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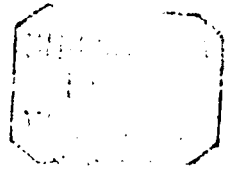

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DR. EDWARDS AND MR. CALLENDER.

VOL. I.

LONDON:
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MDCCCLXV.

PREFACE.

THIS VOLUME is published in deference to a wish generally expressed by the members of the school, and in accordance with the desire of our staff to place on record an account of some of the work which, from year to year, is being done at Saint Bartholomew's.

We hope that subsequent volumes will be enriched by the introduction of essays from those of our members, throughout this country or elsewhere, who may be willing so to aid us by their contributions that these 'Reports' may hereafter represent, most thoroughly, not the practice of the Hospital only, but the opinions, the teaching, and the experience of the school.

The essays in this volume are by the staff of the Hospital, who consider it right that they should initiate a work which will continue to receive their earnest support.

It has been their object to give to these essays a thoroughly practical character, admitting, however, scientific contributions connected with subjects taught in the school. Especially has it been sought to give—what essays such as these should, they consider, in the main consist of—accounts, brief but accurate, of the more important cases under treatment in the wards; cases interesting, not so much from their rarity as from

the points of practice involved in their diagnosis and in their subsequent treatment. Such reports of cases, isolated or grouped, form the greater part of the contents of the present volume.

As clearness of description is the best illustration of the subjects treated of, it has been our endeavour to limit as far as possible the introduction of diagrams and drawings: a few, however, have been inserted, and in future volumes others will be had recourse to when considered indispensable.

THE EDITORS.

St. Bartholomew's Hospital:
October 2, 1865.

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SAINT BARTHOLOMEW'S HOSPITAL REPORTS.

ARTICLE I.—*Cases of Chronic Pyæmia.* By JAMES PAGET, F.R.S.

CHRONIC PYÆMIA is seldom spoken of, and in many of the best systems of medicine and of surgery is not so much as referred to. Yet cases to which the name is appropriate are not very rare. Such cases resemble the well described and typical pyæmia in the formation of widely dispersed, shapeless collections of pus or other allied inflammatory matter; in the probability that these formations are due to some infection of the blood by the entrance of diseased inflammatory products; and often in the occurrence of rigors and profuse sweatings, of phlebitis, and inflammations of joints. But they differ from the acute type in that their course extends, continuously or with relapses, over many weeks or months, and is often free, at least in its later stages, from all severe general disturbance of the health, and from nearly all risk of life.

A record of some of these cases may promote a more general knowledge and a better study of the disease; a study which is much to be desired for the avoidance of the errors apt to arise, in this as in other cases, from a too exclusive consideration of what we regard, perhaps wrongly, as types of diseases.

The intimate relation of acute and chronic pyæmia may occasionally be seen in cases which, after presenting for a time all the characters of the acute form, assume a very slowly fatal course. Of these I need not give any detailed examples. It may be generally said of them that, after presenting the ordinary signs of acute pyæmia, the disease continues week after

week steadily destroying the health. Its course is indicated by slow wasting; all the tissues becoming dry and shrivelled; by increasing pallor; by decreasing muscular and mental power, the voice becoming weak, the mind slow and dull, and at night often wandering; by quickness and feebleness of pulse and breathing; by frequent and sometimes profuse sweatings, especially when there is much suppuration; by less frequent chills or rigors; by increased thirst and usually aversion from food; by dryness and shrinking of granulations. I do not pretend that the general signs of pyæmia can in every case of this kind be distinguished from those of hectic, or of mere exhaustion; yet commonly they are distinct enough, and the distinction becomes very nearly certain when, as it often happens, there appear occasional patches of redness on the skin, or abscesses with flaccid walls, or œdema of a foot or hand, or indications of pneumonia.

It is not, however, of cases such as these that I wish to speak. I refer to them only to make more evident the relationship between acute pyæmia and those instances which differ from it, not only in their slow progress, but in their comparatively mild general symptoms. To these the name of chronic pyæmia is especially appropriate.

I. *Ligature of subclavian artery—Pyæmia on the* 18*th day—Pyæmial arthritis, lobular pneumonia, and pustular eruption—Secondary hæmorrhages—Death on the* 65*th day.*

In June 1860 I tied the right subclavian artery of a man, 54 years old, who had a large axillary aneurism. He had fair general health, but in textures appeared older than his age. All went on well, except that his pulse, for some few days, had gradually increased in frequency, till on the 18th morning after the operation, he had a very severe rigor, followed by heat, and then by profuse sweating. On the next (19th) day he felt shaken, and rather feeble; and he complained of pain like rheumatism in his left shoulder; but his pulse was slower, and except for some recurrent sweatings, he had no general signs of pyæmia or other severe illness. On the 20th day the ligature was cast off; and on the 21st he felt and appeared as well as before the rigor, and might have been thought convalescent. He had taken large doses of quinine, and good food and wine. On the 22nd day a profuse sweating occurred, and the pulse rose; and on the 24th a very severe pain ensued in the right elbow, and, lasting for two hours, was followed by great exhaustion and sweating, and increased rate of pulse and breathing.

On this day, also, there was an increased discharge of pus from the wound, apparently from suppuration in or about the aneurismal sac.

During the next ten days (to the 34th) the patient appeared to lose flesh rather quickly. He often suffered severely with pain in the left shoulder and right elbow; nearly the whole of the right upper arm became very large with œdema and appearances of suppuration pointing at the elbow; he slept little, had profuse sweats, frequent chills, and no appetite; his pulse became weaker and was seldom under 100; his breathing less full, and generally 30 in the minute. Pus was freely discharged, and welled-up through a small opening which alone remained unhealed at the wound. Full quantities of stimulants and all the food that could be taken seemed to produce no effect. But in the next week (35th to the 41st day) a marked improvement in the general symptoms took place. The patient every day called himself 'better,' or 'quite well;' he slept well, and rarely sweated; his pulse ranged from 96 to 108, and was always soft and moderately full; his breathing became daily slower, his tongue was always clean, his appetite pretty good; his bowels regular; and he sat up in bed for a short time every day. The œdema of the arm and the suppuration about the sac appeared stationary; but there was neither pain nor rigor.

On the 41st day, the pulse, without evident reason, rose to 120 or more; and on the 42nd secondary hæmorrhage, to the amount of a pint, ensued through the opening at the wound. In the next three weeks, to the 61st day, bleeding to a few ounces occurred twice. The suppuration in the upper arm was profuse, with discharge at the elbow, and after a time at the axilla through an opening spontaneously formed. (After the formation of this opening the operation wound healed in two days.) The patient became constantly thinner and weaker; yet he often said that, but for his local ailments, he should feel quite well; and indeed he had no signs of general illness more than any one would have with losses of blood and profuse suppuration. Yet twice, during these weeks, he had thinly scattered pustular pyæmial eruption on the trunk and limbs, and for some days near the end of the time had quick breathing and cough connected, most probably, with pyæmial pneumonia.

On the 63rd day severe hæmorrhage again occurred, and then a sharp rigor, followed by heat and sweating. Again all these were twice repeated on the 65th day, and then he died.

At the examination after death (in addition to the disease connected with the aneurism, which it is unnecessary to describe here), some purulent deposits were found in firm circumscribed

spots in the upper lobe of the right lung; the left shoulder-joint was full of pus, and the cartilage of the humerus was thin, soft, and partially detached; and in the right elbow-joint all the articular cartilages were removed, and the ends of the bones were rough with superficial ulceration. The lower fourth of the right humerus was bare and surrounded with pus.

II. *Lithotomy—Rigor on the following day—Repeated suppurations in the sterno-clavicular region—Rigors and epileptiform convulsions—Suppuration in the prostate—Phlebitis—Recovery.*

In July 1859, I performed lateral lithotomy on a gentleman 34 years old, a patient of Mr. Hewer. He was of naturally robust health, but now worn-down by suffering and by residence in China. The stone was large and soft. The operation had in it nothing worth describing; but in the course of the day after it the patient had three sharp rigors, after as many times of passing urine through the urethra. During the next day he began to complain of pain, like that of rheumatism, about his left shoulder and clavicle. This continued and increased, and was soon attended with increasing swelling, and, at the end of the first week after the operation, issued in the formation of a large deep abscess over the lower left cervical and subclavian region, which abscess was opened. During the same week the pulse was seldom under 120; and frequent profuse sweatings occurred; but with these exceptions there was nothing materially different from an ordinary favourable progress after lithotomy.

In the second week recovery continued, and at its end the patient was able to leave his bed and walk to the sofa every day; his urine passed freely through the urethra; and 'he had not a bad symptom.' But he was annoyed with 'prickly heat,' such as he often had in China, and with the continued suppuration about the clavicle, for which two more punctures were necessary, and with which some sloughing of the subcutaneous tissue was now connected.

Sixteen days after the operation, after a rather restless night, but with no other warning, he had a rigor of the greatest severity; then a long hot stage, and then profuse sweating, which lasted through the day. They were like those of very bad ague; and he had had ague ten years before. Large doses of quinine were ordered.

Soon after the rigor, a part of the swelling near the front of the neck, which had been much raised and boggy, as if there were sloughs under it, almost completely subsided; yet there

was no increased external discharge of pus. During the night, there was profuse sweating; but on the next and following days, to the 25th, the patient's condition returned to what it had been before the rigor, except that he sweated more and had a slower pulse. The only apparent consequence of the rigor was the formation of an abscess over the upper piece of the sternum and the adjacent costal cartilages, which was let out on the 23rd day. With this exception, he appeared convalescent.

But on the 25th morning, after much distress in the bladder and rectum during great part of the night, the patient had an epileptiform seizure which lasted an hour, and was followed by great rapidity of pulse and profuse sweating. Before this 'fit' the parts about the abscess over the sternum were observed puffed-up and swollen; after it, they had quite subsided, though without any visible discharge of pus. In connection with this 'fit,' which, in all its relations, appeared to be the equivalent of a rigor, a large abscess formed in the left lobe of the prostate. But the general health of the patient suffered no other disturbance than would have been produced by an ordinary abscess in the same part; and when the pus was discharged, by puncture through the healed lithotomy-wound, he was at once relieved from all trouble, general as well as local.

Thirty-six days after the operation, when the patient's health was so far restored that he was daily walking or riding out, he was suddenly seized with severe cramp-like pain in the legs, the first symptom, as it appeared, of phlebitis of the posterior saphenous veins, which, in succession, became hard and tender at and below their junction with the popliteal. He was for many days troubled with the lameness and œdema thus caused; but when these were remedied, his recovery seemed complete, except in that the prostate-abscess led to a formation of a small fistulous communication between the bladder and rectum, which only slowly closed. He has ever since had good health.

In both of these cases, condensed from full reports, the general characters of pyæmia are clearly marked: yet they differed widely from the acute type in respect of both time and intensity.

A 'typhoid' state is commonly referred to as most characteristic of the general condition of a patient with pyæmia.*

* I should not myself so speak of it. Among even the worst cases of pyæmia under my own care, both in the hospital and in private, many, and I think the majority, of the patients have either never been 'typhoid,' or have been so for but a short time, and then have passed into the fatally exhausting form of the disease described at p. 2.

Certainly nothing 'typhoid' was observable in either of these patients. Both of them, for many days together, appeared and felt as if they were convalescent, even while, as we may believe, the mischief of pyæmia was at work in them.

It may be observed, too, that in both these cases the healing of the operation-wounds was unaffected by the pyæmia. The same fact may be commonly noticed in chronic pyæmia; and even the healing of one pyæmial abscess while another is forming, and while the patient is being gradually exhausted; but in these cases the healing of the wound is rather by contraction and drying than by the organisation of new tissue.

The cases of chronic pyæmia longest in duration that I have yet seen occurred in connection with acute necrosis (so-called) —i. e., necrosis apparently due to acute diffuse suppuration between a bone and its periosteum.* The frequency of death from acute pyæmia in this disease is well known; yet I think there are no cases of pyæmia in which death is more often escaped. Neither are there any among which better evidence may be found that the presence of pus is not essential, as the starting-point, for what we assume to be a pyæmial infection of the blood.

III. *Acute necrosis of the left os calcis—Phlebitis—Abscesses—Acute inflammation of the right knee-joint—Necrosis of the left femur—Inflammation of the elbow and hip-joints—Symptoms extending over three years.*

In September 1859, I saw a lad, 11 years old, of healthy constitution, and living in good circumstances. He was a patient of Mr. Sainsbury, to whom is due whatever credit may be given to medicine for an escape from pyæmia. In July 1858, he had had gastric or typhoid fever of great severity, attended with tympanites and a very painful state of several joints. But from this he had completely recovered. In May and June 1859, he had numerous boils; and on the 6th of July was almost suddenly attacked with a severe pain in his left heel and ancle. This was ascribed, with fair reason, to excessive exercises at cricket, and in gymnastics during which he hung on a rope by his heels for a long time.

