sequelæ. Emphysema, or small "cellular abscesses," are occasionally observed to follow, but they are rarely very troublesome. And Principal J. McCall, of Glasgow, to whom I allude at p. 98, says that in that city they have, for long, punctured the rumen of cattle in tympanites, and also, when necessary, incised the walls of the abdomen and stomach, and removed the ingestion, and with a fair amount of success. He remarks that for the past ten years he has also frequently punctured the bowel through the abdominal walls, for distressing tympany in the horse. He is certain that "if he had resorted to the practice earlier he would have saved the life of many a valuable horse [8]."

Lastly, I will quote from a remarkably interesting

* About the same time Dr A. Smith amusingly said, "I gave a large turpentine enema to a savage tigress who had convulsions. The animal lived in good health for some years afterwards, but whenever she got a sight of me she became so excited that the visitors speedily retired."

French work on veterinary subjects, the 'Dictionnaire de Médecine de Chirurgie et d'Hygiène Vétérinaires,'* in which (tome i, p. 462), under the article, "Coliques," the following statement appears: "Si la tympanite devient trop forte, si elle gêne trop la respiration de l'animal, et le menace d'asphyxie, il ne faut pas hésiter à pratiquer l'entérotomie que l'on fait sur le flanc droit." The author speaks of the operation as having been recommended, in 1780, by Barrière and Herouard, and as having been successfully adopted by a number of others whom he names.† He warns against delay in having recourse to it. He states that he has, in some desperate cases, though without any real benefit, *injected remedies, by the cannula of the trocar, into the punctured bowel.*

Such are the references to standard authorities and the illustrative cases supplied to me by living practical physicians and surgeons, "the joint force and full result" of which will, I think, suffice, indisputably, to indicate the great good which may be accomplished by the expedient, when timely adopted, of puncturing the abdomen with a fine trocar, in excessive tympanites. Consideration

* The work is beautifully "got up," and well and copiously illustrated. An English translation would be a very valuable addition to our libraries.

† He alludes to a work by Charlier, entitled 'De la Ponction dans les Coliques,' Paris, 1863, a book which I have not been able to procure.

of the references given will show that the weight of evidence, the preponderance of testimony, is in favour of, and warrants, this operative measure. They will be enough to demonstrate emphatically, and make obvious to those who have hesitation or fears as to the wisdom of the procedure, that the operation is not, as some with whom I have conferred upon the matter would fain think, one to be regarded as "an example of magnificent indiscretion," a wanton and necessarily dangerous, and therefore culpable, act—a species, in fact, of professional assassination; but that it is, incontestably, when resorted to with circumspection and deliberation, a legitimate procedure, attended by most benign results, one that may be undertaken *tutò, celeriter, et jucunde;* at any rate, that it has strong evidence in its favour as a *dernier ressort.* Their unprejudiced consideration will justify the conclusion, that there are many cases in which even the pitiless and inexorable torments of death can be forthwith averted by the operation in question, and sable-winged "Thanatos," with inverted torch, be made to give place to his brother "Somnus" with his poppies, medical aid stepping in, as, at once *vitæ artifex, mortis fugator.* Several to whom I have spoken regarding the operation have remarked, "I should have liked to have done it many times, for years, but I dare not." Dr Clapton, of St Thomas's Hospital, has lately said to me, "I could never bring my mind to the point of actually

ordering the operation to be done. But I now wish that I had done so in some cases, for I have subsequently found from the experience of others that it is a safe one, and may give immense relief." We must, surely, not desire to learn the art of swimming without going into the water, but bear in mind the ancient proverb, "Experience makes the blind to see." But, in addition to immediate solace and relief from distress, it has been shown that *permanent good* may arise from the operation, by reason of the fact that removal of the pent-up gas, in many cases, enables the atonic or paralysed intestinal walls to contract upon, and therefore evacuate, their contents, even when constipation has lasted many days;* and it is interesting to find that this, not infrequent, result was recognised by some of the oldest writers on the subject,† who knew that over-distension, "ballooning," as the French often call it, paralysed the muscular walls of the bowel. It is certain that in many cases of obstruction found, after death, to have resulted from volvulus, or twisting of the intes-

* It has been suggested, as by Macilwain in his work on 'Strangulated Hernia,' that the over-distension of the bowel embarrasses the action of the *abdominal muscles*, as well as the muscular walls of the bowel.

