right edge of the sternum. There was no distinct apex-beat, but a diffused heaving, most distinct between the fifth and seventh ribs. On auscultation at the base, there were heard two murmurs; a short blowing and softly flapping murmur with the first sound, and a loud harsh murmur with the second sound. The systolic murmur was heard most distinctly at the mid-sternum, opposite the third rib and above it, but was not heard at the apex. The diastolic murmur was loudest at the third costal cartilage of the right side, and was also distinct up and down the sternum; it replaced the second sound in the carotids, but was not propagated towards the apex of the heart. At the apex, over the mitral area, was heard a murmur with the first sound, longer and somewhat harsher than the systolic murmur heard at the base. The urine was scanty, high-coloured, and albuminous. The liver was enlarged, reaching three finger-breadths below the costal arch, and was tender on pressure. The abdomen was somewhat tense; the lower extremities were slightly œdematous.

After admission, he improved slightly, and got some rest under the use of morphia hypodermically. He had, however, a bad syncopal attack on the third day; and, although these attacks were warded off by the use of stimulants and liquor ammoniæ, internally, up to the morning of the 14th, he then died suddenly from syncope.

The *post mortem* examination was made by the resident pathologist, Dr. A. H. Carter. On opening the chest, the lungs were seen to be widely separated by a very large heart. The pericardium contained no fluid, but the right pleural cavity contained half a pint, and the left somewhat more. There was also about half a pint of fluid in the peritoneum. *Right Lung.*—The upper lobe was emphysematous; the lower lobe nearly solid, from large hæmorrhagic extravasation, not very recent, and undergoing inflammatory changes. There were several smaller and more recent spots of hæmorrhage in the same lobe. *Left Lung.*—The upper lobe was emphysematous; there was a large recent wedge-shaped hæmorrhage in the lower anterior angle of the lower lobe. The liver was somewhat contracted, firm, and granular; it weighed 47 ounces. The kidneys were large and congested, but in other respects healthy. The heart was much enlarged; it weighed 18 ounces. There was a white friction-patch on the anterior surface, near the apex. All the cavities were dilated and full of uniform black blood-clot. Both auriculo-ventricular orifices were dilated; the left admitting four fingers. The mitral valve was healthy, but its papillary muscles were thin and undergoing degeneration, and therefore, with the dilated orifice, accounted for the regurgitant mitral murmur. The pulmonary valves were healthy. On further examination of the heart (which was exhibited), the following lesion of the aortic valves was found. The posterior aortic segment was torn down at its angle of attachment to the left segment five-sixteenths of an inch, and remained this distance below the left segment. The posterior segment was also torn down at its other angle of attachment, together with the right segment, to a similar extent. The right angle of the posterior segment, in giving way, had been torn as far as the middle of the valve, so that a contracted and somewhat thickened and irregular fold flapped loosely in the blood-current, giving rise to the systolic aortic murmur. The right segment was torn down at its posterior angle of attachment, but was very slightly torn at its junction with left segment, so that the valve sloped from its corpus Arantii down to its abnormal attachment with the posterior segment. The posterior segment was retroverted somewhat towards the ventricle, and the regurgitation took place freely, from the unnatural position of this and the right segments. The left segment was the only healthy one. There was a little atheroma of the aorta just above the valves, but higher up the vessel was healthy. The left ventricle was greatly dilated, measuring four and a half inches in length, and in diameter, at widest part, three and a quarter inches. The aortic orifice measured three and one-eighth inches in circumference. The walls of the ventricle, which were not hypertrophied in proportion to the dilatation, measured at apex three-eighths of an inch in thickness, at the midpoint eleven-sixteenths of an inch, and at the base three-quarters of an inch. The cardiac muscle generally was undergoing degeneration.

The points of most interest in the case, are the manner in which the accident occurred, and the short duration of the man's life after the rupture. The rapid progress of the case was due to the great injury which the valves sustained, but more especially to the fact that, by the position of the rupture, the coronary circulation was robbed by the regurgitant current. On this account the cardiac nutrition was unable to keep up the hypertrophy necessary to compensate for the valve defect. The man's history was singularly perfect, inasmuch as it afforded very strong evidence of the healthy condition of his heart a short time before the accident. In this respect, it was corroborated by the *post mortem* conditions.

