promotes its spread, and a temperature above it tends to check its spread. It is clear, however, that this observation can apply only to the country in which it has been made, or to one presenting similar climatic conditions." Another remark of the same author is well worthy of being quoted, especially in relation to Dr. Macpherson's observations, namely, that "in all seasons of the year comparative atmospheric dryness is more conducive to the spread of small-pox than comparative humidity of the atmosphere."

Dr. Arthur Ransome has kindly furnished me with a copy of curves of the weekly number of deaths from various diseases in Manchester, during ten years ending December 1870, which he has projected with infinite pains and accuracy. From the small-pox curves in his diagrams, we learn that the seasonal prevalence of the disease indicated by Dr. Ballard, holds good in the case of Manchester also; that is to say, it holds good as a general rule, and making due allowance for the influence of an increasing or decreasing epidemic tendency from time to time.

In a paper on "Excessive Infant Mortality," read before the National Association for the promotion of Social Science, at York, in 1864, Dr. W. S. Trench, analysing the statistics of the mortality of Liverpool, in the decade ending December 31st, 1863, writes to the following effect: "Small-pox was least prevalent in the third or September quarters, when the range of the thermometer is highest. It was most prevalent in the first and second quarters of 1858, and almost absent during the second and third quarters of 1861. The mean heat during the former period was 48.5 degs.; during the latter 57.4 degs.; the range of the barometer and dew point difference being almost identical, and the only other difference being amount and duration of rain, which was greatest in 1861. As we know from experience that a high degree of atmospheric heat soon exhausts the power of the vaccine-pox, it may be a reasonable question to ask whether the virulence of the contagion of small-pox in the clothes of patients is not weakened by summer heat, and one mode of its propagation thereby lessened."

The suggestion here thrown out by Dr. Trench, as to the disinfectant power of warmth, appears to be well worthy of consideration; but I believe that a far more powerful agent in the diminution of small-pox during summer is to be found in the freer ventilation of the dwellings of the poor, and in the consequently lessened dangers of overcrowding and ocliosis, at that season of the year.

In Sweden, as shown by Dr. Wistrand, in his annual reports on the mortality and morbidity in that country (published in *Hygiea*) the greatest prevalence of small-pox is, on an average of several years, observed in May, the cases in that month being 13.7 per cent. of the total cases occurring in the year; while the least prevalence is observed in September, when only 3.9 per cent. of all the cases in the year occur. The mean temperature of April and May, at Stockholm, on an average of seven years (1862-68 inclusive), was 42.9 degs., and about the end of May the mean temperature reaches and passes 50 degs. From May, a rapid decline in the number of cases of small-pox takes place, while through the winter, from November to May, the number is high.

TABLE I.—Showing the Prevalence of Small-pox in Sweden by Months in the Years 1862-69 inclusive.

Year.	Jan.	Feb.	Mar.	April	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1862..	28	55	43	40	56	53	66	67	46	42	25	52	573
1863..	35	60	64	56	99	124	152	91	54	85	122	108	1050
1864..	163	148	157	222	267	314	187	130	160	163	244	317	2477
1865..	323	417	504	662	806	662	441	219	187	248	399	422	5290
1866	647	484	498	636	619	530	315	184	89	101	254	159	4516
1867..	260	289	396	468	551	427	401	321	227	281	321	456	4398
1868..	595	544	619	813	770	567	471	228	211	186	373	608	5985
1869..	635	464	641	835	1005	678	609	309	199	141	252	277	6073
Totals	2686	2461	2930	3752	4173	3355	2642	1549	1173	1252	1990	2399	30,362

Small-pox is, indeed, essentially a disease of winter and spring; and my object in writing this paper is to show how true are Dr. Ballard's observations, as tested by the course followed by the recent epidemic of the disease in London, Liverpool, and Dublin.