On July 7th the pain was less; but at night it became worse, and he put his feet into cold water to relieve it. During this night he became delirious; and he continued so next day, with

* See especially T. Smith, in *Brit. Med. Jour.*, 1863, Nos. 133, 134, 135.

swelling and apparently great pain in the ancles, especially the left one.

On July 9th, Mr. Sainsbury found him with acute fever, delirium, abdominal distension, and general 'typhoid' symptoms. Next day the integuments below the left ancle-joint and heel began to slough; and in some days following the sloughing extended rapidly, a large portion of the os calcis perished, and the ancle-joint, or that of the os calcis and astragalus, or both, were laid open. For many days he appeared dying—typhoid and exhausted, with rapid wasting; but he gradually recovered. The large piece of the os calcis, with the attachment of the tendo Achillis, remained widely exposed; and a large portion of integument separated.

During this, the acutest part of his illness, occupying nearly two months, the patient had inflammation of the lymphatics or veins, or both, of the left limb; swellings seeming to threaten suppuration, but subsiding, on the arms; and an abscess on the front of the upper part of the right leg, which was opened and healed.

In the third month the right knee-joint became acutely inflamed, with severe pains, and quiverings and startings of the limb, indicative of ulceration of the cartilages and articular surfaces of the bones. This ended with contraction and firm anchylosis. In the months following, while the patient's general health was so far improved that he seemed to suffer with nothing but the feebleness of a very slow convalescence, there were repeated inflammatory swellings about the hip-joints, and on one side; but none of them suppurated: they subsided, some during the repeated application of tincture of iodine, some while using cold compresses. Month after month thus passed, and in the summer of 1860, the abscess by the right knee formed again and reopened, and necrosis of the left femur occurred, with repeated openings of sinuses and separation of sequestra.

In November of the same year, a very acute inflammatory attack occurred at the right elbow-joint, threatening suppuration of the joint, and leading to permanent contraction and partial stiffness.

In February 1861, the greatest part of the dead portion of the os calcis, the seat of the first necrosis, separated; and thenceforward healing went on, and was in the course of the year completed. The greater part of this year passed without any recurrence of active disease; and the patient, crippled in the left foot, right knee and thigh, and right elbow, recovered better health and strength than he had had since his illness began.

But in November 1861, another acute attack of inflammation of the right elbow-joint occurred. It began, as all of the same kind did, without any apparent cause, suddenly, in the night, with severe pain, which continued many days; was attended with great heat and swelling, and with redness and œdema of the integuments, and was followed by almost complete stiffness of the joint. In March 1862, there ensued an equally acute inflammation of one hip-joint, just like an ordinary 'morbus coxœ;' but this also, treated like that at the elbow, with leeches and cold compresses, and rest, subsided, and left only partial stiffness. In the summer of 1862, the right leg suffered for a month with erysipelas, and a large abscess formed in the left thigh; and in November of the same year, the right elbow was for the third time the seat of acute inflammation of the joint. From this time onward health was gradually without interruption completely recovered, and with complete action of the joints with the exception of the left ancle and the right knee.

Strangely unlike as this case may seem to the ordinary cases of pyæmia—running their fatal course in a week or two, or, as it is said, 'occasionally' prolonged to seven or eight weeks—it is yet evident that the unlikeness is almost only in respect of time. If the events of this case had all occurred in three months, instead of three years, it would have been an ordinary case of pyæmia ending well. But difference of duration is never alone sufficient to indicate a difference in nature, or to justify a difference of substantive-name among diseases. However prolonged, this and the like cases are still pyæmia, chronic or relapsing.

The absence of nearly all respect to time is, indeed, one of the many characters in which pyæmia differs from the most marked specific diseases; and this corresponds with the absence of specific shape in the pyæmial deposits, abscesses, and necroses; with the common characters of pyæmial pus and other products of inflammation; with the absence of all indication of a single constant infecting material; and with the transmutability (as it seems) of pyæmia, with erysipelas, cellular inflammation, and puerperal fever.

It may be a question whether, in such a case as that last related, there was any abiding disease of the blood or tissues in the intervals between the successive outward evidences of pyæmia. We can judge, in such a question, only by the analogy of other relapsing diseases—e. g. of secondary syphilis; and from this we may believe that, during the whole period of liability to outbreaks, there is continuous, though not stationary, disease.

In some of the cases of chronic pyæmia connected with acute necrosis, the secondary affections are limited to the bones or greatly predominate in them. A girl, 11 years old, who was under the care of Mr. Roden, of Droitwich, had acute necrosis of the lower part of the right tibia, and, almost coincidently, of a piece of the left clavicle. Some months afterwards, she had necrosis of a small portion of the left humerus, with considerable suppuration around it; and several months later, a deep abscess, but not attended with necrosis, above the right knee. In another similar case, a young patient had, during four years, a succession of attacks of necrosis of different bones; all acute, none bearing any resemblance to strumous disease.

This election of a single tissue, and the observance of an uniform method of disease, in the secondary affections, are characteristic of chronic rather than of acute pyæmia. They are very marked in some of the cases that follow parturition, in which women suffer for many weeks with a succession of abscesses in the subcutaneous connective tissue of the limbs, and usually (after long suffering) recover completely. Such cases are also sometimes seen in men.

Among the least severe cases of pyæmia that I have seen,—contrasting with the acute cases as strongly in respect of gravity as the last related do in respect of time,—have been some of those associated with disease of the urinary organs or with catheterism.

IV. *Urethral stricture—Retention—Catheterism—Rigors—Pyæmial abscesses—Tumour-like formation about the femur—Liquor potassæ—Recovery.*

A sallow unhealthy-looking man, 40 years old, was admitted into St. Bartholomew's on January 27th, 1863, with old strictures and recent retention of urine. The usual treatment was pursued, with the warm bath and opium, and afterwards with catheterism. He was completely relieved, and taught the use of the catheter; and was discharged, apparently in his usual health, on February 10th. Just before he left the hospital, a No. 8 catheter was passed easily.

On the night of February 11th, about thirty-six hours after his discharge, without any reason that he could assign, he had violent rigors and great pain, like that of rheumatism, in his right shoulder. On the 12th he had some hæmorrhage from the urethra, and about the same time noticed a painless swelling on the right of the upper half of the sternum, and soon after

another swelling under the urethra, just in front of the scrotum. With these, and complaining of dyspnœa and pain in the chest, he was again admitted into the Hospital on February 14. Soon after his admission, a third swelling was found, seated over the left olecranon. All these swellings were or became abscesses: that over the sternum was opened on the 14th; that by the urethra burst into the canal on the 18th, and that over the olecranon was opened on the 19th; and (to end their history), they all healed within the following month.

Two days after his admission, the patient's general condition was only such as might be found in any one with abscess from ordinary causes. He had been rather more ill on admission; but, as it seemed, only from distress added to the irritation of the forming abscesses. After two days' rest, he had a cool, moist skin; his tongue was but little furred on the middle; his pulse 108, full, and soft; breathing 20; his bowels acted daily, and he passed healthy urine freely, and except that he slept little and was feeble, he could hardly have been thought ill.

Near the beginning of March, the patient observed a swelling on the outer and front part of his left thigh. This gradually increased, and at the middle of April covered at least three-fifths of the front and outer part of femur, to which it felt as if immoveably fixed. The swelling was oval, smooth, not perfectly defined, firm, and apparently solid, or, as if a solid infiltrated with fluid. The integuments and all the adjacent structures appeared healthy, and very little pain was produced by even rough handling. A small puncture let out a little bloody serum. The general condition of the swelling appeared to be that of a deep-seated inflammatory infiltration of all the tissues round the bone—but some thought it a firm tumour growing from the bone; the more readily because the patient's health seemed undisturbed. He went out daily, and was in every respect convalescent.

By the middle of April, the swelling had gained its greatest size, increasing the circumference of the limb by two inches. The patient was now ordered to take a drachm of liquor-potassæ three times a day, and to make no change whatever in his manner of life, or any of the conditions in which he was placed. Very shortly the swelling began to decrease, and with no other evident change than that of diminishing size it gradually disappeared, and by the end of May was gone. Soon after, the patient left the hospital apparently well, and he showed himself a month later in the same condition.

V. *Lithotrity — Acute general disturbance — Abscess in the fore-arm, and threatened in the thigh.*

A gentleman, 40 years old, invalid with the consequences of an empyema of many years' duration, had a calculus of lithic acid, which was to be removed by lithotrity. The first crushing was on January 4th, and was followed by no general disturbance. The second, on January 10th, was followed on the next day by a greatly increased rapidity of pulse, — it rose from near 90 to 140,—by rapid breathing, redness and dryness of the tongue, impaired appetite and digestion, frequent vomiting, heat and wetness of the skin. These symptoms continued for five days, with little variation, and then gradually subsided. During and after their continuance, the urine contained more than usual mucus; but the irritability of the bladder was not increased. A third crushing was done on January 16th, and a fourth, the final one, on January 22nd.

While the patient was suffering with the severe constitutional disturbance above described, he began to complain of pain in the left fore-arm, and in the front and upper part of the left thigh. In the former there slowly appeared a widely-diffused œdematous swelling, tense and painful, which, with gradual concentration about the middle of the ulnar aspect of the arm, formed a large abscess in the deep subcutaneous tissue. This was opened on January 27th, and, after freely discharging thick pus, and several times apparently healing and then reopening, finally closed on March 23rd. The pain in the thigh was succeeded by a swelling, similar to that in the fore-arm, but much larger, extending from the great trochanter over all the front of the hip-joint, and far inwards and downwards. At the end of January, it appeared to have already suppurated; but the calculus having been all evacuated, and the patient seeming to be only extremely feeble, I advised him to leave London for his home in fresher air. There, with returning strength, the abscess in the fore-arm healed; the swelling in the thigh slowly disappeared without discharge, and the patient regained and retains his usual health.

Still less severe in its general symptoms than either of these two, was the following case:—

VI. A young man was under my care in the Hospital in March and April 1862. He was admitted with spontaneous moderately acute inflammation of the right inguinal glands. A small puncture was made into the centre of the swelling; but

it contained no pus. A few days later, acute œdematous inflammation of the scrotum set in; while it was subsiding without suppuration, the internal saphena and some other veins of the left leg became nodular, hard and tender, with pains and heat, as in ordinary adhesive phlebitis; and, in a day or two, a similar affection appeared in the veins of the right leg. When these had nearly recovered, pains and swelling, much like those of acute rheumatism, ensued in one hand and elbow, and, after a few days, in the opposite wrist. After an interval of rather more than a week, and when the patient seemed nearly completely well, a swelling appeared by the anterior spine of the right ilium, not far from the glands that had been inflamed. This suppurated, and discharged the only pus formed in the case. While it was discharging, the right spermatic cord became painful and hard. Then knotted hardness, pain, and tenderness ensued, in succession, in some of the subcutaneous veins of the left fore-arm, left upper-arm, and right fore-arm.

With these the case ended, and, after two months' illness, the man regained his usual health and strength. During the whole time he had no more or other general disturbance of his health than is usual in each of the inflammatory diseases from which, in unusual succession, he suffered. In the intervals between them he was weak, but not ill.

If it should seem to some that cases so comparatively trivial as these cannot properly be called by the same name as those from which the ordinary description of pyæmia is drawn, I would observe that the difference between the two groups of cases is only one of degree; and that a complete series of cases might be collected ranging from the most to the least severe, and all resembling one another more than any of them resemble the cases of any other disease. The differences between the cases of acute and of chronic pyæmia are not greater than those between cases of acute and chronic tuberculosis. Sameness of designation is, in both cases alike, justified by the rule that differences in degree do not constitute or prove difference in kind.

The conclusions which the cases just related go to prove may be thus summed up:—

It is not rare to meet with examples of disease presenting the essential characters of pyæmia, but much slower in progress, and much less severe and perilous, than those from which pyæmia is usually described.

These cases are frequent enough to justify the general use of the names 'chronic' or 'relapsing' pyæmia.

They are more rare among the instances of pyæmia following wounds than among those occurring in diseases.

The local evidences of chronic are, more often than those of acute, pyæmia, seated exclusively or chiefly in different parts of the same tissues; they are more frequent in the trunk and limbs than in internal organs, and when seated in the veins are most frequently found towards the close of the disease.