ON THE DETECTION AND REMOVAL OF VESICAL CALCULI.*

By WILLIAM DONALD NAPIER, M.R.C.S.

UNABLE to devote any but my contracted leisure moments to the study of this subject, in which I have taken vivid interest, I have found eight years not more than sufficient to work out, to my satisfaction, the various schemes that have at different times suggested themselves to me, and that have resulted in the instruments that I am about to lay before you, hoping, as I do, that they possess at least the merits of simplicity and originality. One of them I have already been permitted to bring before the notice of this society; but as I did so hurriedly and without previous notice, and as it has since been greatly improved in manufacture and is intimately connected with the others to which I am anxious to call your attention, I must hope for your pardon for including it in the series, which would be incomplete without it.

There has at no time, I believe, been any hesitation in the mind of the profession as to the rank amongst operations of importance that should be assigned to the one commonly practised for the relief of persons suffering from stone in the bladder. But perhaps its pains, its perils, and its jeopardies were never fully appreciated by the general public until an illustrious life lay in the balance about a year ago, and the newspapers were teeming with surgical details, variations of symptoms, and auguries as to the chances for and against the termination of the struggle that was known to be going on between science and disease in that quiet room at Chislehurst. And then, gradually but persistently, the gravity of the malady forced itself on men's minds.

I have alluded to the place held in professional estimation by the operation for the removal of stone; but were any testimony required in proof of it, none more convincing could be found than in the enormous number and almost incredible variety of the instruments immediately connected with it, that were lately exhibited at the International Exhibition, each bearing silent witness to a fresh effort to divest the operation of some cause for anxiety, spare the sufferer some suffering, avoid some complication, attain some desired end, ward off some dreaded result. Taken collectively, as they may fairly be, and tested by the laws that regulate supply and demand, what do they prove? Three points appear obvious to me:

1. The difficulty of early diagnosis.
2. The danger to life involved by the operation of lithotripsy as now practised.
3. The impediments to convalescence consequent on its successful performance.

Under this last head I should be disposed to class, the continuance in the bladder of fragments of stone too large to find their exit in a natural manner; the premature repetition of the first operation which the intense distress caused to the patient is apt to render compulsory; and the protracted suffering consequent on abrasion of the mucous membrane, from portions of the calculus being caught and drawn away, a process that not only considerably retards recovery, but occasionally results in permanent stricture.

I am taking in this rough grasp only such obstacles as may present themselves to the skilful operator; the man whose sense of hearing is quickened by constant use, whose touch is rendered delicate by familiarity with the cause of suffering, whose mastery of the instruments he handles renders his manipulation steady, gentle and deliberate, and whose experience anticipates some of the evils he may not be able to avoid. Given these impediments, or embarrassments, or perplexities, whichever you choose to call them, under such circumstances as these, there need be little fear of overrating the complications that may arise under less expert direction.

This view of the subject having commended itself very strongly to me as the one that should be kept constantly before anyone who sought to improve the present method, I have worked continuously with one especial aim: viz., to produce instruments that by their simplicity of mechanism and manipulation should ensure efficiency in the hands of the less experienced practitioner. I think I am correct in stating that there are few investigations into the primary cause of suffering in which accuracy is of greater importance in its bearing on the result, than in that for discovery of stone in the bladder; its removal in the first stage being comparatively simple, but, after a length of time, so complex as to rank, when entirely successful, with the greatest triumphs of surgical art.

And there is, in addition to this argument in favour of early detection, another, hardly less obvious. I mean the aggravated misery in-

* Read before the Medical Society of London.

flicted upon a person suffering from stone by mistaken diagnosis, and the consequently mistaken treatment that is apt to follow it. An instance comes to my mind of a patient with stone in his bladder being treated, although a young man, for enlarged prostate, and the application of a blister to the perinæum being ordered for him, entirely in consequence of unsuccessful sounding.

That there is some imperfection in the present system of investigation, is evidenced by the failure of one surgeon to detect the presence of a calculus which is discovered immediately afterwards by a man only his own equal in ability, or possibly less experienced than himself. And this—being by no means a rare occurrence—points conclusively, I think, to something defective in the agent rather than in the operator.