† These older writers were also acquainted with the facts, now much relied upon, that diuretics and other medicines, given in cases of ascites, fail to act satisfactorily until the peritoneal liquid has been discharged by paracentesis. They were, moreover, conversant with the application of electricity for the purpose of making the intestines contract in tympany.

tines, relief might have been obtained had the distending air been liberated by puncture. Of modern writers none more than Dr Brinton (see his work, ' On Intestinal Obstruction,' edited by Dr Buzzard) have insisted upon the evil consequences of distension brought about by obstruction of the bowels. He remarks that the mere paralysis of the obstructed bowel, once fully developed, sometimes renders any subsequent removal of the obstacle of little avail towards the re-establishment of the intestinal functions. He says, " There can be no doubt that either this paralysis, or the nervous lesion it expresses, is one of the circumstances which render postponement of the operation for strangulated hernia *so fatal as it notoriously is.*"

It has been shown that the danger to be anticipated from the operative measure is, no doubt, that of peritonitis; this, however, would seldom arise from direct injury to the serous membrane by the instrument, but from the oozing or leakage into the peritoneal cavity, of some of the fæcal contents of the bowel.* In some instances, however, in which

* In a few cases, I have heard of peritonitis having apparently surrounded the orifice made by the trocar into the outer surface of the bowel. Mr B. Travers concluded, from some experiments, that in cases of strangulated hernia, diffused peritonitis, when it exists, is not directly due to the act of strangulation, but to the obstruction and resultant distension of the bowel. In connection with the probability of escape of the contents of the bowel through puncture in their walls, it may be mentioned that Bell, in his ' Principles of Surgery,' maintained that as there was no such thing as a peritoneal cavity, all the viscera might be wounded and yet there

at first sight, after death, it would appear that the puncture had caused harm by letting out fæcal matter into the peritoneal sac, it seemed, upon investigation, that this extrusion had been altogether a post-mortem phenomenon.

But "the old order changeth, yielding place to new," and in these days, when the surgeon with his better-educated "digitus chirurgicus," and with so many antiseptic appliances, deals (and tampers, as it would have been formerly said) with the peritoneal surface in so very fearless a manner, as compared with what was customary in earlier days; when we are bidden not to shudder, on reading of "mopping out," "thoroughly sponging out," the peritoneal cavity, "making complete exploration of" the sac, &c., we may well conjecture that this surface would not gravely resent so comparatively slight an affront as the piercing of it by a very fine trocar, or an aspirator needle [9].

Of course, as regards the manipulative aspect, properly speaking, of these cases, I will not presume to make precise and positive suggestions. Surgeons will know how the procedure should be

would be no escape of blood or fæces. Petit had asserted (as quoted by Travers) that effusion, in injury of the bowel, is resisted DURING LIFE by the mutual contraction of the muscles and intestines, and consequently, when the resistance ceased, as after death, effusion readily takes place. Travers, on the contrary, asserts that the resistance is the same in the dead as in the living. Travers (op. cit.) also, judging from experiments on animals, says that effusion from the intestine is a very rare consequence of penetrating wounds.

conducted, and what are the indispensable conditions of probable success in individual cases; but the general mode of operation and the principle of action may be gathered, I surmise, by those who have any doubt on the subject, from the more or less explicit directions and hints contained in many of the quotations which I have presented to the reader (see especially the words of Dr Wathen, Dr Saunders, and Mr Teale). A very important and, indeed, as I think, a profoundly instructive lesson to be gathered from the experience of many whom I have quoted is, obviously, *the absolute necessity of using a very fine instrument, previously disinfected, and of not delaying the operation too long*—that is, of not waiting until irreparable mischief has been produced by prolonged pressure of structures and organs, and until the muscular walls of the bowel have been so long stretched and so far strained that they have irrecoverably lost tone and all their contractile power, and the bowel has become, *ipso facto*, paralysed, or has otherwise become diseased. In most cases, probably, where the operation is at all requisite or advisable, a Fabian policy is a mischievous one [10].

APPENDIX

Note (1). P. 1.

It is a matter of antiquarian interest to notice the functions which have at different epochs been assigned to this remarkable muscle, the diaphragm.*

The older physicians gave to it the name "φρὲνες," as they considered its office to be connected with, and to have some share in, the "understanding," the "intelligence," or "prudence."