The nearest affinities of chronic pyæmia are with rheumatism, through gonorrhœal or urethral rheumatism; with simple or single abscess-formation after fever; with hectic fever; yet, with very rare exceptions, the diagnosis from all these is, in practice, clear.

The prognosis in chronic pyæmia may, usually, be very favourable; especially when there are long intervals between the successive local manifestations of disease, and no evidence of serious pulmonary affection. The slower the pulse and breathing, and the less the sweating, the greater are, in general, the probabilities of recovery.

The usual treatment of chronic pyæmia may be with good food, patient nursing, a moderate use of stimulants and tonics, and an abundance of fresh air. The value of this last condition was strikingly shown in Case V. The influence of the liquor potassæ in Case IV. deserves consideration. Its curative power seemed clearly proved; and I suspect that a part of its reputation for causing the absorption of tumours is due to its influence on morbid deposits imitating tumours, such as existed in that case.

Article II.—*On the Diagnosis of Systolic Endocardial Murmurs, whose point of greatest intensity is at or near the Left Apex of the Heart.* By James Andrew, M.D. Oxon.

MY EXCUSE for adding one more to the numerous essays on the physical signs of diseases of the heart, is the difficulty I have myself experienced in the accurate diagnosis of the lesions indicated by the various murmurs, more especially by those heard at or near the left apex, and during the systole. The student's first impression is that a murmur, at this place and time, indicates mitral regurgitation, almost as certainly as a diastolic murmur at the base indicates aortic regurgitation. He soon learns (for the fact is mentioned in most recent works on Diseases of the Heart) that this his first idea is far from correct; that there are many causes, besides incompetence of the mitral valve, which may give rise to a systolic apex-

murmur. His difficulties begin when he endeavours in any particular case to ascertain the significance of the morbid sounds which he may hear, or the exact nature of the lesions of structure or of function upon which they depend. Not unfrequently indeed the physical signs are themselves so obscure, and their interpretation so difficult and uncertain, as to render it all but impossible to found an unassailable diagnosis upon them; it may even be impossible to determine with certainty whether a murmur is produced at the mitral or at the aortic orifice. But the number of cases in which this uncertainty exists would be greatly diminished if the means at our disposal were always employed with sufficient care, and the conclusions to which they lead accepted with the confidence to which they are entitled. It is also by no means an unnecessary refinement to distinguish in practice different murmurs from each other—regurgitant from onward. The treatment of aortic regurgitation is not more distinct in principle from that of mitral regurgitation, than the treatment of this last ought to be from that of the cases in which the obstruction to the circulation takes effect during the passage of the blood into the left ventricle, or within that cavity. But whilst the constitutional effects of some forms of heart-disease furnish at once distinct and trustworthy indications for different modes of treatment—e. g., the tendency to syncope in aortic regurgitation as contrasted with the tendency to pulmonary congestion consequent on mitral incompetence—the general effects of other diverse cardiac lesions, e. g. of mitral constriction and of mitral incompetence, are so closely allied, that the rational treatment even of their symptoms must rest all but entirely on that knowledge of their real nature which can be gained from the physical signs alone. Thus, in mitral insufficiency, measures which increase the power of the left ventricle will often but increase the mischief; for the quantity of blood which, with each systole, passes backwards into the left auricle, may be increased not only absolutely, but also relatively to that propelled through the aortic orifice. On the other hand, if the circulation be embarrassed, either at the auriculo-ventricular orifice or within the ventricle itself, the closure of the mitral valve being perfect, anything which improves the tone of the heart, and thus strengthens the contractions of the left cavities, will relieve instead of aggravating the general symptoms.

The murmurs which may be heard within the mitral area, classified according to their seat and the direction of the blood-stream in which they arise, are at least four in number, viz. :—

1. Auriculo-ventricular (onward).
2. Ventriculo-auricular (regurgitant).
3. Ventricular, i. e. produced within the ventricle (onward).
4. Mixed, i. e. when the second and third coexist.

Of these, the first is in point of time diastolic or præsystolic, and is therefore excluded from the present enquiry; the consideration of the fourth will be found to throw light upon the cause and nature of musical murmurs; but it is my intention to treat principally of the second and third, and of the means of distinguishing them the one from the other. And in doing this the value of certain physical signs of disease of the heart, viz., hypertrophy, intensification of the second sound in the pulmonary artery, and the degree in which the murmur is audible posteriorly, at or near the inferior angle of the left scapula, will be incidentally discussed.

The following table contains 100 cases of systolic apex-murmur, classified according to the presence or absence of the physical signs which have been just enumerated. Of these the most important appears to be the existence of the murmur posteriorly, at or near the inferior angle of the left scapula. If the murmur be not audible in this region, I believe that it rarely indicates regurgitation. The principal value of the other physical signs to our present enquiry lies in the confirmation, more or less direct, which they afford of the truth of this statement. In practice they are of course of the highest value, indicating, as they do, with tolerable exactitude the extent to which the circulation is interfered with.

But few of the reports of the cases rest solely on my own authority; many of them were verified by the late Dr. Kirkes. The details relating to chorea, rheumatism, and hereditary predisposition, although irrelevant to the subject of this Paper, appeared to be of sufficient interest to justify their insertion. The number of cases in which I was able to verify the diagnosis by a post-mortem examination was very small; but it must be remembered that of fatal cases of heart-disease in hospitals, a very large proportion are admitted in a condition so prostrate as to render a complete physical examination during life impossible, and that without this they could not be made available for my present purpose —

TABLE CONTAINING 100 CASES OF SYSTOLIC APEX-MURMUR.

(*Males*, 54; *Females*, 46. *Ages from* 16 *months to* 64 *years.*)

			Pulse was irregular in	Thrill was present in	A musical sound was present in	No history of rheumatism in	
Audible Posteriorly—							
Hypertrophy. Intensification of pulmonary 2nd sound . . .	56		15	19[a]	3[c]	21	cases 28–30
Hypertrophy. No intensification of pulmonary 2nd sound . .	8		1	2	1	2	„ 7–13
No hypertrophy. Intensification of pulmonary 2nd sound . .	0		—	—	—	—	—
No hypertrophy. No intensification of pulmonary 2nd sound . .	2		—	—	—	—	„ 5–6
		66					
Not Audible Posteriorly—							
Hypertrophy. Intensification of pulmonary 2nd sound . . .	11		2	3[b]	—	7	„ 14–24
Hypertrophy. No intensification of pulmonary 2nd sound . .	4		1	—	—	1	„ 1–4
No hypertrophy. Intensification of pulmonary 2nd sound . .	3		—	—	—	1	„ 25–27
No hypertrophy. No intensification of pulmonary 2nd sound . .	16		—	—	—	6	—
		34					
		100	19	24		38[d]	

[a] In 7 of the 19 it coincided with irregularity of the pulse.
[b] In 1 of the 3 it coincided with irregularity of the pulse.
[c] In 2 of the 3 thrill was present, and in one of these 2 there was also irregularity of the pulse.
[d] In 5 of the 38 there was a distinct hereditary history of heart-disease, and in 5 more of chorea.

The cases here tabulated are taken, as far as possible, from my notebooks in the order in which they came under my observation. It would be tedious to give the whole of them at full length, but it will be necessary for me to refer to the details of the following cases. It may be as well to mention that, in determining the comparative loudness of the second sound in the aorta and in the pulmonary artery, the stethoscope was applied to the points given by Dr. Walshe as most suitable for that purpose—viz., in the case of the aorta to the second right, in that of the pulmonary artery to the second left costal cartilages at their junction with the sternum.

CASES.

1. W. H., æt. 16, admitted into St. Bartholomew's Hospital February 18, 1863, with acute rheumatism, first attack. Pericarditis and double pneumonia. On March 15 states that he feels nearly well. Heart's impulse, forcible and extended; apex in sixth intercostal space, in a line with the nipple. A soft bellows murmur, loudest at the point of greatest impulse, is traceable towards the axilla, but is not audible posteriorly; in front it is lost at about the level of the nipple at the left edge of the sternum; pulmonary second sound not intensified; pulse small, but regular.

On April 1st and 5th no alteration was detected.

2. John C., æt. 50. Acute rheumatism, third attack, the first thirty years, the second two years ago. Impulse of heart not increased; apex in sixth intercostal space; a harsh systolic murmur at the base; at the apex a soft bellows murmur, which fades in both directions, and is not audible posteriorly; pulmonary second sound not intensified; pulse regular.

3. George W., æt. 16. Rheumatism, first attack. Heart's impulse increased; apex slightly displaced downwards and outwards; a systolic murmur at the apex, becoming louder at the level of the nipple, slightly audible at the left base; no intensification of the pulmonary second sound; pulse 104, regular.

4. Susannah G., æt. 11. She has never been strong, but no history can be obtained of any illness, except the usual infantile ones—pertussis, rubeola, and scarlatina. Her manner is very nervous, almost choreic. Heart's impulse extended; the apex a little displaced outwards and downwards; a ringing systolic murmur at the apex, loudest at the level of the nipple, lost at the base, and not audible posteriorly; pulmonary second sound not intensified; pulse, feeble and a little irregular. She was under observation for nearly eight months, and the physical signs remained the same, except that there were variations in the intensity of the murmur, and that the irregularity of the pulse was not again noticed.

5. Sophia H., æt. 26. Had rheumatic fever seven years ago, and again six months ago. Impulse of heart normal, but apex displaced outwards; a systolic murmur at the apex, fading in both directions, but very faintly audible posteriorly; pulmonary second sound not intensified; pulse of fair volume and regular.

6. Maria T., æt. 26. March 16th. Had an attack of rheumatism seven years ago, and has never been quite so strong

since. Has suffered from pain in the chest for the last twelve months only. Heart's impulse forcible, but apex in normal position; a systolic murmur at the apex, which is audible posteriorly; pulmonary second sound not intensified; pulse, regular.

March 30th. The murmur is not detected anywhere.

April 6th. The murmur is again audible.

April 27th. The murmur not detected to-day. It did not reappear during the remainder of the time, four weeks, that she was under observation.

7. Agnes W., æt. 9. Feb. 19th. Disease of mitral valve after slight rheumatism, first attack. Heart's impulse accompanied by a purring thrill; apex in sixth intercostal space; a loud shrill systolic murmur, loudest immediately below the nipple, is audible posteriorly, but as a faint distant muffled sound; pulmonary second sound not intensified; pulse, regular, and of moderate volume.

March 15th. No change.

8. John B., æt. 42. Admitted May 25th, with hemiplegia of left side, one day, and disease of the mitral valve following an attack of rheumatism two years and a half ago.

June 30th. Heart's impulse not increased; apex in sixth intercostal space in a line with the nipple; a long droning systolic murmur becoming softer and shorter towards the base. It appears to begin immediately after the second sound, and terminates with a very loud first sound; it is audible, but faintly, posteriorly; pulmonary second sound not intensified; pulse small, but regular. He left the Hospital, but was again admitted a few weeks later with hæmoptysis, and died. Leave to make a post-mortem examination could not be obtained.

9. Caroline D., æt. 12. Chorea after rheumatism. Mitral murmur. Heart's impulse, forcible, extended, and accompanied by purring thrill; apex in sixth intercostal space, about in a line with the nipple; in the fifth intercostal space, however, the heart's impulse is perceptible considerably further towards the left. At the apex there is a loud blowing systolic murmur, fading upwards towards the left base, where it is still audible, though faintly; it does not fade much into the axilla, and is heard distinctly posteriorly; the second sound is faint but clear at the aortic cartilage; at the pulmonary cartilage there is a loud harsh diastolic murmur.

10. Thomas B., æt. 41. March 19th. Had rheumatic fever when seventeen years old; for the last seven years has suffered from rheumatic gout; except during the last two or three years, has not had pain in the chest. Heart's impulse,

natural; apex in fifth intercostal space, but just external to the nipple. A musical systolic murmur all over cardiac region; it is loudest at the apex, weaker in the axilla than over the body of the heart; it may be traced continuously high up in the carotids; posteriorly, on approaching the spine, it again increases in intensity, and is plainly audible all down the spine; pulmonary second sound not intensified; pulse regular.

July 16th. The same.

11. Fanny M., æt. 38. No history of rheumatism; always had moderately good health up to two months ago, when she began to suffer from palpitation and pain in the chest. Heart's impulse, forcible; apex in sixth intercostal space, external to the nipple; a blowing systolic murmur at the apex, lost at the base, but audible posteriorly; pulmonary second sound not intensified; pulse irregular, but varies from time to time.

