THE BRADSHAW LECTURE ON MODERN ABDOMINAL SURGERY.

*Delivered at the Royal College of Surgeons of England,
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MR. PRESIDENT AND GENTLEMEN,—Some who hear me to-day—I fear not many—may remember the condition of abdominal surgery in the early years of the Victorian Age, forty or fifty years ago. Younger men may easily inform themselves on the subject by referring to the surgical dictionaries and textbooks of the period; and all must acknowledge that the contrast with the abdominal surgery of our own time—with what we may call modern abdominal surgery—is very remarkable. An occasional operation for strangulated hernia was almost the only piece of abdominal surgical work done in those days. The radical cure of hernia had scarcely begun to attract attention. Astley Cooper had tied the abdominal aorta, and a case of Cæsarean section, when it was heard of, was talked of by the profession and the public as a marvel. A gunshot or other penetrating wound of the abdomen was rarely met with in civil practice, and there, with an occasional formation of artificial anus, abdominal surgery may be said to have reached its boundaries; for neither then nor now have operations on the rectum, nor removal of stone from the bladder until quite recently, been classed as parts of abdominal surgery. Take Syme's *Principles of Surgery* as an example. In the fourth edition, published in 1856 (a book which he says in his preface is the result of thirty years' hospital experience, and has been tried by a long succession of pupils at home and abroad), the surgery of the abdomen is treated in twenty-eight pages, four of which are devoted to wounds; penetrating wounds, he says, being almost certainly fatal. One page is given to tapping, twelve to hernia, and a few lines on iliac abscess complete Syme's survey of abdominal surgery in 1856. Compare this with the recent work of an English provincial surgeon, Mr. Greig Smith, surgeon to the Bristol Infirmary. In the second edition, published in 1888, we find forty-sixty pages on the diagnosis of abdominal tumours, forty on abdominal operations generally and their after-treatment, sixty on ovariectomy, ten on the Fallopian tubes and broad ligaments, thirty on operations on the non-gravid and sixty on the gravid uterus; 140 on operations on the stomach and intestines, fifty on the kidneys, forty on the liver and gall-bladder, and twelve on the spleen and pancreas. Then we have a few pages on omental and mesenteric tumours and intra-peritoneal cysts. A long chapter on suprapubic cystotomy follows, and then some sixty pages are devoted to wounds and injuries of the hollow and solid viscera, perforating ulcers, purulent collections, and tubercular peritonitis. It is difficult to imagine a more striking contrast than this of abdominal surgery forty years ago and now, or to contemplate without surprise the vast and rapid advance made in our own day and generation, first in this country and afterwards abroad. In systematic works for students, and books of reference for practitioners, the sections on abdominal surgery are much enlarged. You, Mr. President, were one of the earliest of the leaders in this advance. The successive editions of your own practice of surgery, like those of Erichsen's *Science and Art of Surgery*, confirm all that I have said, and a comparison of Heath's *Dictionary* with that of Samuel Cooper would do so quite as strongly. We have the well-known works of Treves on *Intestinal Obstruction*, and Morris on the *Surgery of the Kidneys*, and I am glad to be able to say that the subject has not been neglected in this theatre. Mr. Treves's Hunterian Lectures in 1885, on the Anatomy of the Intestinal Canal and Peritoneum in Man, mark a distinct advance in our knowledge and improvements in our practice.

In 1878, as Hunterian Professor, I delivered six lectures in this College on the Diagnosis and Surgical Treatment of Abdominal Tumours. Two of these lectures were devoted to the diagnosis, and four to the surgical treatment of these tumours. Three were restricted to the treatment of ovarian cysts and tumours, especially to ovariectomy, and to the consideration of antiseptics in abdominal surgery. The Surgical Treatment of Uterine

Tumours was the subject of the concluding lecture. It was based upon the whole of my experience up to that time. A short description of Freund's method of entirely removing a cancerous uterus by abdominal section completed the survey that I was able to take of the state of abdominal surgery twelve years ago. Ten years later—in 1888—in the Morton Lecture on Cancer, I entered more fully into a description of the mode of extirpating the entire cancerous uterus by the vaginal operation.