To render a doubtful result to investigation conducted with ordinary care more exceptional than hitherto—and I imagine that it is in the first stages of the disease that the percentage of uncertain issues is by far the greatest—it seemed necessary to devise an instrument of peculiar sensitiveness, and capability of application to minute objects. Whether the one before you will fulfil these conditions in all instances, remains to be proved. It has not failed me yet in the experiments to which it has been subjected. I believe it to be unique in its mode of action, depending, as it does, upon ocular instead of oral proof; and I cannot help hoping that, by reason of its exquisite susceptibility of impression, immediate manifestation of the existence of a foreign body may follow with absolute certainty its introduction into the bladder.

The Calculus Detector (Fig. 1.), for that is the name I have given it until a better can be found, is precisely similar in form to the ordinary sound. It is composed of steel up to the commencement of the curve, where it is reduced in diameter, and a coating of pure lead is cast round the smaller part, of sufficient thickness to render the surface perfectly smooth and even along the entire length. The leaden extremity is then polished as highly as possible with a leather, and rendered keenly sensitive to the slightest contact with any rough or hard substance, of which it would be now found to bear visible trace. On some of these instruments I tried to increase the susceptibility by dipping the leaden end in a weak solution of nitrate of silver, or what is better, chloride of platinum, which produces a black pigment on the surface; but further experiments have almost convinced me that this preparation is unnecessary, and that the pure lead is perfectly efficient. The instruments that I showed before were coated with pewter, on which the use of lead is a great improvement, by reason of its readier impressibility.

Before the introduction of the detector, it should be carefully rubbed with a leather, and submitted to the test of a magnifying glass, so that no slight scratch or indentation previously incurred should, on its withdrawal, mislead the operator, who will find it satisfactory again to apply the same means for discovering the marks which contact with a hard substance may have produced during its employment in the bladder.

With regard to the other instrument, which I call the Calculus Extractor (Fig. 2), I may premise that I incline to confine its use to the removal of small stones—I trust that the day of large ones is at an end—and fragments of stone; and this because I do not myself believe that lithotomy should ever be resorted to when a stone has from any cause, such as absence from available medical assistance, or the dread of the sufferer to submit to the necessary test, been allowed to attain to large dimensions. Then the patient's chance for recovery must lie in lithotomy.

To be as concise as I can, I shall simply describe it as an instrument intended to withdraw from the bladder either a stone intact, or crushed into fragments, so enveloped in a delicate elastic wrapper—I use the term advisedly, for as you will see, it literally folds itself round the substance in question—that injury to the passage will be simply impossible. It consists of a soft India-rubber tube, terminating at one extremity in a funnel-shaped orifice, greatly resembling the ordinary convolvulus flower, and it is capable of containing a calculus or portion of calculus of considerable dimensions. When it is inserted into the bladder, its form and position render it the receptacle of such foreign substances as would from the position of the

patient and the flow of urine determine towards the natural outlet. This receptacle, enclosing such bodies in the folds of its delicate membrane, and permitting itself to be gently withdrawn, retains them in its elastic envelope, and protects the urethra from direct contact with them.

Fig. 2.—The India-rubber Tube, with its convolvulus-like opening at the end. A. Silver Cannula, into which the India-rubber Tube is (after being soaped) drawn. B. Cocoa-butter Point, which closes its orifice. C. Convulvulus open, as it would be in the bladder. D. The same commencing to fold itself round a portion of calculus, marked D. E. Section of India-rubber Tube.

Fig. 3.—Same sized Tube, with a smaller Convulvulus, intended to be used as a self-retaining Catheter.

After bringing it to the state of completeness in which you now see it, I was very much and very long perplexed as to the best means of introducing it into the bladder; and it was only after many trials and as many failures that I was able to see my way to the accomplishment of this, without which my instrument would be useless.