12. James F., æt. 16. Has had many slight attacks of rheumatism; but has never been confined to his bed with it for more than a week. Heart's impulse forcible; apex in sixth intercostal space, a little external to the nipple; at the apex a loud systolic murmur, fading towards the base, loudly audible in the axilla and posteriorly. Pulmonary second sound not intensified. On percussion there is much greater resonance at the pulmonary than at the aortic cartilage; pulse small and regular.

13. Mary C., æt. 25. No history of rheumatism; has only suffered from palpitation for the last two months. Apex in sixth intercostal space, external to the nipple; a loud systolic murmur audible over the whole anterior cardiac region, and also posteriorly; is loudest at the point of greatest impulse; pulmonary second sound not intensified; pulse regular.

14. James V., æt. 22. Second attack of rheumatic fever, the first four years ago. Apex in sixth intercostal space, in a line with the nipple; a long very faint blowing murmur at the apex, fades towards the base; may be traced into the axilla, but is not audible posteriorly; pulmonary second sound accentuated; pulse regular.

15. Henry M., æt. 20. June 15th. Was admitted on June 9th with acute rheumatism—first attack—and endocarditis. Apex in sixth intercostal space a little external to the nipple; impulse slightly increased. At the apex a blowing systolic murmur, which fades towards the axilla, and is not audible posteriorly; it becomes louder between the nipple and sternum, fading thence towards the base, where it is, however, still audible, most so at the pulmonary cartilage; occasional slight reduplication of the second sound; pulmonary second sound intensified; pulse small and regular.

June 21st. The same.

July 11th. Murmur no longer detected.

16. Susan B., æt. 44. Anasarca, five weeks; urine slightly albuminous. Has always been 'short-winded,' and unequal to any violent or continued exertion; does not remember having had any illness as the cause of this. Apex of heart in sixth intercostal space, in a line with the nipple; impulse extended and forcible; at the apex a blowing murmur, terminating with a loud first sound, is lost at the base, and not audible posteriorly; pulmonary second sound intensified; pulse very small, somewhat irregular. Died. Examination not allowed.

17. Michael C., æt. 64. Has never been laid up with rheumatic fever, but last winter suffered from pains in his limbs. Paralysis, from lead, of extensor muscles of forearms. Heart's impulse slightly increased; apex displaced a little outwards and downwards; and with a slight systolic murmur; pulmonary second sound intensified; pulse regular. Posteriorly the heart sounds are clearly audible, but there is no murmur. Chest somewhat emphysematous.

18. John M., æt. 34. No history of rheumatism or of any very serious illness. Six years ago he had ague. Seven years ago he had an accident; his left arm was pressed with great violence against the front of his chest, and he has never been well since. Heart's apex in sixth intercostal space, in a line with the nipple; impulse forcible, with slight thrill; a systolic murmur at the apex, fading rapidly in both directions, most so into the axilla; not audible posteriorly; pulmonary second sound intensified; heart's action irregular. This note was taken in the out-patient room. He was shortly afterwards admitted into the Hospital with gangrene of the right leg, from embolism, and from which he died. No post-mortem examination was allowed.

19. Henry T., æt. 18. Never strong: had rheumatic fever when five, and again when ten years old. Chest compressed laterally, with projection of lower part of sternum; heart's impulse forcible, extended, and accompanied by thrill; apex in sixth intercostal space, in a line with the nipple, whence a systolic murmur, resembling a coarse friction sound, fades towards the axilla; is not audible posteriorly; pulmonary second sound intensified; pulse small, but regular.

20. William R., æt. 17. May 25th. A printer. No history of rheumatism; but his work is very heavy. Has been out of health for two years. Heart's impulse forcible, with slight thrill; apex in sixth intercostal space, external to the nipple. At the apex there is a long droning systolic murmur, fading in both directions; not audible posteriorly; slight intensification

of pulmonary second sound; pulse, regular. The murmur varies somewhat in length and pitch from beat to beat.

June 15th. The murmur does not vary so much.

July 29th. Thrill more marked. The murmur terminates with the commencement of the first sound.

August 19th, September 2nd, November 4th. No change.

21. William W., æt. 23. July 15th. No history of rheumatism. Heart's apex in fifth intercostal space, but a little external to the nipple; a systolic murmur at the apex and at the pulmonary cartilage, is not audible posteriorly; pulmonary second sound intensified; pulse regular.

July 22nd. The murmur is not so loud.

August 19th. No change.

22. Catherine S., æt. 46. No history of rheumatism. Has been out of health since her hushand's death, six years ago, and has gone through much anxiety. Five and a half years ago was laid up with a 'nervous fever.' Apex displaced downwards and outwards, but only slightly; a loud systolic murmur, fading in both directions; not audible posteriorly, although the heart sounds are loudly so; intensification of pulmonary second sound; pulse small and regular.

23. Mary Ann T., æt. 38. No history of rheumatism, but subject to attacks of sickness. Has been troubled by palpitation for the last seven or eight years; it began 'when she was in a hard place.' Lips livid. Heart's apex in sixth intercostal space, displaced outwards; a murmur, ending with the first sound, lost at the base, and not audible posteriorly, but may be traced a little way into the axilla; intensification of pulmonary second sound; pulse small and regular.

24. James H., æt. 43. Phthisis; albuminuria; anasarca. No history of rheumatism, but has had a cough all his life. Heart's impulse slightly increased; apex displaced outwards, so as to be external to the nipple, but slightly, if at all, downwards; a systolic murmur at the apex, fading in both directions; not audible posteriorly; pulmonary second sound accentuated; pulse regular.

25. Harriet L., æt. 24. Chorea, two months. No history of fright or rheumatic fever. Impulse, a little forcible; apex in normal position; a systolic murmur at the apex, which becomes fainter towards the axilla, louder, and all but musical, in a line with the nipple, but it varies somewhat with successive beats; intensification of pulmonary second sound; heart sounds loudly audible posteriorly, but unaccompanied by any bruit; pulse regular.

26. Edward G., æt. 16 months. No history of illness up

to five weeks ago, when he suffered from violent sickness, followed by swelling of limbs and of face, which lasted for about two weeks. Urine said to have been natural. Apex in normal position; impulse natural; a systolic murmur, loudest about midway between base and apex; not audible posteriorly; action regular; marked intensification of pulmonary second sound.

27. Henry B., æt. 22. Has had rheumatic fever twice; first four years, and again two years and a half ago; has never been quite well since the first attack. Apex a little displaced; a systolic murmur, not audible posteriorly, slightly so at left base; intensification of second sound at pulmonary cartilage, where there is also dulness on percussion. Pulse regular.

28. Alfred D., æt. 19. March 4th. First attack of rheumatism twelve months ago; had no pain in his chest, but a blister was applied; has not been quite well since. His feet first began to swell five weeks ago, his abdomen also at present contains fluid, and he suffers much from pain in the chest, and inability to lie down. Impulse, forcible and extended; apex in seventh intercostal space where there is a loud systolic murmur, which becomes musical anteriorly, and is heard as a well-marked bellows-sound posteriorly; pulmonary second sound intensified; the aortic second sound almost lost; pulse, small and irregular. He died on March 22nd, having meantime had an attack of pericarditis. At the examination of the body almost the whole front of the chest was found occupied by the pericardium, distended with yellow turbid serum, both the surfaces beset throughout by flocculent lymph, and here and there organised firm adhesions, most numerous towards the base. The mitral valve opposed scarcely any resistance to the passage of water from the ventricle into the auricle, but except slight thickening, and a few small bead-like vegetations, it, with the chordæ tendineæ, appeared natural. But the shape of the cusps was altered; they were broader and at the same time shallower than usual. The weight of the organ was eighteen ounces, all its cavities being dilated and hypertrophied; the circumference of the pulmonary orifice was three and a half inches; of the tricuspid, five inches and ten-sixteenths; of the aorta, three inches; and of the mitral, five inches and nine-sixteenths.

29. Sarah L., æt. 6½. January 22nd. No rheumatic history. Considerably increased cardiac dulness. A loud systolic murmur, musical over a limited space at the apex; a simple bellows-sound being audible in other parts of the chest, at the angle of the left scapula, and in the left axillary region; intensification of pulmonary second sound; pulse regular. The physical

signs remained unaltered during the time she was under observation. At the post-mortem examination, on May 6th, all the valves were found to be healthy, except the mitral, which on its auricular surface was studded by numerous vegetations, which extended also upwards over the auricle; tested with water it admitted of free regurgitation.

30. Mary M., æt. 31. Has never had rheumatic fever; but for the last eighteen months has suffered from palpitation and pain in the chest, brought on, she believes, by fatigue and anxiety. Her mother's family are subject to heart disease. Two of her aunts have died from it; and I had the opportunity of examining a cousin and an elder sister, who both had a systolic apex murmur. Heart's impulse forcible, with thrill; apex in seventh intercostal space, external to nipple; a loud blowing murmur at the apex, with which there is also a shrill musical sound, audible all over the sternum, but loudest at the level of the fourth intercostal space: it is heard, also, loudly in the left axilla, but posteriorly the musical part of the sound is lost, and there is only an ordinary bellows murmur; slight intensification of pulmonary second sound; pulse regular. The condition of the heart has remained about the same for the last twelve months since this note was taken.

In the present state of cardiac pathology it cannot be necessary to insist on the value of the murmur being heard posteriorly as a sign of mitral regurgitation. It will be sufficient in this place to refer to Dr. Walshe,* and to quote the following passage from a valuable paper by Dr. Austin Flint, of New York.†

'If the murmur be limited to a circumscribed space, at or within the apex of the heart, i.e. not propagated much without the heart towards the left lateral surface of the chest, and not heard on the back, it does not denote regurgitation. It does denote regurgitation, as a rule, if it be propagated much without the heart, and if it be heard on the back. But there are exceptions to this.' My own experience in the dead-house of St. Bartholomew's Hospital certainly confirms this view. To mention a single instance: a few weeks ago, having occasion to examine the body of a woman who had died with Bright's disease, in whom the left ventricle was greatly dilated and hypertrophied, the mitral valve, when tested with water, was found not to admit of regurgitation. I was then told that a loud systolic

* On 'Diseases of the Heart,' 3rd edit. p. 998.

† On 'Valvular Disease.' See extract of paper in vol. xlvii. of Braithwaite's 'Retrospect.'

murmur had existed at the left apex, and in the notes of the auscultation by Dr. Martin, in whose charge the patient had been, it was stated that the murmur was not audible posteriorly. No valvular lesion whatever was detected. At the same time, in estimating the value of this sign in any given case, it must be remembered, on the one hand, that a very faint murmur in the left auricle may be inaudible posteriorly, by reason of the great thickness of the chest wall, and the anatomical relations of the auricle itself; and on the other, that a very loud murmur may be directly transmitted from the cavity of the ventricle, without any regurgitation taking place; but, in this latter event, the character of the sound is usually more or less altered, becoming muffled or distant. It is further necessary to be borne in mind that murmurs in the aorta and in the pulmonary artery are also not unfrequently audible within this same region.

Opinions are more divided with regard to the intensification of the pulmonary second sound; some observers attaching great value to it, others, with Dr. Walshe, looking upon it as of little or no importance. In the Table, out of the seventy cases in which it was present, there were but three in which there was not also hypertrophy; and hypertrophy was noted in every case in which, along with this sign, the murmur was also audible posteriorly. This would seem to indicate that, whatever its value may be in connection with mitral regurgitation, there is, at any rate, a close relationship between it and hypertrophy, either as effect and cause, or as coordinate effects of some common cause. The sign itself is doubtless due to increase of pressure in the pulmonary artery, causing the sigmoid valves to close more sharply and forcibly, and this increase may be occasioned by conditions, such as emphysema, impeding the circulation through the lungs, as well as by those which act on the left side of the heart. But the fallacies to which it is liable will be most conveniently described and illustrated in the further analysis of the Table.

Post-mortem evidence of the existence of undue pressure during life within the pulmonary artery is to be found in the hypertrophy and degeneration, atheromatous or calcareous, of the coats of that vessel. The frequency of the occurrence of these changes in connection with the hypertrophy of the right ventricle, excluding, of course, those cases in which that hypertrophy is only compensative of changes at the right semilunar valves, has been very much underrated. Atheroma of the main trunk is not common, although hypertrophy of its walls frequently takes place to such a degree as to render them almost, or quite equal to those of the aorta in thickness. But,

according to the results of post-mortem examinations here, it is very rare indeed to find any considerable increase in the thickness of the wall of the right ventricle, without also finding a noticeable amount of atheroma in the secondary and smaller divisions of the artery within the lungs: still more rare is it to find these changes in the coats of the vessel if there be no such hypertrophy of the ventricle.