Hippocrates (B.C. 460—357), gave it the same name but he seemed to have thought that the above-mentioned opinion as to its special use was unfounded, and he remarks that any mental surprise, as, of joy or grief, would cause the muscle to vibrate or tremble.

Aristotle (B.C. 384—322) who, as Harvey (in opposition to Fabricius) says, "knew the muscles," gave to this muscle the name of "διάζωμα," and was of opinion that its only use was to act as a screen or fence for separating the cavities of the chest and

* On this subject see the Introduction to Luschke's Monograph, 'Der Nervus Phrenicus des Menschen,' Tübingen, 1853.

abdomen, in order that the former cavity, which is the centre and seat of the sensory soul, should not be infected by the vapours which, during digestion, arise through the vessels, from the other one, and from the consequent heat would interfere with sensation and the intellect.

Galen (A.D. 130—200) recognised the fact that the muscle, which he termed διάφραγμα, was concerned, along with other muscles, in the acts of respiration.

In addition to its use in assisting to enlarge the cavity of the thorax, and thus give more space to the lungs during their inflation, he says that it serves, when it is lowered, to compress the bowel, so as, assisting the abdominal muscles, to propel the fæces.

The elder Pliny (A.D. 23—79) in his 'Natural History' (book xi, c. 79), says that in battles and gladiatorial combats many persons have been known to have been pierced, through this membrane, and to have died in the act of laughing (? sardonic laughter). Following Aristotle, he states that "to this organ is attributed quick and ready wit, and hence it is that it has no fleshy parts, but is composed of fine sinews and membranes." "This part is also," he remarks, "the chief seat of gaiety of mind, a fact which is more particularly proved by the titillation of the armholes, to which the midriff extends." It has been well said that our medical nomenclature recalls ages and histories long past, and is an epitome of literature and philosophy.

Note (2). P. 2.

The movements of the diaphragm have great physiological influence on the functions of the abdominal organs, as well as those of the thorax.

Interesting observations on the *rôle* played by the diaphragm are contained in a most valuable paper by Mr Le Gros Clark in the 'Proc. of the Royal Soc.', 1872 (see vol. xx, p. 122), on the "Mechanism of Respiration." In this paper it is shown that the scaleni are auxiliary in inspiration, by raising and fixing the first and second ribs, thus rendering them relatively immovable. Mr Le Gros Clark states that the fact of women breathing more by the chest than by the abdomen, is due to *artificial compression*, and to the altered form of the chest consequent on its early adoption: "endeavouring to improve the natural symmetry of form at the expense of health and comfort."

As an old pupil of the late Dr. J A. Wilson, I must here allude to his views regarding the action of the diaphragm, as expressed in his work, 'Spasm, Languor, and Palsy,' 1843, p. 42.

Béclard, in his 'Traité Élémentaire de Physiologie Humaine,' 1866, pp. 328—9, has some very interesting remarks on the mechanism and uses of the diaphragm, in which he takes exception to the observations of other writers on the subject, such as Duchenne (de Boulogne), MM. Beau and Maissiat, &c.

Note (3). P. 2.

Interference with the contraction of the diaphragm is, probably, more disastrous to the thoracic organs in the man than in the woman, as in the former the thorax is ascertained to be dilated mainly by the descent of the diaphragm, whilst in the latter it is brought about considerably by the raising of the sternum and the ribs. This difference has been attributed to the greater flexibility of the ribs of the woman, permitting their greater movement by the muscles. In his well-known paper on the "Respiratory Functions" ('Med.-Chir. Trans.,' vol. xxix, p. 222), Mr John Hutchinson says that a full meal will even make a difference in the vital capacity of the lungs: a dinner will diminish it to the extent of twelve and even twenty cubic inches, the average of the vital capacity being 225 cubic inches. Dr Inman, in his 'Foundation for a New Theory of Medicine,' p. 492, observes that "woman's frame is prepared beforehand for vast abdominal distension (*i. e.* during pregnancy), man's is not. As tympanitic and even dropsical distension in a woman does not materially differ from uterine enlargement, we see women tolerating, with ease to themselves, a meteorism which would materially interfere with the respiration of men." It must also be remembered that the inspiration is diaphragmatic

or abdominal in young children, as it is in horses, cats, and rabbits. Aristotle was of opinion that the walls of the abdomen were left unprovided with ribs, like the thorax, in order to allow of the expansion of the part after a meal, and of the growth of the embryo in women.