Since 1878 the development of abdominal or peritoneal surgery has been wide and rapid. When, in 1885, I published, in a concentrated form, a small book on the *Diagnosis and Surgical Treatment of Abdominal Tumours*—which might be called a fourth edition of the first published in 1865 on *Diseases of the Ovaries*—I had to describe the wide spread of the domain of abdominal surgery; to make many additions which naturally arose out of the growth of the subject, and to include the operative treatment of various kinds of tumours—splenic, renal, hepatic, mesenteric—and other operations hardly noticed in the earlier editions.

No intelligent student of the history of our science and art can doubt that ovariectomy was the starting point in the modern advance of abdominal surgery. The first extension was to uterine tumours, and to partial and complete extirpation of the uterus. Although I have formerly alluded to these subjects in the Hunterian and Morton Lectures, experience has accumulated so rapidly of late years, that I may perhaps offer for your consideration a few remarks suggested by later modifications of these uterine operations, and upon some other of the more recent developments of abdominal surgery. But I will first allude to some practical questions which are still waiting for a decided answer, and which apply to nearly all surgical operations.

ANÆSTHESIA.

The first question is, Which is the safest and best anæsthetic? Is it chloroform, or ether, or a combination of the two, or the mixture of alcohol, chloroform, and ether, known as the A.C.E. mixture, or bichloride of methylene, or laughing gas, or anything else? Beyond all doubt chloroform is still the usual and favourite anæsthetic. But I was from the first afraid of it. The only death I ever witnessed under an anæsthetic was from chloroform. This was in 1848, and the surgeon was Maligne. The first year I was at the Samaritan Hospital, in 1854, I amputated a small breast, and the patient very nearly died from the chloroform. For a time we thought she was dead and it was only after prolonged artificial respiration she recovered. In several of my earlier cases of ovariectomy I was made very uneasy by the effects of the chloroform during the operation, and in many more by the vomiting which I thought it set up after operation; and twice, when Clover administered the vapour diluted with air from his bag, I had to stop my work while a patient was resuscitated. Whether chloroform was given by lint and a towel, or by Skinner's mask, or by some inhaler, I was always much more anxious about the anæsthetic than about hæmorrhage or any other operative detail; so that when, in 1867, Dr. Richardson explained his views as to the causes of danger of death from chloroform, and his belief in the greater safety of methylene, which he was then introducing, I was quite prepared to give the newer liquid a fair trial.

To my mind, the result of the first case was most satisfactory, and I have repeatedly made known what my experience of methylene has been. I have been surprised that, in the face of the reports of deaths from chloroform repeated week after week in the newspapers and medical journals, we have not yet had to defend one of our brethren against a verdict of manslaughter on the ground that an anæsthetic, well known to be dangerous, had been administered when others, equally efficacious, were known to be safer. I should not at all like to be tried on such an issue, for I fear the defence would be very difficult. I am sorry I cannot enter more fully into this question, but there are others which demand more time than I have at my disposal, and I must be content with explaining that some of the reasons urged against the use of methylene may be completely answered. It can be made by any manufacturing chemist in the manner described in his first paper by Dr. Richardson. Its chemical composition shows it to differ from chloroform only in containing one equivalent less of chlorine.

	Composition.	Specific Gravity.	Boiling Point.
Bichloride of methylene	CH ₂ Cl ₂	1320	128°
Chloroform	CH ₃ Cl ₃	1480	142°

It is not so easy to procure pure methylene as pure chloroform,

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for in spite of the greatest care, a little chloroform, from which methylene is reduced by the action of zinc, occasionally passes over during distillation; but the quantity is too small to be of much consequence. Still I trust the makers will be able to guard against this accidental admixture. Even as now sold, if it is administered sufficiently diluted with air, as it may be from Junker's inhaler, by any intelligent student, or even, in cases of emergency, by a nurse, I believe any surgeon who will try it on my recommendation (after more than twenty years' experience of its use in a very large number of operations, some of them exceptionally long and trying), will be freed from much unnecessary anxiety, and may escape censure which some might think to be not quite undeserved. I am sorry I cannot devote more time to this important discussion now; but I have some reason to believe that the whole subject may be treated fully, either in this theatre or in the Examination Hall of the two Colleges, in a full course of lectures on Anæsthesia by Dr. Richardson, including all the substances described in his synopsis of anæsthetics in the second volume of the *Asclepiad*.