Taking now the sixty-six cases in the Table in which the murmur was audible posteriorly, fifty-six of them may be regarded as typical instances of mitral regurgitation, viz. those in the first line of the Table, in which, with this murmur, hypertrophy and intensification of the pulmonary second sound were also present. Of the remaining ten, in eight one only of these two latter signs, viz. the intensified second sound, was absent, whilst in two there was neither hypertrophy nor intensification. (See Table.)

There are, thus, eight cases in which there is a presumption that the conditions leading to intensification of the pulmonary second sound existed, and in which, notwithstanding, that sign was absent. In attempting to explain this apparent anomaly, the most convenient method will be to make, first, some general observations upon the intensification of the second sound in the pulmonary artery, with the fallacies to which its interpretation is liable, and then, to see how far these considerations meet the exceptional cases; not only those in which it is absent, but also others to be noticed by-and-by, in which it was met with, although the physical examination of the heart gave no sufficient reason for its presence.

The greater loudness or accentuation of the second sound in the pulmonary artery, as compared with the aorta, may be either real or only apparent. I apply the term apparent to cases in which a difference in the intensity of the sound, on the exterior of the chest, at the so-called right and left bases, or rather a little above them, may be, and often is, brought about by causes in no way concerned in the actual production of the sound itself. The most obvious of these are, differences in the conducting media on the two sides, and, in practice, the one of most frequent occurrence will be found to be the greater or less degree in which the two lungs overlap the base of the heart, especially in connection with the existence of emphysema or of pleuritic adhesions. For the most part, if by percussion greater dulness be detected on one side than on the other, there will be on that same side a proportionately greater intensity of the second sound. If the intensification of the pulmonary second sound be real, it may then be either relative or abso-

lute: relative, when it depends upon a weakening of the second sound in the aorta; absolute, when it depends upon an actual increase in the intensity of that sound within the pulmonary artery. In many instances, and notably in that of mitral regurgitation, these two conditions coexist. For the amount of blood propelled into the aorta at each systole, and the consequent force of the recoil of the artery, is diminished in proportion to the amount which passes back again into the auricle, and the consequent increase of pressure within the pulmonary vessels. But in determining the value of this sign, even when it appears to be absolute, it must be remembered that it is by no means necessarily connected with obstruction to the circulation on the left side of the heart. The hypertrophy of the right ventricle, which is assigned as its most common cause, may be consequent on obstruction to the circulation within the lungs, as in chronic bronchitis, the left side of the heart being either not affected, or only secondarily so. In order, then, to estimate correctly the value of an intensified second sound in any given case of heart disease, it is necessary to ascertain as far as possible, first, whether it is or is not only apparent; secondly, whether there exist, apart from the cardiac lesion, any other conditions to which it may be, in whole or in part, attributable. And again, before its absence can be looked upon as of any importance, or even as proved, it must be shown not only that the conditions necessary to its production exist, but also that there are none by which it might be masked. Further, it is to be observed, in regard to the connection between increased pressure within the pulmonary artery and hypertrophy of the right ventricle, that this increase will only take place when the hypertrophied muscle is acting with increased force, and that, even when this is the case, its effect may still be in part neutralised by regurgitation through the tricuspid orifice.

Of the eight cases—those, namely, in the second line of the Table—in which some explanation of the absence of an intensified pulmonary second sound appears to be required, seven (Cases 7–13) are given above. The details of the eighth are unfortunately not perfect; it is however inserted here, in order that the whole argument may be stated with perfect honesty.

31. James D., æt. 31. Apex in line with nipple, but not depressed; a bellows murmur at the apex, audible over a wide extent posteriorly, but loudest between the inferior angle of the left scapula and the spine; no intensification of pulmonary second sound; pulse regular.

Now in this case, as also in Case 10, the hypertrophy cannot have been very great, especially in the latter, where the heart's impulse was natural. Again, in Case 10, it appears probable that the murmur did not indicate regurgitation, but was an onward murmur, produced in the ventricle, and that its being audible posteriorly was due to its being propagated along the aorta; the loudness of the murmur was certainly out of all proportion to the embarrassment of the circulation, as indicated by the pulse and the man's general condition. This case will come again under consideration in connection with the other three instances of musical murmur included in the table. In Case 7, it is probable, from the faintness of the murmur posteriorly, that there was but a small amount of regurgitation; indeed the muffled character of the sound behind might be due to its being conducted from the ventricle, and not from the left auricle, so that the pulmonary circulation was still protected by the mitral valve from systolic reflux, and consequent increase of pressure; whilst the character of the pulse, regular and of moderate volume, is strongly against the supposition that there was any great constriction of the left auriculo-ventricular orifice. The age, too, of the patient, nine years, is of importance, as in the young the circulation adapts itself with greater readiness to deviations from its normal conditions. In Case 8 there was evidence of increased size of the heart in the extended cardiac dulness and the displacement of the apex, but none of increased muscular power; the organ was probably dilated rather than hypertrophied. Case 9 ought not to have been included in the Table at all; but the presence of a diastolic murmur at the left base sufficiently explains the want of a loud second sound at that point. In Cases 11 and 13, the date of the commencement of the cardiac lesion was unknown, but it had only recently produced any sensible constitutional disturbance; they were also both females, and within the age at which mammary development frequently interferes with the physical examination of the heart. In Case 12 the want of intensification of the second sound to the left of the sternum is accounted for by the greater percussion-resonance on that side, as stated above.

There still remain to be considered the two cases in the fourth line of the Table, in which two out of the three physical signs which I have selected as together significative of mitral regurgitation are wanting. Of these, in regard to Case 5, it is sufficient to refer to the character of the pulse, of the heart's impulse, and of the murmur itself, in proof of the trifling nature of the lesion. In Case 6, notwithstanding

the rheumatic history, the progress of the case makes it all but certain that the murmur depended upon some functional derangement of the heart's action, rather than on any organic lesion. It is difficult in any other way to explain the disappearance and return of the murmur, and the seemingly complete recovery. The theories with which I am acquainted which have been advanced to explain the occurrence of transient regurgitant murmurs at the apex, such as irregular contraction of the musculi papillares, are all more or less unsatisfactory. But there is one mode in which abnormal contraction of the left ventricle alone, without any organic lesion, might produce mitral incompetence; and this mode is susceptible, so far as such a thing can be, of post-mortem demonstration. The proper shape of the mitral orifice is oval, and the shape, size, and attachments of the cusps of the valve are adapted for the closure of an orifice of this form. If, then, during the systole, the auriculo-ventricular orifice were to become round, without any further change whatever, the valve would necessarily be rendered at once insufficient. Now that the orifice might assume this shape during life is rendered at least possible by the fact, which I have more than once observed, that it occasionally does so during the presence of post-mortem rigidity. And that this alteration in shape does, under certain circumstances, admit of regurgitation taking place, may be proved by actual experiment. Thus, in a healthy heart, if by means of a tube introduced into the left ventricle, either down the aorta or through a small incision near the apex, the cavity be filled with water at some slight pressure, the heart being held gently by its right side, with the apex downwards, and the left auricle thrown freely open, so as to bring fully into view the auricular aspect of the valve, it will be found that there is little or no regurgitation. But if pressure be now made at opposite sides of the base of the left ventricle, in such a way as to shorten the long diameter of the mitral orifice, and thus at the same time of necessity render the aperture more or less round instead of oval, regurgitation to a greater or less degree at once takes place, but ceases when the pressure is removed; and this may be repeated again and again, so long as the force used does not produce any permanent dilatation. Occasionally, it is true, a heart is met with in which the experiment fails, for in some cases the proportion of the size of the cusps of the valve to that of the orifice appears to be greater than in others, but it is, I believe, successful in the great majority of healthy subjects. Of course a transient murmur, as in Case 6, whether produced in this or in any other way, would

not be likely to interfere very seriously with the circulation, or to occasion hypertrophy of the right side of the heart.

In summing up, then, briefly the results of the first division of the Table, it appears that the value of the union of the three physical signs, as proofs of mitral regurgitation, is even greater than what is indicated by the actual numbers. For, of the ten exceptions, there are two, viz. Cases 7 and 10, in which it is very doubtful whether regurgitation existed at all; three, viz. Cases 5, 6, and 31, in which the lesion was clearly insignificant; two, viz. Cases 9 and 12, in which the absence of the intensification of the second sound is satisfactorily accounted for, and the force of the remaining three, viz. Cases 8, 11, and 13, is at any rate somewhat weakened by the considerations which have been adduced respecting them. It is also worth while to notice the large per-centage of these cases in which irregularity of the pulse, and thrill, important indications of serious embarrassment of the circulation, existed. In further illustration of the value of intensification of the pulmonary second sound, especially with reference to the order of development of the sequelæ of mitral regurgitation, the following case is given here, as in it the first appearance of the murmur was determined within narrow limits.

32. W. T., æt. 11. Jan. 25. Admitted under Dr. Kirkes, is one of three children suffering from a form of paralysis resembling locomotor ataxia. No history of rheumatism. Apex in sixth intercostal space in a line with the nipple; at apex a loud systolic murmur, which can be traced up to the right sterno-clavicular articulation, audible, but not loudly, posteriorly; no intensification of pulmonary second sound; pulse regular. This murmur and the hypertrophy, as evidenced by the displacement of the apex, certainly did not exist five weeks previously, when the heart was most carefully examined; but there was then what seemed to be a slight anæmic murmur at the base.

June 4th. Murmur, nowhere very intense, but still audible posteriorly; intensification of pulmonary second sound.

From this case it would seem that, after the occurrence of regurgitation and even of hypertrophy, some little time must elapse before the pressure within the pulmonary artery becomes much greater than natural; it may be because the walls of that vessel become hypertrophied more slowly than those of the right ventricle, and that, until such hypertrophy has taken place, there is no great increase in the force of the recoil of the artery during the ventricular diastole. That there was in this case, at the time the first note was taken, hypertrophy of the

right side of the heart, is rendered all but certain by the displacement of the apex towards the left.

In the second division of the Table, the fourth line contains typical cases of non-regurgitant systolic murmurs; but, before proceeding to their more minute consideration, there are one or two remarks to be made on hypertrophy, and on its value in relation to intra-cardiac murmurs, for which this is the most convenient place. And first, it is very difficult to diagnose with certainty the lesser degrees of this change; there is no doubt that it frequently exists, without its being in our power to demonstrate its existence. Again, it is difficult, if not impossible, to distinguish in every case between hypertrophy and dilatation; we can make a good guess, and but little more. On the other hand, we are very likely to mistake for hypertrophy mere displacement of the heart, or even its more extended contact with the chest wall, e.g. in consequence of retraction of the anterior borders of the lungs, whilst, at the same time, the actual size and weight of the organ may be even diminished. Thus, although for brevity's sake the term hypertrophy has been employed in this paper, as if it were a physical sign not less direct and immediate than those furnished by percussion or auscultation, it must not be forgotten that this is very far from being the case; that it is really a deduction from one or more facts the ascertaining of which very often requires the nicest and most careful observation. Even when the existence of a certain amount of hypertrophy cannot be denied, it may still be very difficult to determine whether the right or the left side of the heart is affected, or both. With regard to the causes of hypertrophy it would be superfluous labour to enumerate them here, but I would make one addition to the usual list, viz. adhesions between the external surface of the pericardium and the neighbouring parts, by which the parietal layer is prevented from adapting itself easily to the varying size and position of the heart, and thus embarrasses its movements. I have met in the dead-house with several cases, where, in the absence of the commonly recognised causes, such as adhesions within the pericardial sac, and valvular, hepatic, or renal disease, this appeared to be the only means by which the existing hypertrophy of the organ could be accounted for. It also, I believe, frequently counteracts the tendency to atrophy of the heart in phthisis.

It was necessary to state, however briefly, some of the difficulties connected with the determination of hypertrophy, because, although in the sixteen cases in the fourth line of the second division of the Table it is noted as absent, a certain

amount of it would still seem to be required by some of the causes which may be assigned for these non-regurgitant apex murmurs. Setting aside the possibility of a blood murmur being produced at or near the apex, which may or may not be the case, one or two tangible reasons may be given for a ventricular murmur in this situation. Such are the following:—

1. Roughening of the ventricular endocardium, whether on the muscular portions of the wall or on the ventricular aspect of the anterior cusp of the mitral valve.
2. Vegetations or fibrinous masses projecting from the edges of the cusps into the cavity of the ventricle, but not interfering seriously by their attachments with the closure of the valve.
3. Vegetations on the chordæ tendineæ.
4. Undue tension of the chordæ, such as might be produced by dilatation of the ventricle, or by causes, such as excited action, leading to any considerable increase of pressure on the ventricular side of the valve.