The pernicious influence on the heart and liver produced by interference, from flatulent distension, with the movements of the diaphragm, may be illustrated by consideration of the anatomical connection of those parts, as alluded to by Mr Hilton in his thoughtful and thought-suggesting lectures 'On the Influence of Mechanical and Physiological Rest,' 1863. In them (see pp. 243–4) he refers to the assistance given to the hepatic circulation by the squeezing of the liver, during active respiratory movements, between the contracting diaphragm and the contracting abdominal parietes; the absence of which pressure induces congestion and inflammation of the liver; and he points out that the contraction of the diaphragm, by virtue of its connection, or rather identification, with the pericardium (the pericardium being attached above to the deep cervical fascia), renders the pericardial sac tense and resisting so that, during full inspiration, when the lungs are distended with air and the right side of the heart gorged with blood from a suspension of respiration, the heart should not be encroached upon by the surrounding lungs. He alludes (p. 245) to the

branch given off to the pericardium by the phrenic nerve.

Note (4). P. 2.

In Todd and Bowman's 'Cyclopædia of Anatomy and Physiology,' it is stated (vol. ii, p. 5) that "if the phrenic nerves be divided in a living animal, great difficulty of breathing follows, the entire labour of respiration being thrown on the muscles which elevate the ribs. If the spinal marrow be divided above the giving off of the phrenic nerve, respiration ceases at once, but not so if divided immediately below that point; and in a case of fatal dyspnœa, Béclard could find no cause but a tumour of one of the phrenic nerves."

I may say, in passing, that in the St George's Hospital Pathological Museum we have a specimen showing a phrenic nerve, split, as it were, into two by the enlargement of a bronchial gland, which had been connected with an irregular dense mass containing much calcareous and carbonaceous matter. At the lower part of the specimen the separate elements of the nerve take their course through an enlarged and softened bronchial gland. The specimen was found in the dissecting-room, and is described in our 'Hospital Pathological Museum Catalogue' (series viii, 155). This concretion round the phrenic nerve was also described by Mr Cæsar Hawkins in the 'Medical Gazette,' 1828 (see vol. i,

p. 271). After noticing this specimen, and also a curious case of the median nerve involved in a tumour, Mr Hawkins remarks that he "had often seen the nervi vagi surrounded by diseased bronchial glands when there did not seem to have been any disturbance of the viscera supplied by the nerves. But from the very hard nature of the concretion which encircled the phrenic nerve it appears not at all improbable that such a circumstance might occasionally give rise to an incurable asthma, from the disturbance which it would produce in the action of the diaphragm."

It may be remarked that Andral mentions compression of the phrenic nerve by glandular masses, and Berard describes a tumour developed in the thickness of the nerve. In passing, I will, in illustration of the functions of this nerve, allude to a recent note in the 'St Thomas's Hospital Reports' (vol. xvi, p. 127), by Mr W. W. Wagstaffe, who describes the anterior scalenus muscle as being supplied by the phrenic nerve in many cases, indicating an important physiological connection between the diaphragm and the anterior scalenus in respiration, and pointing to the simultaneous action of the upper and lower ends of the respiratory apparatus.

The evil effects of pressure within the mediastinum upon the phrenic nerves are mentioned by Hilton in his work 'On Rest,' &c. (alluded to at p. 94). He points out that when extravasation of air occurs from rupture of the trachea or a large bronchial tube, death may rapidly be occasioned, with

shortnesss of breath, owing to pressure upon the phrenic nerve by the extravasated air, and consequent destruction of the power of the diaphragm. He considers that emphysema of the lung may cause dyspnœa by pressure on the phrenic nerves in the mediastinum.

Note (5). P. 7.

By way of demonstrating the power with which the gas may be expelled through the trocar by the contracting intestine, I might adopt the expression of several writers, as well Latin as French, who constantly speak of the current of gas as being sufficiently strong to "blow out a candle." M. Mothe, to whom I have alluded elsewhere (p. 13), after describing a case, writes as follows "La ponction fut faite, et à peine la trocart fut-il rétiré, que l'air sortit impétueusement, et éteignit, plusieurs fois la chandelle." It would seem that this experimental method of extinguishing a candle may at times cause a degree of consternation, as may be surmised from the description of the case related by Mr W. Adams, of Regent's Park (see p. 53), in which the gas passing through the trocar caught fire on the application of a lighted candle. And I have heard from different sources that stable boys have a trick of holding a lighted candle to the anus of horses and watching the combustion of the gas which escapes.