Let me now pass on and ask you to consider for a few minutes the question of

DRAINAGE

which, with or without flushing of the peritoneal cavity, is one of the more recent additions to the practice of abdominal surgery. First introduced and practised by Peaslee in 1855, rather in the treatment of septic peritonitis after ovariectomy than as one of the steps of the operation, it has been followed extensively in America, in this country, and in Germany. Some surgeons attach great importance to it, and adopt it almost as a general rule, even where there has been no escape of fluid or oozing of blood into the peritoneal cavity. Koerberlé and Keith first used glass tubes $\frac{1}{4}$ to $\frac{1}{2}$ an inch in diameter. Since then smaller tubes of vulcanite have been preferred, and various modes of syringing, attaching waterproof protectors or sponges, have been used to carry off fluid and to prevent the entrance of septic matter into the cavity. In my own work, I have from the first looked upon drainage as a practice to be avoided if possible, and only put in a tube when I knew I had not been able to thoroughly cleanse the peritoneum, or thought that some oozing was likely to go on after the incision was closed, or when, some days later, I had reason to suspect the presence of fluid in the cavity; but I soon began to think that the tube acted as an irritant, and led to the formation of the fluid which it served to remove. At first, when I was in doubt, I put in a tube; but very soon, when in doubt, I left it alone. More than once I was sorry I had not used it, but much more often I was glad; and so early as 1876, in a paper read before the Royal Medical and Chirurgical Society on completing 800 cases of ovariectomy, I argued that drainage should only be an exceptional practice. Later, in 1885, after an experience of more than 300 additional cases, I maintained that it should be "almost entirely discarded," and said, "I have not drained one case in which antiseptic precautions have been taken; and, on looking back, I cannot believe that there are more than two or three in which, if a drainage tube had been used, it would have been useful. The simple explanation is, that the mixture of blood, other fluids, and air, left in the peritoneal cavity, or oozing into it after operation, formerly went through putrefactive changes, and, if not drained off, produced septicæmia, whereas now no putrefaction takes place, and absorption is quite harmless."¹

This was six years ago. I can now add that I have only twice flushed or washed out the peritoneal cavity with warm water, and in both cases I regretted having done so. When the bladder or intestine has been wounded by gunshot, or otherwise injured, and urine or fecal matter has escaped into the abdominal cavity; or when pus has escaped from an abscess, flushing may secure more complete cleansing than simply sponging, and so become really valuable; but in a large majority of cases of removal of abdominal tumours, it simply adds to the amount of sponging required at the expense of more or less shock or depressing effect, and leaves the patient no better, perhaps worse, than after careful sponging with soft moist sponges. I have tried several substitutes for sponge—soft linen or cotton handkerchiefs, and absorbent cotton enclosed in muslin—but have not yet found anything that answers so well as sponges. I still preserve them from infective pollution in the manner I have repeatedly described.

I am well aware that two of my successors at the Samaritan Hospital drain much oftener than I ever did, and often flush

and they regard both practices as valuable additions to ovariectomy. Their results are excellent, but I must be guided by my own experience, and it is my duty to let others know what I think I have learned. The question is so important, and still so undecided, that I cannot refrain from relating some cases in my practice this year, where I hesitated as to flushing and draining; they seemed to be exactly the cases where at least drainage was imperatively necessary, yet they recovered admirably well without either flushing or draining.