My first idea had been to insert the convolvulus-shaped cup folded in the form and manner of a bud, and retained in its position by some adhesive substance that should permit it to expand after its introduction. But there were several objections to this. At last it struck me that, inserted in a fine silver cannula, it would be entirely at the direction of the manipulator; and I was successful in reducing my idea to practice; but then I was met by a difficulty that I feared at one time would be insurmountable. How was it possible to avoid the trouble to which

Fig. 1.—Calculus-Detector: the curved end showing marks on its surface such as would result from contact with a hard substance.

a calculus or portion of calculus of considerable dimensions. When it is inserted into the bladder, its form and position render it the receptacle of such foreign substances as would from the position of the

the insertion of a cannula open at the end could not fail to give rise? An artificial point appeared to be the only solution; and it seemed to me that cocoa-butter was possessed of a peculiar fitness for the purpose; for this reason; for a hard dense substance, its dissolubility under moderate heat is, I believe, quite without parallel. Subjection to a temperature of 96 degs. dissolves such a portion of it as my purpose requires with curious rapidity—in as nearly as possible one minute. There is besides the additional advantage that it serves as a lubricator in its passage to the bladder. But it is not in connection with my instrument alone that this application of it will, I hope, be found to be a profitable discovery, but in every operation where it is expedient temporarily to close the mouth of a catheter or cannula. I mean that I consider the cocoa-butter point *per se* worthy of attention.

I would now briefly suggest to you a further adaptation of the principle and form of the Extractor that may be found useful. As a self-retaining catheter (Fig 3), I cannot help thinking it would prove as simple and effective an appliance as could be used; and I know that the increased demand for these instruments of late has called forth various improvements and emendations in the means both of introduction and of retention.

After speaking so long of myself and my own labours, it is especially pleasant to me to turn from them to the more agreeable task of acknowledging, which I will do as briefly as possible, the obligations that I am under to those who have generously afforded me assistance, which has been invaluable to me in surmounting the difficulties with which I have had to contend.

Amongst my medical friends I must mention Mr. Barnard Holt, to whom I am indebted for sound practical advice. To Dr. Robert John Lee I owe more than I can express, for the unwearied patience and kindness with which he has assisted me in my experiments on the dead subject; also to Mr. Warrington Haward of St. George's Hospital, who deserves my warmest thanks not only for facilities and personal help afforded me in the *post mortem* room, but for the preparation now on the table, by which I hope to be able to exemplify practically the processes I have described.

The success that has attended the manufacture of the instruments is due in part to the care and attention bestowed on them by Mr. Charles Maw, of the firm of Maw and Son, Aldersgate Street; and in part to Mr. Jaques, the representative of the firm of Messrs. Warne and Co., Tottenham India-rubber Works, who, in the cause of science and suffering humanity, spared neither time nor trouble in bringing to perfection the India-rubber tube and convolvulus, devoting his best energies to the work in hand, with unflagging interest, until the end was accomplished.

The Calculus Detectors which I have brought with me this evening, were made by Mr. Hawksley of Blenheim Street, who has taken especial pains to carry out my instructions.

For assistance in procuring suitable chemical agents for the solutions I have alluded to, my best thanks are due to Mr. Gale, of the firm of Bell and Co., Oxford Street, and to Dr. Flite, of the British Museum.

It remains only to commend the inventions to your criticism, and, if they meet with approval, to your adoption. That they are faultless, it would be too much to hope. Time and use would doubtless suggest improvements, modifications, and additions; but if the principles be sound, a step will have been gained. It would have been more satisfactory for you, and certainly for me, had I been able to bring evidence of successful operations effected by their means; perhaps on a future occasion some of the gentlemen present may be able to supply this omission. Meantime, I am content to hand them over to the profession—for what they are worth.

NOTES ON CONSUMPTION.

By RICHARD PAYNE COTTON, M.D., F.R.C.P.,

Senior Physician to the Hospital for Consumption and Diseases of the Chest, Brompton; etc.

IV.—CONSUMPTION AND HÆMOPTYSIS.

SOME years ago, there was an interesting discussion at the Medical Society of London, respecting the significance of hæmoptysis; and I quite well remember the general impression at that time, that phthisis and hæmoptysis were so essentially related to each other as to justify the conclusion that they were but different terms for expressing the same condition. It was, in fact, simply but significantly put by one of the speakers, and received the general assent of the meeting, that "hæmoptysis meant phthisis." Those who, like myself, were in the habit of seeing a vast number of consumptive patients at a special chest-hospital, might very fairly have joined in such a conclusion, the two conditions being in such institutions constantly associated. A

further reflection upon this point, however, must make it sufficiently obvious, that the value of hæmoptysis, in a diagnostic point of view, cannot be exclusively studied in consumptive patients, but that the expectoration of blood must be taken as a separate condition or symptom which must be traced backwards to its cause or origin.