In a letter which I have, Principal James McCall, of the Veterinary College, Glasgow, states that serious fires in stables have been traced to these tricks of boys. I have also learnt that gas escaping from man by the same exit is at times inflammable.

The late Professor Robertson, of the Royal Veterinary College, Camden Town (referred to elsewhere, see p. 83), also informed me that the inflammability of flatus in certain states of tympany in the horse is well known, and that he has himself seen it lighted when escaping from the anus. In the case of a horse operated on by Barrière in 1783 (alluded to elsewhere, see p. 80), it is specially stated that the gas rushing out from the trocar caught fire from the lighted candle.

This inflammability of intestinal gas was described by that mystical philosopher, physician, and chemist, van Helmont (see his "Ortus Medicinæ," 1652, p. 341), who in his chapter "De Flatibus," writes as follows:—"Stercoreus autem flatus, qui in ultimis formatur intestinis, atque per anum erumpit, transmissus per flammam candelæ, transvolando accenditur, ac flammam diversi, colorem iridis instar, exprimit. Qui verò in Ileo, sive intestinis gracilibus formatur, nunquam est inflammabilis, sæpe inodorus est," &c.*

This, of course, suggests the question as to what

* Van Helmont (1577—1614) was the first person to invent or to apply the term "gas" in the sense now used, as mentioned by Humboldt in his 'Cosmos,' vol. ii, p. 343, Eng. ed., 1849.

may be the chemical composition of the gas liberated from the bowels which permits it to burn. Majendie and Chevreul found the gases which existed in the large intestines of two criminals to consist principally of carbonic acid and nitrogen gas, with varying small quantities of hydrogen and carburetted hydrogen, and a small quantity of sulphuretted hydrogen. Laycock, in his work on the 'Nervous Diseases of Women,' alludes to the case of a lady who used to pass enormous quantities of gas daily from the stomach, which was found to contain 50 per cent. of nitrogen. An analysis of intestinal gases by Ruge is quoted in some recent physiological works, who, in 1862, found the gas, in the large intestine of man, to be tolerably constant in composition, after different kinds of food—nitrogen preponderating after the use of flesh, hydrogen after that of milk, and carburretted hydrogen after that of vegetable diet, a slight amount only of sulphuretted hydrogen existing. We have only to suppose, under disease or after certain kinds of food, a certain definite proportion of hydrogen and carburetted hydrogen to exist, and then the admixture would be inflammable.

The most recent analysis of intestinal gas which I know, and with which my friend Mr Church, Professor of Chemistry in the Royal Academy of Arts, has made me acquainted, is by H. Tappeiner (see 'Ber. der D. chem. Gesellschaft, xiv, S. 2375, 1881). It was as follows:

Intestinal Gases during Hay-feeding.

Percentage.	Oxen.	
CO_2 65·3	17·7	36·4
H ·2	4·0	2·3
CH_4 30·6	49·1	38·2
N 3·9	29·2	23·1
From first stomach.	From small intestine.	From large intestine.

	Horses.	Hay and oats.
CO_2 75·2	55·2	45·2
A 14·6	1·7	3·1
CH_4 0·0	32·7	40·0
N 10·0	10·0	11·9
O ·2	—	—
From the stomach.	From the colon.	From the rectum.

Goats.

Hay and oats.

CO_2	12·3
CH_4	37·1
N	50·3

From rectum.

Tappeiner finds traces of H_2S (sulphuretted hydrogen), which are included in the CO_2. In some of the analyses which he gives there is no CH_4 (marsh gas), nothing but CO_2, H, and N. Professor Church has also referred me, regarding this question of animal gas, to an Inaugural Dissertation by B. Tacke published in the 'Ber. der Deutschen chem. Gesellschaft,' 1884, Bd. 17, S. 1827, of which an abstract is given in the 'Jahresbericht der Agrikultur. Chemie,' Bd. vii (1884), S. 494.