These causes agree very well with the generally high pitch of these murmurs, and with the point at which they are heard in their greatest intensity, viz. not at the very apex of the heart, but over the body of the left ventricle, at or just below the level of the nipple, and about midway between it and the sternum. It is true that it is for the most part impossible to demonstrate after death the dependence of a ventricular murmur upon any given cause, but in the absence of any proof of regurgitation we are all but obliged to seek for the explanation of the morbid sound within the ventricle itself. A very striking instance of a loud musical murmur for which no source could be detected, except a long thread-like vegetation attached to one of the chordæ tendineæ, was furnished by a young man who died in the Hospital a few years ago from tubercular meningitis. For the first day or two after his admission the heart sounds were perfectly natural, at the end of that time a loud musical murmur was developed, and continued up to the time of his death, five or six days later. At the examination, with the exception of the one single thread-like mass of fibrine attached to one of the chordæ tendineæ, no abnormal appearances whatever were found in the heart.

Of the four instances of musical murmur included in the Table (viz. Cases 10, 28, 29, and 30), in one only (Case 10) was there a musical sound audible posteriorly, and in it there is reason to think that the murmur, one of unusual loudness and high pitch, was propagated down the aorta. In Case 29 it

might have been due to vegetations projecting into the ventricle from the free margin of the valve; but in Case 28 it is difficult to suggest any cause other than undue tension of the chordæ tendineæ; certainly, in neither of the two cases, in which a post-mortem examination was made, could it have been produced by any narrowing of the auriculo-ventricular orifice. This absence of any musical sound posteriorly becomes still more significant from the fact that, notwithstanding in the three cases where regurgitation undoubtedly took place, there was an ordinary bellows murmur loudly audible in that region. The number of cases is of course too small for any very positive conclusion to be drawn from them, but it will be found that musical murmurs, excluding those which arise at the base of the heart, are very rarely audible posteriorly, and that consequently they must indicate some lesion within the cavity of the ventricle, not necessarily attended by regurgitation.

It is difficult to suppose that mitral incompetence can ever exist for any great length of time without causing serious embarrassment to the circulation, but it is evident that the consequences of the lesions indicated by a ventricular murmur may vary within much wider limits. The obstruction to the blood stream may be so slight as to produce scarcely any deviation from healthy function, or so great as to lead rapidly to a fatal result. Thus, on referring to the Table, it will be seen at once that the proportion of cases in the second division unattended by serious symptoms, is very much greater than in the first, whilst it still includes several of extreme gravity. It is consequently in this class of cases that the value of the other physical signs of heart disease is the greatest, especially with regard to the prognosis. The constitutional symptoms show the degree in which the cardiac lesion has actually interfered with the circulation: the physical signs, such as hypertrophy and intensification of the pulmonary second sound, give the measure of the lesion itself by indicating the amount of extra power which is required to overcome the obstacle. It not unfrequently happens that the increased force of an hypertrophied heart is sufficient to maintain the circulation so completely that the patient is himself unconscious of any defect, and yet that his danger is great and immediate; the knowledge of the nature and extent of that danger has to be gathered in the main from the physical signs.

In considering, however, the second division of the Table, it is to be remarked that the number of grave cases, viz. those in the first line (Cases 14-24) is in all probability unduly large, in consequence of the difficulty of distinguishing with certainty

in all cases, between a præsystolic, or onward, and a systolic murmur, even when this latter is due to regurgitation; but a præsystolic murmur occurs most frequently in connection with mitral stenosis, i.e. with perhaps the most serious of all cardiac lesions. Thus in three of these eleven cases, viz. 16, 20, and 23, it is stated that the murmur terminated with a loud first sound, in other words, that the murmur, though apparently systolic, i.e. coinciding with the contraction of the ventricles, as marked by the heart's impulse, did not replace the first sound or any noticeable part of it. But the coincidence of a murmur with the commencement of the heart's impulse does not necessarily prove that it is systolic. For if Marey's observations on the heart's movements, made by means of the cardiographe * are trustworthy, the first shock of the heart against the chest wall coincides with the sudden contraction of the auricles, which immediately precedes that of the ventricles. And although it may be plausibly urged that the portion of the impulse due to this cause will be somewhat diminished in cases where the passage of the blood into the left ventricle is attended by a murmur, which must indicate more or less obstruction to the stream, whether by narrowing of the mitral orifice, or by roughening of its walls, so that in certain diseased states the commencement of the impulse will coincide, more nearly than in health, with that of the ventricular systole, yet a sufficient reply to this objection is to be found in the dilatation and great hypertrophy of the right auricle, which almost invariably attends upon mitral stenosis, and must be sufficient to replace to a great extent, if not completely, the force which may have been lost on the left side of the heart. So that it is safer to determine the period in the heart's action, at which a murmur of this doubtful character takes place, by its relation to the first sound, than, as is almost instinctively done, by its relation to the impulse. At the same time it must be confessed that the diagnosis of a præsystolic from a systolic ventricular murmur, is one of the most difficult tasks in the physical examination of the heart, and is often all but impossible. If the murmur masks and is continued through the first sound, it is pretty surely systolic; if, on the other hand, the first sound is heard of natural quality, and following the murmur, it is with equal certainty præsystolic and onward. But, unfortunately for the auscultator, the changes which occur in the auriculo-ventricular orifice or its neighbourhood, leading to the production of an onward murmur, are very fre-

* Journal de l'Anatomie, par M. Charles Robin, Mai, 1865.

quently such as to interfere more or less with the ordinary action of the valves, and so far to alter the quality of the first sound as to render the determination of its exact commencement and duration extremely difficult.

There are still three cases, those in the third line of the second division of the Table (Cases 25-27) in which, in the absence of hypertrophy, the intensification of the second sound in the pulmonary artery appears to require explanation. It is sufficient to observe with regard to these, that in Case 25, although there may not have been hypertrophy, the heart was acting with increased force. In Case 26 we may infer from the age of the patient, only 16 months, that the power of the right ventricle, as compared with that of the left, would be somewhat greater than in an adult, and that consequently any resistance to the current propelled into the pulmonary artery would be met at once by a force which at a later time of life would have required for its development more or less hypertrophy. In Case 27 the difficulty is explained by the percussion dulness at the left base.

Of the 4 cases in the 2nd line of this same division of the Table (Cases 1–4), in which, although hypertrophy was present, there was yet no intensification of the second sound to the right of the sternum, I would briefly observe, that in Case 1 it is all but certain, from the history of pericarditis and double pneumonia, that adhesions existed both within and without the pericardium, and that the hypertrophy was due as much to these as to any intra-cardiac obstruction. In Case 2 there was evidence, in a basic systolic murmur, of some lesion at the aortic orifice, and thus the hypertrophy would have taken place principally on the left side, and could not increase the pressure in the pulmonary artery; whilst in Cases 3 and 4 the hypertrophy was but slight.

In conclusion, the deductions I would draw from the statements contained in this paper are briefly these:—

1. That of systolic murmurs, audible at or near the apex, a large number, 34 per cent., do not indicate mitral regurgitation, or for the most part any very serious lesion.

2. That the decision as to the regurgitant or non-regurgitant character of a murmur rests principally upon its presence or absence posteriorly.

3. That intensification of the second sound in the pulmonary artery, as a gauge of the obstruction to the blood stream on the left side of the heart, is of great value, but that in estimating it there are certain precautions to be taken.

4. That the occurrence of a non-regurgitant systolic murmur may be explained by changes on the inner surface of the ventricle, or by dilatation of its cavity leading to undue tension of the chordæ tendineæ.

It would have been easy for me to have employed an equal number of selected cases, which would have apparently established these propositions in a far stronger and more conclusive manner than those actually tabulated may be held to have done. For every case requiring explanation, one might readily have been substituted in which no such necessity would be felt. If my argument seems to be imperfect, it is because I have preferred the honest statement of facts with all their difficulty and complexity, the cases being taken strictly in the order in which I met with them, to the specious demonstration of a foregone conclusion.

Article III.—*Brief Notes of the Surgical Practice of the Hospital.* By George W. Callender *and* Alfred Willett.

In the beginning of the year 1864, 335 cases occupied the Surgical Wards. During the 12 months next ensuing, 3,500 patients were admitted, including 352 children under ten years of age.*

A number of these patients, about one hundred and sixty, suffered from diseases of joints, chiefly of the lower extremities. Many such remained for a short time under treatment and were discharged cured, or were sent out relieved; the latter class usually reappearing ere long to renew a claim for admission.

Leather, metal, or other splints—variously-contrived rest-agents—counter-irritants—blisters, firing, and so forth—were the local remedies chiefly trusted when these joint-inflammations drifted into a chronic condition—a state in which they are very commonly presented for treatment. Great pains were taken

* The Surgical Registrar has to keep in each of the surgical wards a register, in which he enters the names of all the patients upon their admission, and which gives also the following particulars:—the dates of admission and discharge; the age and occupation of each patient; the nature of the disease, the result of treatment, together with such other particulars as it may be considered necessary to record. It is further the duty of the Registrar to visit each ward at short intervals of time, to make inquiries respecting the progress of the cases, and to note any new features amongst those previously registered. All cases of operation are reported in a separate book. The Registrar is usually present at the operations, and, as often as possible, accompanies one or other of the surgeons in going round the wards.

with the mechanical agents in many such cases (severe cases), in some with satisfactory results. A female, æt. 22, was thus cured of a rheumatic affection of the knee-joint after remaining, chiefly in bed, three hundred and seventy days in the Hospital; a male, æt. 51, after one hundred and eight; a male, æt. 22, after one hundred and eleven; and a third male, æt. 8, after two hundred and six days of rest—the last being a case of strumous disease, so called. A male, æt. 13, was cured of long-standing disease of the ankle in one hundred and four days.

Perhaps the most instructive of this class of cases was that of a female, æt. 10, admitted in a state of urgent exhaustion from disease of the hip-joint, with dislocation of the femur on the dorsum ilii. Abscesses had formed about the old articulation, discharging profusely in all directions. There seemed to be little chance of her recovery. By means, however, of rest, secured by the use of an ordinary long splint, aided by good diet, she slowly mended. In one hundred and seventy-two days she was discharged, able to walk comparatively well with an anchylosed hip.

Not a few cases of disease of the hip-joint were cured by the use of the long splint—as that of a male, æt. 21, in one hundred and twenty-six days; or that of another male, æt. 6, in one hundred and ten days. In some cases of this form of disease the parts were kept at rest by, and relief was obtained from extension by means of a weight (3 to 4 pounds for children) arranged so as to pull from the leg over the end of the bed, the patient being recumbent. A simple contrivance, easy of application, good in its results.

In some instances, as might be expected, no lasting good ensued from the treatment employed in chronic joint cases. A female, æt. 17, left unrelieved of disease of the knee after three hundred and twenty days; a female, æt. 8, with diseased hip, was discharged unrelieved after two hundred and forty-one days; a male, æt. 4, had his diseased elbow but little bettered after one hundred and sixty-two days; a male, æt. 46, died of exhaustion from disease of the hip-joint, after lying ninety-five days in Abernethy Ward. The disease dated from a hurt to the joint from a fall four years back, although the marked symptoms had been present for two years only. The head of the femur * had left the acetabulum, and was lodged beneath the anterior inferior spine, the trochanter major pointing directly backwards. The tendon of the psoas muscle wound round the outer aspect of the head to reach the lesser trochanter; the iliacus muscle

* Museum of the Hospital Series, iii. 138.

was stretched over the inner portion of the head; and between the two muscles was the anterior crural nerve. The femoral vessels lay to the inner side of the head of the bone.

Amongst the cases of diseased joints many were complicated with various deformities, resulting from contractions or from displacement of articular surfaces, or both. Gradual extension, with or without division of tendons, or forcible extension under chloroform, were the remedies employed when any were admissible. A female, æt. 19, with chronic rheumatic disease of the elbow, was made much worse by the forcible extension of the joint under chloroform, losing the trifling amount of movement previously existing; and a female, æt. 21, began to sink rapidly, and died with disease of the hip, after an attempt made with the help of chloroform to bring the limb into better position, the head of the femur having become displaced on to the dorsum ilii. Rupture of one or more of the adductor tendons, or muscles, was quickly followed by the formation of fresh abscesses. A female, æt. 24, was set straight of an old rheumatic distortion of the knee—a remarkable deformity—by forcible extension; and a female, æt. 9, from the country, with false anchylosis of either knee and a rheumatic history—a complete cripple, scarcely able to move about on her bent and nearly fixed knees— was much helped by division of the hamstring tendons, and by subsequent extension, so that she could walk, after a fashion, about the ward.