Last spring a lady from Yorkshire, aged 63, consulted Dr. Matthews Duncan, whose death we have so recently been deploing. He found an abdominal tumour, was doubtful whether it was uterine or ovarian, feared it might be malignant, and advised postponement of any operative treatment. Let me say a word of respect for the memory of Matthews Duncan. I esteemed him highly as an able, thoroughly conscientious, and careful physician. I can support all that Mr. Doran has said in his interesting memoir, published in the *American Journal of Obstetrics*, of the great good effected by Duncan by "instilling high principles of professional morality into the minds of his disciples." We are all grateful for his valuable addition to our museum in the many beautiful coloured drawings of various diseases classed together as lupus. I can respect the feeling which led him, in 1857, to publish his paper, "Is Ovariectomy Justifiable?" and I cannot deny that the opinion he then expressed was justified by the facts then on record. His deliberate conclusion was that the defenders of ovariectomy "have nothing but flimsy and fallacious arguments" to offer in its support. I frequently met Duncan in friendly consultation, and have not infrequently argued with him that, like some other physicians, his advice tended to postpone surgical operations until neither patient nor surgeon had a fair chance. The physician often thinks the surgeon rash or venturesome, inclined to operate before the necessity for operating is sufficiently proved, and too sceptical of the good effect of expectant or medicinal treatment. The surgeon quite as often believes that if he could operate before the disease has brought the patient into a condition when recovery is doubtful or improbable, failures in saving life would be fewer, and success more certain and complete.

In the case I now speak of, a delay of three months was the result of the first consultation. Then sudden and rapid increase in the size of the abdomen took place, and the patient again came to London. Dr. Andrew saw her, and, guided by the former history, expressed his fears as to the case being one of peritoneal cancer and ascites. When I saw the lady for the first time I expressed a very confident opinion that there was no evidence of malignant disease; but that there was strong ground for hoping that the free fluid in the peritoneal cavity proceeded from a burst ovarian cyst; that both ovaries were enlarged and the uterus normal. After considerable opposition I was allowed to make an exploratory incision and act upon what I might discover. This I did—removed many pints of ovarian fluid, and both ovaries, after detaching adhesions to the abdominal wall, intestines, and omentum. Then came the question of flushing or drainage. I never saw a case where it appeared to be so necessary. The peritoneum, wherever it could be seen, was soft, red, thickened, covered by loosely adhering pasty layers of lymph, broken down ovarian structures, and blood clot. A great deal of sponging left it imperfectly cleansed, and I was thinking of flushing when the patient appeared to be so extremely weak that I was glad to complete the operation as rapidly as possible and get her to bed alive without a drainage tube. I arranged with Mr. Robert Priestley, who attended to the after-treatment, that if any sign of accumulation of fluid should appear, or much rise of temperature, we might remove a stitch and insert a drainage tube. But neither of us after the operation had the slightest uneasiness or apprehension. There was neither pain, sickness, nor fever, but uninterrupted recovery. She went into Yorkshire four weeks after the operation, and I saw her in London in October in excellent health.

I had a very similar case last spring—a patient of Mr. Mason, of Ross, in Herefordshire—where the operation had also been put off until rupture of a cyst of the right ovary had occurred some three weeks before I operated. The abdominal cavity was filled with ovarian fluid, and the peritoneum everywhere had a most alarming aspect. It was studded everywhere with flakes of lymph, blood clot, and masses of proliferating papilloma. It was quite impossible to cleanse it thoroughly, with or without flushing, and I was content with doing all I could by sponging

¹ *Abdominal Tumours*, p. 61.

Twelve or fifteen years ago I should have put in a drainage tube, and, if the patient had recovered, have probably attributed the recovery to the drainage. Now, as she recovered admirably well, I believe she recovered partly because I did not drain—that the drainage would have exhausted her, and might have led to infective or putrefactive processes.