Milne-Edwards in his 'Leçons sur la Physiologie,' &c. (1862) (see vol. vii, p. 100), refers

the "meteorism" of cattle to the probable action of vegetable or animal parasites in the stomach and bowels.* He has several pages on the gases of the intestines in man and animals, quoting researches of various experimenters, as Chevreul (1814—15), and Majendie, Gendrin, Vauquelin (1817), Valentin, 1854, Frerichs, &c. Baumès, in his 'Traité des Maladies Venteuses, &c.,' 2nd ed., 1837, p. 17 (op. cit., see pp. 4, 16), treats of the composition of, and the causes producing, the intestinal gases, quoting among others the analysis of Leuret and Lassaigne.

Note (6). P. 18.

On making inquiries of Dr Little regarding this highly interesting case, and asking permission to copy the accompanying woodcut, that gentleman writes as follows. He says: "The drawing of the intestine in the 'Pathol. Trans.' of 1851 is quite at your service. The immediate relief to urgent symptoms arising from distension was very striking. The patient, however, sank in about twenty-four hours after tapping of the colon, apparently from shock to the system through the presence in the colon of what appeared to be the whole of the parts, peel and pith, of a dozen large oranges.

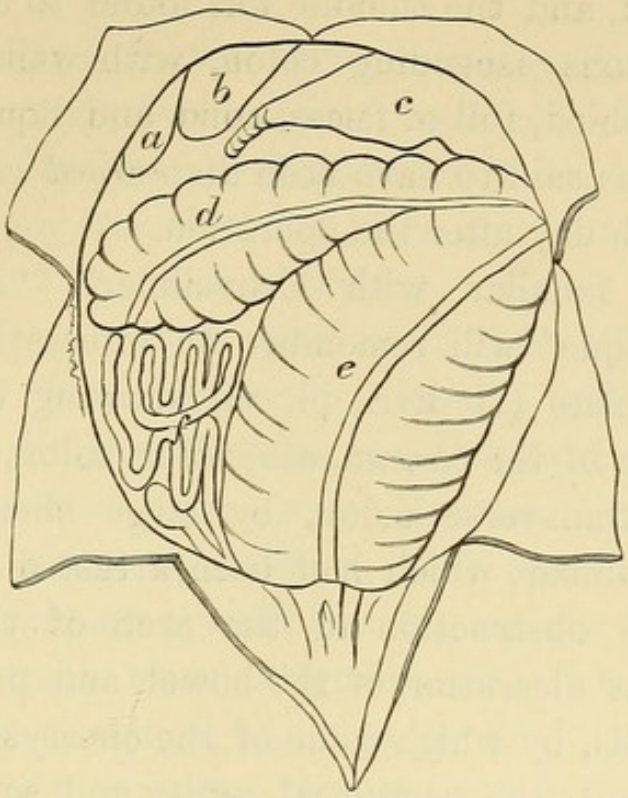
* In the 'Lancet' for January 14th, 1888 (p. 85), is a notice of the discovery by Mr Arloing of a new bacillus having the property of generating gas within the tissues which it attacks.

"I believe that I mentioned in the paper that there was no trace of peritonitis. I could not discover the spot where the trocar had entered the colon. I was able to find the healed mark where the abdominal wall had been punctured.

"The thickened walls of the colon, resembling those of an ox's stomach in health, presented also a very hypertrophied villous appearance. The patient had doubtless, from early childhood, accustomed himself to swallow everything he could which offered a food-like temptation to his gluttony.

"I do not know whether, before this case occurred, I had heard of tapping the abdomen for meteorismus in the human subject. The resident physician at Earlswood objected to tapping, notwithstanding my mention of the custom of shepherds to save sheep who had partaken of too much 'fat' pasture. I therefore told him to lend me a fine hydrocele trocar, and that I would take the responsibility of the result of the operation. It is evident that in man, as in animals, tapping is justifiable and desirable, even if only a small part of those operated on are saved. The fatal tendency depends mainly, in all probability, upon the actual bulk of offending obstructive matter. This idiot had probably passed unscathed after eating five, six, or eight oranges, including peelings, &c., but a dozen full-sized thick peelings was too much for him. Mr Callaway (junr.) did not see the patient alive, for if he had he would have operated instead of me."

The condition of the colon is shown by the Woodcut below.*



a. Right lobe of liver. *b*. Left lobe of liver. *c*. Stomach, with the liver and diaphragm, situated unusually high, intruding upon the thoracic cavity. *d*. Transverse colon much distended. *e*. Enormously hypertrophied and dilated sigmoïd portion of descending colon. *f*. Small intestines pushed into the right iliac fossa.