Many were rheumatic, but the greater number of the patients suffering from chronic joint disease were simply of feeble health—scrofulous, if a name is wanted. Many eventually broke down with symptoms of phthisis pulmonalis. A male, æt. 41, developed this disease so rapidly that, beginning with a bronchitis which commenced whilst he was in the ward, he died from hæmoptysis thirty days after his admission for chronic knee-disease; and a second male died thirty-one days after being taken into his ward for a similar affection, the phthisis having aggravated itself with very great rapidity; in a third case, a male, æt. 19, with recent disease of the ankle-joint, died with consumption in one hundred and forty-eight days, an attack of erysipelas being the immediate cause of death.

The failure of rest-treatment led occasionally to the question of removing joint-disease by amputation or otherwise—by amputation especially when it became evident that the strain of the local mischief was beginning to kill the patient; for these joint-affections prove fatal, and not seldom so. Many patients die from hip disease, a less number from knee disease, amputa-

tion intervening; though knee disease sometimes kills outright, in a way to prevent an operation from being resorted to. A female, æt. 20—her father dead from rheumatic fever, her mother from cancer—was admitted with synovitis of the knee, dating five days from over-much walking. There was, from the first, great constitutional disturbance. She emaciated rapidly, the joint remaining very painful. Presently came rigors and lung complications, and then death in forty days. The right pleural sac was full of pus; secondary, so-called, deposits were in the lungs, right and left, and also in the kidneys; in addition, was the inflamed joint with cartilage ulceration, and finally large bed sores.

In fifteen cases, after more simple treatment had failed, amputation was resorted to, recovery of a useful limb being hopeless, or death threatening. The result of the year's experience of these operations was unfavourable. Of twelve amputations at the thigh, five died—virtually seven. As usual, the fatal issue could be traced to the bad constituents of each patient, or to the occurrence of some form of blood-spoiling—pyæmia.

Taking in the order of their occurrence the fatal cases—first came a male, æt. 27, long a sufferer from disease of the knee-joint. Phthisis supervened. For a time, he obtained relief by change of employ and country air; but, drifting to the bad, amputation became necessary. At the fourth hour there was slight hæmorrhage, and seventeen days after an attack of rigors, as through the on-coming of pyæmia. They marked, however, instead, a sudden getting worse of the lung disease. His thigh wounds remained languid, they would not heal; but he recovered so far as to be able to leave for the country. Relieved of the joint mischief, he died, eighty days after the operation, from the pulmonary disease. Such also was the fate of a male, æt. 26, incapacitated for work, with spoilt ankle and knee joints. Teale's amputation at the thigh removed the disease. Depressed by secondary hæmorrhage on the tenth day, he rallied sufficiently to heal up his wounds and to improve somewhat his general health, so that after forty-two days he was moved to the country, whence he came, where he soon after died from consumption.

An artist, æt. 61, in a state of extreme exhaustion, died on the third day after amputation at the thigh for chronic disease of the knee-joint, his end being hastened by a recurrent hæmorrhage. A male, æt. 52, sank from local mischief about the thigh veins, and consequent blood-spoiling. A female, æt. 28, suffering from chronic disease of the knee-joint, died, thirty-four days after amputation, from acute pyæmia. And another

female, æt. 23, after severe hæmorrhage at the third day from the detaching of the ligature from the femoral artery, sank rapidly and died on the twenty-third day, also from pyæmia. An abscess breaking into the knee-joint, in front of the external lateral ligament, necessitated amputation at the thigh, in the case of a female, æt. 50, who presently died from pyæmia on the twelfth day. Here the synovial membrane was found inflamed and consequently thickened; the cartilages had disappeared from over the outer and inner sides of the two condyles, and to a less extent, from the patella; at these points, the bones were covered with soft, pale-yellow granulations. The cartilages of the tibia and the semilunar were not affected. In the Cases previously referred to, the cartilage ulceration was associated with synovial disease, the articular bone ends retaining a healthy appearance.

A poor fellow, æt. 38, who recovered from amputation for chronic disease of his right knee, has since been re-admitted with the right carpal bones in a state of caries. As a set-off against this unfortunate complication, and in contrast with the two cases of phthisis, accelerated rather than hindered by the amputations, two operations were followed by happier results. A male, æt. 27, had suffered from ordinary symptoms of phthisis, and, shortly before his admission, from severe hæmoptysis. To this a diseased knee added itself—painful and rest-destroying. So the limb was amputated. The wound healed slowly, and a small portion of the femur necrosed. Eventually, sixty days after the operation, he was discharged cured. Again, admitted with symptoms of phthisis, and after an attack of hæmoptysis, a male, æt. 14, left the Hospital well ninety days after amputation performed for chronic disease of the knee (antedated by the phthisis). The stump healed slowly, and his recovery was retarded by the death and separation of a considerable portion of the shaft of the femur. Two females, aged respectively 49 and 35 years, complete this list of thigh amputations. Both did well—the elder of the two after an operation on Teale's plan.

Lesser amputations needed for joint diseases recovered, as a matter of course; a male, æt. 34, with ankle-joint mischief, whose leg was removed; a porter, æt. 60, under similar circumstances; and two amputations at the fore-arm for chronic carpal mischief—two males, æt. 26 the one, æt. 20 the other. Excision of the wrist and carpus has not been practised at St. Bartholomew's for some years; the experience of past operations not encouraging.

Excision of joints has been resorted to from time to time,

and, for the year in question, with the following results. The operations on the elbow had but partial success. After one hundred and ninety-six days of treatment, a male, æt. 18, was discharged to the Convalescent Hospital; his elbow stiff after excision of the joint. More than a year after the operation, a female, æt. 37, is an inmate of the Hospital, with fragments of bone occasionally extruding from the wounds of an excision. A male, æt. 18, who had his elbow excised for chronic disease, obtained, after one hundred and eighty days, a stiff elbow and a useless limb.

Four hundred and forty-four days after excision of the head of the thigh-bone, died a male, æt. 7. The operation had been performed under favourable circumstances; the pelvis was free from disease, but the bone-mischief, with attendant abscesses, crept down the shaft of the femur, and by degrees led to the fatal exhaustion.

The fifth, sixth, seventh, and eighth cases of resection, performed during the year, involved the knee-joint. First of the four, in order of time, came a male, æt. 11; his case briefly runs as follows—resection of knee, failure of repair process; amputation at the thigh eventually necessary; recovered from the amputation. Parts resected in the Museum of the Hospital. Time interval between the two operations, seven months. The second history records the case of a male, æt. 18, with chronic disease of the knee-joint. Resection. Death, on the 26th day, from acute pyæmia. From slight recurrent hæmorrhage some blood-clots lodged in the wound; these, rapidly decomposing, may have infected the system. Third, a female, æt. 20, who some time previously had lost a finger from a chronic joint-affection, was admitted for recent disease of the knee, and was patched up, for the time, in forty-eight days. After about five months, she was back again with the knee spoilt; synovial disease, with cartilage ulceration. The joint was excised, and for a time she seemed to be doing well; the bones, healthy in appearance, remained in good position, the wound uniting rapidly. Presently she began to flag; then her health failed quickly, as suppuration became more profuse about the wounds. At the last, amputation was resorted to; but she died two days later—thirty-three days after the resection. Fourth, and last, a lad, æt. 11, made a good recovery with a limb on which he could walk without support eight months after excision of the knee.

These cases of knee-disease were selected as suitable for the operation of excision. The results were, two deaths, one amputation, one recovery. This operation, excellent in its result when it does prove successful, contrasts naturally with certain

amputations at the thigh. Confessedly adapted only to picked cases—to patients by choice under twenty years of age, not above twenty-five—its attendant risks compare with those of amputation at the thigh for patients under twenty. After twenty-seven such amputations, consecutive from January 1857 to October 1863, two died; nineteen were for disease of the knee-joint and all were recovered from.

Of diseases of bones, or of their investing membrane, one hundred and two cases were admitted during the year 1864; seventy-five males and twenty-seven females, thirty-four under fifteen years of age. The majority, as might be expected, were instances of necrosis or of caries. Some of these, numerically few, could be traced to blows or other hurts. A ship's officer, æt. 24, whilst at sea, fell into the hold and fractured either femur, the left fracture being compound, with much comminution of the bone. He was under the joint care of the captain and the carpenter; and considering the severity of the case, no little credit is due to them, that in four months' time he was once more about again. The bones had united in good position, but he was considerably lowered in stature, insomuch as shortening, equal in either limb, to the extent of one inch and a-half, had resulted from the breakage. He acquired a very awkward gait—not exactly a limp, but an odd sort of shuffle. The wound in his left thigh remained open. On three separate occasions he was an in-patient of the Hospital, and several splinters of bone, all of them sharp-pointed and with well-defined edges, were at intervals removed.

In the following case, an injured bone became a source of trouble after a long lapse of time. A male, æt. 63, was admitted with an ununited fracture of a necrosed tibia (right side). About forty years previously he had sustained a compound fracture of the same bone. He recovered, and his leg remained sound until two years ago, when, without any apparent cause, the tibia became necrosed. After going about with it in this condition for more than a year, he fell, and the dead bone, with its immediate surroundings, was cracked across. At the time of his admission, four months after this last accident, there was not the least sign of repair, and he came in to have the limb removed. He failed, however, to recover from the operation.

A fatal case of necrosis of the calvarium was also traced to an injury. A ship's joiner, æt. 46, sustained a severe contusion of the head. Acute suppurative inflammation of the scalp ensued, and upon the subsidence of this it was discovered

that the whole of the bony vault of the skull was dead. When admitted, he was in a most deplorable state; the scalp, thickened and raised, was riddled with wounds, discharging freely. Emaciated to an extreme degree, and partially paralytic, he lived two months after entering his ward.

Similar in some, though differing in other respects, is the case of a coal-heaver, æt. 46, who fell backwards upon his nates with some force. Suppuration in the right buttock followed, and upon subsequent examination bare bone was detected. An operation was performed for its removal, and, upon laying open a rather large cavity, it became evident that pieces of the tuber ischii had been splintered off. Many fragments were removed —some lying loose, some few adherent by shreds of periosteum.

Necrosis of portions of a femur occurred after amputation immediately above the condyles—an after-mischief, apparently due to the circumstance that the patella had been left unremoved at the time of the operation. A labourer, æt. 46—a heavy, bulky man—met with an accident at Birkenhead, which necessitated primary amputation through the femur. Inflammation of the stump followed, and the soft parts became permanently indurated, very liable to inflammatory attacks, and so painful that he never even attempted to wear an artificial limb. Two years later, he was admitted into St. Bartholomew's. Many a sinus, leading to bare bone, was visible about the end of the stump, the integument covering which was tense and glistening, all the tissues hereabouts being so hard and dense that it was difficult to estimate the state of the deep-seated structures. No improvement following from three months' quiet and rest in the ward, and taking into account the useless condition of the limb in its damaged state, it was determined to amputate higher up on the thigh. The man made a satisfactory recovery.

On examining the parts removed, the patella was found to have been left at the previous operation. It had become anchylosed to the femur by a narrow pedicle of new bone. Periosteal inflammation spread from this point, causing superficial necrosis of parts of the adjacent femur.

A characteristic case of match-makers' poisoning with phosphorus is related in detail at page 101. In connection therewith, the history of a male, æt. 2½ years, whose parents were employed in the silvering of mirrors, may be briefly mentioned. The child was attacked with periostitis of the lower jaw. Removed from the poisoned atmosphere, the disease subsided, and on leaving the Hospital he was quite well. On returning to his home the mercury again exerted its influence, the child

suffered a relapse, and on his re-admission it was found that a great portion of the lower jaw had necrosed. After seventy-five days no separation of the dead bone had taken place, so the child's parents were directed to get him into the country, permanently.

Of acute necrosis, many examples came under notice; the case, for instance, of a male, æt. 10, in whom, at an early stage of the disease, the dead shaft of a tibia was removed, by operation, the patient recovering, with a useful limb, in eight months from the date of his admission. In another case of a like character, nature was left to work out her own plan as far as she was able, the surgeon removing the loosened sequestrum. This patient was restored to health within seven months.

The facts of his case are these:—a pale, sickly-looking baker, æt. 22, was admitted with a general, œdematous swelling between the knee and ankle of the left leg, attended with severe symptoms of constitutional irritation, of ten days' duration. The pain, at first most acute, subsided after a while, and then deep-seated fluctuation was detected. A long incision gave free vent to a quantity of fœtid pus, and the shaft of the tibia was found denuded of periosteum throughout its entire length. Twenty weeks later, the dead shaft, having been separated, was removed, and in twenty-nine weeks from the date of his admission he left the Hospital with a sound leg and in robust health.