I was much surprised at such rapid and apparently complete recovery, and was not at all surprised to hear that, after a few months at home, she became ill and the abdomen again enlarged. She came to London, and I saw her on October 30th. The abdomen was much distended, and the cicatrix of the operation extremely thin. There was free fluid in the peritoneal cavity, and a well-defined tumour in the left iliac region, which could also be felt by vaginal examination. Although I had made a note of the operation in February that the left ovary was of normal size, but more closely attached to the uterus than usual, I had little doubt that it had enlarged rapidly, and that the fluid in the peritoneal cavity was, as before, ovarian. One could scarcely operate under less favourable conditions, but the patient was in a state of extreme suffering, and it seemed wrong to allow her to die without making some effort to save her. Accordingly, after one day's rest, I operated on November 1st. The free peritoneal fluid was clear and light coloured. There were many pints of it, perhaps thrown off from the surface of the peritoneum, which was everywhere covered by, or converted into, a rough, irregular, rather hard layer of granular papilloma. A very thin-walled cysto-sarcomatous mass, formed by the left ovary, enlarged to the size of a small adult head, was then removed, and the pedicle tied in the usual way with silk ligatures. I found, quite loose in the peritoneal cavity, a mass as large as an orange, so smooth that it did not look like what I had just broken up, but as if it had escaped from the cyst some time before. This I took out, and other smaller masses were sponged away. I removed all I could by sponging, but did not either flush or drain.

I need not say how much I feared a rapid collection of fluid secretion by the diseased peritoneum, or how surprised I was that nothing of the kind occurred, and that the patient recovered as well as after the first operation. The temperature remained almost normal; there was no sickness, very little pain, and when I removed the stitches on the seventh day the wound was healed completely, and, so far as anyone could see, recovery was complete. She left London twenty-six days after operation.

I went to Paris last July to see an American lady, seventy-five years of age, in consultation with Dr. Faure Miller and Dr. Bonilly. All the facts pointed to recent rupture of an old standing cyst of the right ovary. There was a great deal of free fluid in the peritoneal cavity, and a large solid tumour, certainly not uterine. The necessity for immediate relief was urgent, and with the kind assistance of Dr. Bonilly, on July 25, I made an exploratory incision. A large pailful of turbid fluid escaped from the peritoneal cavity, and then we found an enormous mass of papilloma. It converted the thickened omentum into a large tumour, and covered the peritoneum of the whole of the abdomen and pelvis with such a dense layer of sprouting growth that it was quite impossible to ascertain or do anything more. I had scarcely a doubt that drainage would have been a fatal mistake, and closed the wound. I heard that Dr. Bonilly removed the sutures on August 1, and "found everything healed, and says she could not have done better had she been twenty years of age." I had a very satisfactory report of her condition a few days ago.

It is very curious that simply removing fluid by tapping does not appear to have any such beneficial result as incision either in cases of tubercular peritonitis, or in cases of papilloma of the peritoneum, whether these have followed bursting of an ovarian cyst or have originated from some other cause. The very extraordinary recovery, whose peritoneum was in a condition of the most hopeless character, and then remaining many years after the incision in good health, was noticed by Mr. Thornton in 1881. I have been greatly surprised at several such cases in my own practice, and Dr. Keith has met with others.

The extremely important practical question of drainage cannot be discussed without some thoughtful consideration of Dr. Ruffer's recent investigations on the destruction of micro-organisms by amoeboid cells—on the phagocytes of the alimentary canal—and on the processes which take place in diphtheritic membrane. Koch's most recent bacteriological researches, and Hankin's work on defensive proteids, also assist in unravelling much that has been, and is still, mysterious. More than the whole of one lecture

would be required to treat these subjects at all fully, and I must not now attempt to do more than present a bare sketch or outline of what has been done, rather as encouragement for future research than as conclusions for present guidance.

The phagocyte theory of Metchnikoff, or rather his observations upon the wandering cells or leucocytes by which the animal body protects itself against the attacks of bacteria—taking in the bacilli, digesting them, and so preventing their multiplication and diffusion—explains much that was almost incomprehensible in the relations of bacteria to wounds and to infective diseases. Inflammation is set up in living tissues by the microbes, lymph is effused, and the lymph is soon crowded by phagocytes, which stop the further development of the microbes

if they are not present in overwhelming numbers. This battle between the attacking specific microbes and the defending phagocytes has been well demonstrated by Dr. Ruffer in the diphtheritic membrane in man. He has kindly lent me some of his sections, where one or several bacilli may be seen, enclosed in a phagocyte, some of them perfect, some in process of being digested, or disappearing.