With the above case the following one, related by Dr Worrall in the 'Australian Medical Gazette' (see 'Brit. Med. Journ.,' March 10th, 1888), may be taken in connection. It was that of a girl, aged 14,

* The Council of the Pathological Society have courteously sanctioned my copying the woodcut from its 'Transactions.'

who had a large, hard tumour, *filling the entire abdomen*, excepting portions of the left hypochondriac and lumbar regions. Laparotomy was performed, and the tumour was found to consist of an enormous ascending colon, with walls greatly hypertrophied, full of fæces, solid and liquid. The patient was said to have been *discharged well* on the fourteenth day after the operation.

Those familiar with Cruveilhier's 'Anatomie Pathologique' will remember an interesting lithographic plate (26 livr., pl. vi) showing enormous distension of the cæcum, ascending colon, and part of the transverse colon, by large cherrystones, 617 in number, which had been arrested owing to cancerous obstruction of the arch of the colon. There was ulceration of the bowel, and perforation of its walls, by which some of the cherrystones had escaped into the peritoneal cavity and set up peritonitis.

During life palpation of the tumour produced by the distended bowel gave a crackling sensation as of emphysema, the result of collision of the cherrystones. It was found also that, corresponding to the presence of the cherrystones, the bowel had a large quantity of fat developed beneath its peritoneal covering and beneath its mucous surface, apparently the result of inaction of the bowel.

Note (7). P. 30.

With regard to the procedure of getting rid of flatus in strangulated hernia, here and elsewhere* alluded to, Dr Cameron (referred to p. 31, &c.) offers an objection—viz. that "if it do not succeed, and an operation becomes necessary, the free handling of recently punctured gut might possibly lead to unpleasant consequences." On this point also I will quote Mr Bryant, who, in a Clinical Lecture on intestinal obstruction (see 'Medical Times and Gazette,' April 20th, 1872, p. 455), stated that his prejudice is much against puncturing the bowel in cases of hernia, when distended with flatus, owing to the risk of escape of fæces or fluid, though he had resorted to it in two cases of ileus, with immense advantage. He remarked that at Guy's Hospital the operation had been done more frequently than at any other institution; and that Mr Stocker, "who had had more clinical experience than almost anyone in London," had always been in favour of it. He quoted the case of an old man with strangulated scrotal hernia, in which the operation of pricking the bowel four or five times was successfully performed. Mr Dent (before quoted, p. 52) thinks that in strangulated (external) hernia, though the distension appears to constitute the chief diffi-

* See pp. 8, 9, &c.

culty of reduction, "puncture does not enable the gut to be reduced more easily or without division of the structure, and therefore inflicts a needless injury." The late Mr Tatum, a former colleague of mine at St George's Hospital, was in the habit of puncturing the intestines when, owing to their distension during the operation of strangulated hernia, they could not be easily reduced.

Note (8). P. 83.

This mode of dealing with cattle is ingeniously taken advantage of by the author of a well-known modern novel, 'Far from the Madding Crowd,' where the operation is graphically described. A number of sheep (see Chapter 21) are represented as breaking into a field of young clover, and "getting blasted." An attendant exclaims, "They will all die as dead as nits." After a time many fell down helpless and livid, "swoln with wind," foaming at the mouth, and with quick and short breathing. "One of the ewes contracted its muscles horribly, extended itself, and jumped high into the air, then fell heavily and lay still," and died. Some recovered without operation, but forty-nine operations were performed, with complete success, with "a small tube or trochar, with a lance passing down the inside." "Passing his hand over the sheep's left flank, and selecting the proper point [the operator] punctured

the skin and rumen with the lance as it stood in the tube; then he suddenly withdrew the lance, retaining the tube in its place. A current of air rushed up the tube, forcible enough to have extinguished a candle held at the orifice." Being desirous of knowing what authority the writer of the above had for describing the leaping into the air as a result of over-distension of the bowels, the author of the novel, Thomas Hardy, Esq., has favoured me with a letter in which he says that he had lately been talking, during a sheep fair at Dorchester, to some shepherds, "and they unanimously asserted that the leap into the air is a fact; one of them signifying the height of the leap by his hand, about five feet apparently. These shepherds said that the springing up thus is always a sign that the animal will not recover."

Note (9). P. 88.