In an accompanying table I have entered the weekly number of deaths, during the epidemic period, in each of these cities, with the mean temperature of three weeks before set down opposite each entry. It will be seen that, in attempting to trace and to estimate the influence of temperature on the prevalence of the disease, I allow an interval of three weeks for 1, the period of incubation of the disease; 2, the length of the illness; and 3, the delay in the registration of the deaths. In doing this, I am justified by precedent, as all writers on the subject have followed this course. I wish, here, to express my indebtedness to the columns of the *Medical Times and Gazette*, for the vital statistics

and meteorology of the epidemic period in London, and for the weekly mean temperature at Liverpool; to Dr. W. S. Trench, the distinguished Medical Officer of Health of Liverpool, for the statistics of the disease as observed in that city; and to the Registrar-General for Ireland, and Dr. W. M. Burke, for the Weekly Returns of Births and Deaths in Dublin, which have supplied me with the requisite information about that city.

[To be continued.]

CASE OF RUPTURE OF THE AORTIC VALVES BY ACCIDENT.*

By BALTHAZAR FOSTER, M.D., F.R.C.P.,

Professor of Medicine in Queen's College, and Physician to the General Hospital, Birmingham; Consulting Physician to the West Bromwich Hospital; etc.

ACCIDENTAL rupture of the heart-valves is a lesion which has been long known to pathologists, who have divided the cases into two classes, in accordance with the previous condition of the valves. The tear of a valve previously diseased is not very rare, but the laceration of a valve previously healthy is a much less common accident. It usually occurs from some severe muscular effort, and is produced by the extra tension of the aorta under such conditions, associated probably with some jar to the main arterial trunk. The following case is a very good illustration of this form of heart-mischief, and I therefore bring it before the Section. It is the third case of rupture of previously healthy valves which I have met with in eight years.

Henry Horton, aged 33, was admitted to the General Hospital on November 7th, 1873, suffering from great dyspnoea and palpitation, with oedema of the legs. On auscultation, a double aortic murmur was detected.

Previous History.—He had originally been a jeweller, but, fourteen years ago, he enlisted in the Royal Marines, and served his time (twelve years), part of which he spent in Abyssinia. On the expiration of his twelve years of service, he was discharged at his own request, having enjoyed good health during the whole period. He returned to Birmingham, and for a time worked at Soho; but, in February, 1872, he left home for America, and, on his arrival in that country, finding no occupation, he joined the American navy as a marine. Before admission to the service, he was examined medically, and passed as sound. His ship was ordered to Valparaiso, and, during the voyage, he volunteered to act as cook, which he did up to the time when he met with the accident which disabled him. This occurred as follows. One day, during some very heavy weather, when coming up on deck, he was thrown violently forward by a lurch of the ship; he endeavoured to save himself by clutching the side of the hatchway, and partly succeeded. He was struck, however, sharply on the left side of the chest, and felt inwardly hurt and faint. He was ill for two days, and then felt well again, and resumed his work, but found the cooking too much for him. He gave it up; soon afterwards, when on watch one night, and all being quiet, he lay down on deck, he found that the horizontal posture made his breath very bad. The next day, he was examined by the surgeon, and, when at Valparaiso, was invalided and sent back to the States. On his arrival there, he was discharged and sent home to England. On the homeward voyage, he was very ill, and, on his landing at Liverpool, he was sent to hospital. He recovered there sufficiently to get to Birmingham in August last, but had ever since been ailing with shortness of breath, palpitation on exertion, cough, and some oedema of the feet. He never had rheumatic fever or any serious illness. He drank freely while in the service, but never felt any ill effects.

On admission, his difficulty of breathing amounted to orthopnoea; his cough was frequent and dry, and harassed him so, that he had not slept for days. Pulse jerky, 112; respirations 48. His expression was anxious; his face pale. The carotid pulsations were visible. On examination, the chest percussion-note was natural over the lungs anteriorly, and the breathing free from morbid sounds. Posteriorly, both bases were dull, especially the left, on which side the dullness extended to the inferior angle of the scapula, and laterally into the axilla, so as to merge into the area of cardiac dullness. Over the whole dull region behind, the breath-sounds were diminished; and, on the left side, the vocal vibration was lessened. The heart's area of dullness was increased, reaching close up to the second rib, and downwards to a little below the seventh; laterally, it extended, as far as we could make out from the lung-dullness, from the nipple-line to an inch beyond the

* Read before the Pathological and Clinical Section of the Birmingham and Midland Counties Branch.

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.