My own opinion may be thus briefly stated. I consider that phthisis must claim hæmoptysis as one of its most frequent and important symptoms; but that expectoration of blood is very often indeed quite unconnected with tubercular disease.

I propose, in the first place, to consider hæmoptysis in its non-tubercular relations.

1. Any cardiac obstruction, whether from excessive or diminished action of the heart, or from any defect in its valvular structures, may produce hæmoptysis, which may be either small or large in amount, and either pure or mixed with bronchial secretion. Perhaps the most common and severe cases of hæmoptysis from heart-disease occur in connection with mitral obstruction; but cardiac derangement of any kind, by disturbing the normal balance of the pulmonary circulation, is liable to be attended with this symptom. What was formerly known as "pulmonary apoplexy," and which is generally due to heart-obstruction, is often attended and relieved by the occurrence of hæmoptysis.

2. Hæmoptysis from the rupture of an aneurism of the general circulation is occasionally met with; but it is, of course, usually to a large and rapidly fatal amount; although the final rupture is sometimes preceded by small and occasional discharges of blood, arising either from local pressure or the congestion of surrounding parts.

3. Hæmoptysis is an occasional but far from common attendant upon intrathoracic malignant growths; but in such cases it is usually small in amount.

4. Simple bronchitis, whether acute or chronic, sometimes, but not often, gives rise to hæmoptysis. I remember two such cases in which the loss of blood was extreme, and in one of them nearly fatal; but the more common form of bronchial hæmoptysis is of moderate quantity, and is evidenced rather by tinged or streaky sputa than by pure or abundant blood.

5. Bronchial congestion, or that state of lung short of actual pneumonia, is often attended, and indeed relieved by, more or less hæmoptysis. Such condition is frequently to be met with in low febrile states, in which the pulmonary organs have become implicated.

6. True pneumonia, as is well known, is a constant occasion of hæmoptysis; but in this disease the blood is seldom pure, but intermixed with pulmonary secretion in the well known form of "rust-coloured" expectoration. Pneumonia, which has passed into a chronic form, is also often attended with hæmoptysis.

7. Hæmoptysis is occasionally met with in connexion with an impoverished or thinned condition of the blood, the bleeding not being limited to the pulmonary or bronchial membranes, but proceeding also from the throat or gums or other parts. In one such case which fell under my notice, there was likewise a sanguineous exudation from several parts of the body, and even from the extremities of the fingers. In this form of bleeding, which has sometimes been called *spurious hæmoptysis*, but which is nevertheless a reasonable source of alarm, and may occasion doubtfulness even to the medical mind, the blood is never pure, but of a thin watery character, much resembling, as I have elsewhere described it (On Hæmotysis, *Lancet*, vol. 2, 1865), a mixture of red currant jelly and water.

8. Not infrequently a congested state of the pharyngeal mucous membrane or of the tonsils is attended with an escape of blood, either pure or mixed with mucus from the surrounding parts. I have frequently seen this occasion great anxiety, as it is often associated with a defective state of the general health, which may easily be construed into consumptive symptoms.

9. Many writers have treated of a form of hæmoptysis which they have styled "vicarious," as being either supplementary to, or taking the place of other discharges, but especially the catamenia. I do not deny the possible existence of such cases, but I confess that I have never met with what have been to me satisfactory instances of the kind. Hæmoptysis must, of course, sometimes be coincident with the catamenial or other discharges of blood; but I have never met with an unequivocal instance of the one superseding, or being interchangeable with, the other.

From these few observations, briefly but perhaps sufficiently put, it will, I think, be apparent that in practice, we must meet with many cases of blood expectoration, which are quite unconnected with consumption, and that the idea once prevalent, and which I think to some extent still remains, that hæmoptysis is practically but another name for phthisis, must be erroneous.

I have next to consider hæmoptysis in its bearing upon phthisis.

[To be continued.]