On the recent changes of opinion and practice regarding the fearless opening of the peritoneal (and other serous) cavities, see especially the paper by Mr F. Treves on, "Acute Peritonitis treated by Abdominal Section," in the 5th vol. of the 'Medico-Chir. Transactions,' New Series, 1885 (p. 175), also the paper by Mr Howard Marsh, on a "Case of Abdominal Section for Acute Circumscribed Peritonitis," in the same volume; also the works of Sir Spencer Wells, 'On Diseases of the Ovaries,' 1865, and 'On

the Diagnosis and Surgical Treatment of Abdominal Tumours,' 1885. In these writings, the observations referring to operative interference with the peritoneum, of Hancock, 1848, Martin, 1861, Duplay, Terrier, and Juillard, 1879, Marion Sims, 1881, Parkes (of Chicago), 1884, pass under review.

In these latter days we have almost forgotten the earlier experiments and observations of Blundell, who, in 1828, showed that extensive injuries and divisions of the peritoneum, could be recovered from, that the viscera of the abdomen could be removed with much greater impunity, and that operations on them were much more feasible than was generally thought possible by British medical men. He pointed out also that any local peritonitis from tapping or puncture of the abdomen does not by any means invariably diffuse itself over the greater part of the peritoneum. See also, on this subject, at p. 71, some observations upon wounds of the peritoneum by Mr Clay.*

* The reader may be interested in the following remarks on the antiquity of the practice of operating to relieve incarcerated hernia: —Mr Adams in his translation of the chapter of Aretæus which treats of "Ileus" (see "Causes and Symptoms of Acute Diseases," Book II), observes in a note that all the information to be found in the works of the ancient authorities on the subject of hernia may be seen in 'P. Ægineta,' b. vi, secs. 65 and 66, Syd. Soc. edit. He says that, although there be nothing in the works of medical authorities which would lead us to suppose that the ancient surgeons were in the practice of operating for hernia, the following passage in one of Martial's epigrams would almost lead us to suppose the contrary, "Mitius implicitas Alcon secat

Note (10). P. 89.

What the elder Hey (cited by Dr O'Reilly), said of the operation for strangulated hernia may be borne in mind: "I can scarcely press in too strong terms the necessity of an early recourse to the operation as the most effective method of preserving life in this dangerous disease." Again, "I have now performed the operation thirty-five times, and often had occasion to lament that I performed it too late, *but never that I had performed it too soon.*" The above passage from Hey's 'Practical Observations' is quoted also by Laurence in his 'Treatise on Ruptures,' 5th ed. See sect. xii, Chap. VIII, 'General Observations,' in which he cites the words of many authors, English and foreign, who urge the necessity of early operating in cases of strangulated hernia. In his observations on the treatment of strangulated hernia he alludes to the introduction of the long tube, with syringe attached, into the large bowel for procuring a discharge of the air, as recommended by Lafargue and O'Beirne, an expedient which I have before mentioned as being adopted by some practitioners in excessive tympanites (see pp. 10, 11). He also quotes the case related by Petit in which, after the unsuccessful

enterocelas," Epigr. xi, 84, which might be thus translated, "The surgeon Alcon inflicts less pain in cutting for incarcerated intestinal hernia."

use of ordinary resources, an operation was decided upon, when the grandmother of the patient refused permission for the operation, and ordered a bucket of cold water to be dashed on the thighs and abdomen of the patient. The result of this measure was the *almost immediate return of the hernia.*

Query.—Might not such a primitive and grandmotherly procedure avail also in some cases of distressful tympanites?*

Postscript.

Regarding the advisability of puncturing for relie of tympanites Mr H. Morris, to whom I have alluded at p. 38, writes to me as follows:—"I am not favorably disposed to the aspiration treatment in great tympanites, because I have once in my own practice and once if not twice (I think twice) in the practice of a colleague seen extravasation follow, owing to the inelasticity and softening of the overstretched and inflamed bowel. In my own case I saw the oozing of liquid fæces because the abdominal walls had been opened to search for seat of obstruction, and as I could not check the escape of fæcal fluid I made an artificial anus.

* In his Treatise on Ruptures, Pott quotes Dr Munro, of Edinburgh, as having found the external application of cold claret, or snow, useful in reducing hernia.

"In one case of old irreducible hernia with early symptoms of strangulation I was enabled to return the bowel (which was greatly distended) after puncturing with a subcutaneous injection-syringe. Altogether I rather dread the proceeding, and should not do it unless absolutely obliged."

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