We have here a number of preparations which may be seen on the screen showing microbes and phagocytes—the defending cells and the invading enemies. They will be kindly shown by Dr.

Woodhead and Mr. Pringle. All I will show now are some of the bacilli of diphtheria and the phagocytes devouring and digesting them. And you will also see some of the very characteristic bacilli of tetanus sent over by M. Pasteur. They are before you in different stages of development, from the simple rod to the rounded end which shows the sporulation. I may advise all those who are interested in the influence of bacteriology on surgery to wait until after my lecture and see what a number of interesting

specimens of the infecting agents in a variety of diseases—anthrax, diphtheria, tubercle, tetanus, silkworm disease, and fowl cholera; which Dr. Woodhead and Mr. Pringle have ready for inspection, the opening up of a revolution in surgical pathology.

In healthy animals, the protecting cells are victorious unless the microbes are extraordinary in numbers or virulence. In the feeble, the pathogenic organisms, or the soluble poisons they secrete or form, pass into the blood, the spleen, and the liver, and destroy the animal. In the Peyer's patches and tonsils of some animals—of the rabbit, for instance—the struggle, according to Dr. Ruffer, is a physiological process, taking place constantly at every hour of the day.

A new and unexpected support to the phagocyte theory is to be found in Mr. Hankin's recent work on defensive proteids. He has isolated from the spleen and lymphatic glands of various animals a proteid body which has the power of killing bacteria. At the last meeting of the British Association for the Advancement of Science at Leeds, he stated that this defensive proteid, though absent from normal blood, could be obtained from that of febrile animals. If this assertion be accepted as correct, we must believe that, when menaced by a hostile microbe, the organism attempts to protect itself by throwing into the circulation a substance which has bactericidal powers. This view agrees with Mr. Hankin's suggestion that phagocytes can not only kill the microbes they have taken in, but can also (by liberating their contents) exert a bactericidal action.

The question also arises whether animals which are naturally refractory to some special disease may not be so because they have the power of producing some particularly active variety of defensive proteid. If this should prove to be the case, we may hope that (by isolating such substances) remedies, protective or preventive, against various infective diseases, may be discovered and obtained. It seems pretty clear that what Koch and the German pathologists call "toxalbumen" may be the pathogenic albumose of Hankin.

My excuse for alluding to these investigations while they are still in progress, is that, taken into consideration with the power which the serum of healthy blood possesses of killing bacteria—a power connected probably with the presence of a globulin which is only soluble in dilute solution of common salt—they may explain the antiseptic action of common salt and strengthen the belief that we have in dilute saline solutions a safe and useful fluid for surgical irrigation, preferable to water which has been sterilised by boiling, and possibly to solutions of phenol or perchloride of mercury, either of which may irritate the tissues of the patient or injure the instruments of the surgeon.

Some such reflections as these have been leading me to the conclusion that the use of antiseptics in modern abdominal surgery may be summed up as combining the utmost possible cleanliness of the body, the clothing, and the surroundings of the patient, the surgeons, assistants, and nurses; the perfect sterilisation of all instruments by boiling water, as well as of the silk or any material used for ligatures or sutures; and the absolute purity of the sponges or any substitute for them. I long ago asserted that in our daily work we had much grosser causes of danger to guard against than enemies which are invisible without a microscope—that dried clots of blood, or fragments of diseased tissue, imperfectly cleansed from our knives, scissors, forceps, or needles, may act as directly as vaccine matter. Careful assistants or nurses may not perform this duty of cleansing perfectly, and I think what we are learning from the bacteriologists leads to the conclusion that it will be well after all operations, and probably before them also, to boil all our metallic instruments for a few minutes. I have here a simple contrivance for doing this without much trouble. The credit of the contrivance is due to Mr. Cathcart, of Edinburgh. One great advantage of it is that the instruments are taken out quite dry, and remain free from rust.

A very useful series of experiments by Staff-Surgeon Macpherson is now being carried on at the laboratory of the Conjoint Colleges, in order to test different methods of keeping silk or other material for sutures and ligatures aseptic. Some of the tubes on the table here, containing sterilised meat infusion and pieces of silk or catgut prepared in various methods, have been kept for some weeks at a favourable temperature for incubation. In some no putrefactive or germinating changes can be observed. In others these changes are clearly manifest, and the general conclusion so far is that solutions of 10 per cent. of carbolic acid in olive oil are useless, and so is wax impregnated with carbolic acid, while a watery solution of corrosive sublimate, 1 in 2,000, preserves silk

ligatures aseptic. I mention this in passing as one instance of the useful work already begun in our laboratory.

I used the spray at first hopefully, then operated alternately with and without it, and then gave it up altogether. As I have said, I regard drainage as a rare, exceptional practice. The dressing may consist mainly of sterilised absorbent cotton. Whether by any attenuated inoculation, or the injection of any defensive proteid, a patient can be still further protected from septicæmia or tetanus, or the microbes by which they are caused can be destroyed after the battle between the enemy and the defence has begun, is a question which I trust some worker in our rooms upstairs, or on the Embankment, may not leave to our Continental brethren without a close race, handicapped though we may be by mistaken interference and unwise restriction.

That this hope is about to be realised I gather from experiments as yet scarcely completed made in Koch's Institute by his assistant, Dr. Behring, on diphtheria, and on tetanus by Dr. Kitasato, a Japanese. The experiments seem to prove almost certainly that we can prepare one vaccine which confers immunity from tetanus, and another from diphtheria, upon mice, rabbits, and guinea-pigs, but which also, after these diseases have begun, will stop further progress and save the creature, who would otherwise certainly die. The poisons of tetanus and diphtheria are terribly potent, but admit of accurate dilution to an extent which will either kill an unprotected animal in twenty, forty, or sixty hours, or in four to six days; or will, by injection into the peritoneal cavity, cure a poisoned animal after tetanic symptoms have begun, or will confer immunity upon these animals, protecting them against the bacilli and their products.

(To be continued.)

REMARKS ON THE BARKING COUGH OF PUBERTY. (CYNOBEX HEBETIS)

Read before the Medical Society of London.

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SOME thirty years ago Dr. Brown, of Rochester, sent me for examination a boy, aged 14, the subject for several months of an incoercible convulsive cough. The parents belonged to a nervous family; he was himself nervous, and whilst under examination was odd in movements and restless in manner. Small, thin, pale, and fair, but quick in movement and in response, he exhibited all the characteristics of extreme "delicacy." Careful examination brought to light no sign of special structural disease, and at the end of the examination I found myself no further than at the beginning, and could say of the patient only that he was a very delicate and nervous boy. But when preparing to leave the room the lad, startled by a sudden noise, began to cough, and had a paroxysm of coughing, which lasted for over a minute. The paroxysm consisted of a succession of loud, dry, clanging, convulsive coughs, varying in intensity and duration, broken into irregular bars or phrases, and resembling at one time the barking, and at another the howling, of a dog. During the continuance of the paroxysm the patient appeared to be much distressed; his face was swollen and faintly livid, the eyeballs became prominent and congested, the body (bent forwards) was shaken by the violence of the coughing, and the hands crossed upon the chest convulsively clutched his clothes. At the close of the paroxysm the patient appeared to be a little dazed, and was somewhat giddy. Recovering himself in a few minutes he passed a quantity of limpid urine.

The malady of this patient lasted over thirteen months, and then slowly subsided. No ill effects followed, but I learned some years afterwards that the patient was still nervous, and that a dry convulsive cough was readily provoked by trifling colds.

In 1863 I was consulted by a clergyman residing in the east of

† Suggested by my friend, Dr. Rutherford, Head Master of Westminster.