A case, terminating favourably, contrary to expectation, but passing through many trials, and in a short time withal, is that of a male, æt. 6, thin, and of a feeble constitution, who had been ill for only one week prior to his admission. There was swelling, with a diffused dusky blush over the whole of the left thigh, not extending above the groin, and abruptly limited at the knee. The blush presently subsided, and fluctuation being recognised at the lowest inner aspect of the limb, the pus was let out, and then, on introducing a long probe, it could be passed along the suppurating track by the side of the bare femur, nearly to the groin. The pre-existing febrile symptoms quickly subsided, the discharge rapidly diminished, but a sinus remained, through which bare smooth bone could always be detected. Presently, the child was allowed to get up, and one day, whilst running about the ward, he twisted and snapped the femur, apparently at the lower epiphysis. Blood escaped from the sinus, so that the fracture was probably compound. Nevertheless, it united in rather less than the usual time. When the splints were taken off, the sinus had closed. There was evidently a very thick case of

new bone, and it was assumed that it had closely and completely enveloped the necrosed portion. The child was kept under observation for some time, remaining for fourteen weeks in the Hospital. He continued well for several weeks later, subsequently he ceased to attend.

Another case terminated fatally. A feeble, emaciated male, æt. 19, a labourer, got wet and caught cold three months before his admission. He was seized with acute pain in the right leg; extensive necrosis of its bones supervened. Two months later his knee-joint became spoilt, so that soon after his entering the Hospital it was necessary to amputate the limb at the thigh. He never rallied thoroughly after the operation, and 7 weeks later he died, apparently from chronic pyæmia.

An example of necrosis of the trochanter major (femoris), with an attendant chronic abscess, is instructive as showing the importance of an early recognition of the precise seat of the disease. A labourer, æt. 40, came under treatment with a large chronic abscess occupying the upper-half of the thigh. As it tended to point near the outer border of the rectus muscle, it was opened in that situation. A large quantity of healthy pus escaped, but the discharge, after some weeks, showed no diminution, welling up from the outer side of the upper part of the shaft, where was an exceedingly tender spot corresponding with the site of the trochanter major. An incision was made over this point, and a fragment of bone, about the size of a shilling, was found loose, and easy of removal. The trochanter itself was rough and ulcerated about its upper and outer surface, portions of which were removed with a gouge. From this time the patient steadily improved, and presently he was well.

An instance occurred in which the greater part of a clavicle was extruded. A female, æt. 14, presented herself with nearly three inches of collar bone projecting through a long ulcerated wound, the integuments having retracted from it. It required only slight traction with a pair of ordinary dressing-forceps to remove the whole of the necrosed bone. The wound healed in eleven days. Another young person suffered from necrosis of the entire crista ilii. Here also the dead bone was detached by the natural processes, and was with ease extracted. This patient left the Hospital well in twenty-five days.

Of the total number of one hundred and two cases, a very large proportion were affections of the bones of the hand or foot. Disease of any one portion of the carpus is rare; of the tarsus, on the contrary, it is by no means unusual to find the mischief limited to a single bone. The os calcis, in particular,

is often thus affected. Three tolerably well-defined diseases attaching to the short bones of the foot have been illustrated by cases occurring during the past year.

A male, æt. 13, suffered from necrosis of part of an os calcis, the symptoms extending over two years. As soon as loose bone was detected, a cut was made, guided by a sinus, over the outer side of the middle of the bone. Removing a layer of osseous tissue (perforated by the sinus), a cavity was exposed, nearly filled by a loose piece, soft and dead. The walls of the cavity were hard, and superficially ulcerated. The dead bone was scooped out, and a gouge applied all round the lining of the cavity. The wound healed slowly in fifty-four days. Here a circumscribed portion of the bone had perished whilst the remainder was healthy.

In another form of disease the surface of the bone is affected by ulceration, and this unsound tissue may be removed, and the further progress of the mischief may be arrested by a liberal application of the gouge. Such a condition is illustrated by the following case. A female, æt. 11, was admitted with a sinus in the outer and posterior part of the foot leading to bare os calcis, the integuments being thickened and inflamed around. Upon exposing the bone, its surface was found rough and ulcerated. After gouging out this ulcerated patch, healthy vascular bone was brought into view. The wound, carefully dressed, was healed from the bottom, and in forty-three days she was discharged cured.

So-called scrofulous patients are liable to a third affection of these bones. Simple enlargement is the first symptom. As the disease makes progress abscesses form around, and then a probe can be passed without difficulty into their tissue. It seems to have undergone an inflammatory softening, a change which is very liable to spread from bone to bone, until the whole even of the tarsus may become affected. The astragalus, scaphoid, or one of the cuneiform bones are the points from which this form of disease most commonly takes its commencement. A female, æt. 21, married, a poor feeble creature, came into the Hospital with disease of the internal cuneiform bone. As the mischief was apparently confined to this part, the softened bone was removed, the cartilages connected with it being left, a mere shell, untouched. The adjoining bones, however, presently began to enlarge and soften, and before long the ankle joint became affected. Her health beginning to fail, amputation at the ankle was of necessity resorted to (after Pirigoff's method), and she made a good recovery. On examining the foot, no trace of repair was to be seen; on the

contrary, all the bones were unduly vascular and spongy, so soft, indeed, as to be easily crushed between the fingers.

Scooping out and excision of single bones of the tarsus is an unsatisfactory proceeding. Where the disease has ceased to extend itself after the removal of one of these bones, the same result would most probably have followed had no operation been performed; for not seldom the inflammatory softening is arrested, and recovery ensues with rest-treatment and efficient support.

Two cases of exostosis presenting unusual features may by briefly noticed. A male, æt. 12, came under observation with a moveable bony tumour near the internal condyle of the femur. By nature it was an exostosis, but, in consequence of a blow, its pedicle had been fractured. It was about two inches in its chief diameter, and its removal was easily effected. The second case was that of a female, æt. 16, with a bony tumour in the posterior triangle of the neck, raising the left subclavian artery. The swelling had been noticed rather more than a year, and was said to be increasing. It was attached to the spine, probably to the last cervical vertebra. Neither pain nor inconvenience resulted from its presence, nor did it appear to increase in size during the six weeks she remained under observation. A somewhat similar case was admitted into the Hospital four years ago.*

Cases of Strangulated Hernia under Treatment during 1864.†

		Recovered		Died		Totals
		M.	F.	M.	F.	
Femoral	Reduced by taxis	—	4	—	—	4
	Sac opened	—	5	—	4	9
	Sac not opened	2	—	—	—	2
Inguinal	Reduced by taxis	18	—	—	—	18
	Sac opened	—	—	8	—	8
	Sac not opened	6	—	—	—	6
Umbilical	Sac opened	—	—	—	2	2
	Totals	26	9	8	6	49

* See Medical Times and Gazette, August 1861.

† The figures here and elsewhere do not, as a rule, correspond with those given in the Statistical Report of the Hospital for 1864. All cases are here included which were admitted up to the 1st of January 1865.

Of the 22 cases in which taxis was successful in returning the bowel, the average duration of the strangulation was, for the femoral ruptures thirty-two, for the inguinal twenty-five hours. In nearly all these cases the hernia was reduced whilst the patients were in, or immediately after their removal from, a warm bath. There is practically only an exceptional gain in the employment of chloroform, as it seldom avails to secure reduction when the bath has failed. The latter is almost invariably tried in the first instance, being a remedy at once efficacious and harmless. No instance occurred during the year of the return of a femoral hernia by the aid of chloroform inhalation; such cases, the bath having first failed, are rare; but two inguinal ruptures were thus reduced, one after forty-eight hours of strangulation, the second after ninety-six.

As to the fatal results, they are quite independent of the opening of the sac; for although the contrary might, at first sight, be suggested by the Table, the individual cases point elsewhere for the causes of death. Chief, by a long way, amongst these is the duration of the mischief, for the great majority of cases drift into a hopeless condition before being brought to the Hospital, from the changes which the bowel undergoes from long continuance of its strangulation. The expectation of gangrene necessitates the cutting of the peritoneum to examine the state of the damaged intestine. For instance, from the cases of the year we learn that in the inguinal ruptures for which the sac was opened, the strangulation had been continuous for, on an average, fifty-five hours; but in those for which it was not opened, only twenty hours. Traced in each of the eight fatal cases of inguinal rupture, further and independent causes of death are in some apparent. Gangrene of the bowel, with perforation, stricture (malignant) of a portion of intestine, rapid exhaustion, bronchitis, pleurisy, and carcinoma of the rectum leave two deaths only to unmixed peritonitis.

Amongst the cases of hernia, the following may be noticed: —A nurse, æt. 55, recovered in eighty-one days, convalescence having been retarded by an attack of phagedæna, involving the wound in the groin. A male, æt. 38, after an operation for femoral hernia, suffered from peritoneal symptoms which subsided whilst he was subjected to mercurial inunction. Another male, æt. 40, had an inguinal hernia returned without opening the peritoneum; but the sac subsequently sloughed, and allowed a large mass of omentum to protrude. He eventually recovered. In a male, æt. 45, the incision over an inguinal hernia healed by the first intention. A male, æt. 53, recovered, despite the complication of an attack

of typhus fever. A male, æt. 60, with symptoms of strangulated intestine, had an umbilical and an inguinal hernia, both irreducible. The umbilical was first operated upon by reason of the history and the symptoms; but the inguinal had subsequently to be examined, as it proved to be the one strangulated, the other being incarcerated. This patient died a few hours after the operations—duration of strangulation, ninety-six hours.

In nearly all cases the after-treatment consisted in the occasional exhibition of opium, the patients being kept quiet and at rest, all action of the bowels being avoided for the first few days after the operation. Peritonitis was treated, for the most part, with opiates.

Amongst the cases of hurt joints may be mentioned that of a male, æt. 27, who had suffered for four months from an unreduced dislocation of the femur on to the dorsum ilii. He was a labourer employed on some railway works in Spain, in which country the accident had befallen him. All that could be done—and the attempt was twice repeated—failed to replace the head of the bone. In the case of a labourer, æt. 33, a recent dislocation of the femur on the dorsum ilii resisted treatment by ordinary extension, but the displaced bone was subsequently reduced by manipulation, the femur being flexed on the pelvis, and then rotated outwards.

Another labourer, æt. 54, was admitted with a hurt similar to that in the last case, the dislocation being readily reduced by extension. When this patient recovered from the chloroform, he was found to be hemiplegic, no brain symptoms having been apparent before beginning the inhalation. He was subsequently removed to a medical ward, where he died some months later. On making a post-mortem examination, the brain substance was found to be extensively softened with hæmorrhagic erosion, and it was presumed that this condition had resulted from some injury sustained by the nerve centre at the time of the fall which occasioned the hip-dislocation.

Displacement of the internal semilunar cartilage of the knee-joint, occurring to a male, æt. 23, was easily reduced by sharply flexing the leg on the thigh. In this instance, the malposition of the cartilage formed a characteristic projection below the condyle of the femur. The movements of the joint were ultimately and perfectly recovered.

A five weeks' dislocation of the humerus into the axilla was reduced by extension, the patient, a male, æt. 67, making a good recovery.

Of the fracture cases, not the least interesting are the compound ones of the tibia, or fibula, or of both these bones. Of twenty-one such cases, five died; in four of the latter the ankle-joint was involved in the injury. A compound fracture of both bones extending into the ankle, occurred to a male, æt. 56. An attempt was made to save the limb, but a diffused inflammation extended from the hurt; and from this, and from an associated traumatic delirium, he died on the twelfth day. In another somewhat similar case (the fibula only being broken with compound dislocation), a male, æt. 51, died on the fifth day after primary amputation from exhaustion, consequent upon gangrene and delirium tremens. So, also, traumatic gangrene proved fatal to a male, æt. 58, on the third day after primary amputation for compound comminuted fracture of the tibia and fibula, extending into the ankle-joint. A male, æt. 64, after a hurt similar to the last, underwent amputation twenty-four hours after the accident, having, at first, refused to submit to the operation. Reaction having fully set in, this is to be reckoned as a secondary, so termed, amputation. Death, preceded by sloughing of the stump and delirium tremens, followed fifteen days later. These cases ended badly, in part from the somewhat advanced age of the patients, but still more as a consequence of their drunken, dissipated habits.

A younger male, æt. 32, alone of the five cases of compound fracture involving the ankle-joint, recovered. With him the astragalus had been completely torn away, the fibula being extensively comminuted. Primary amputation was followed in seventy-six days by recovery. His convalescence was tardy; he suffered often from rigors, with the formation of odd swellings about (not in) his joints and elsewhere, by some thought to be purulent collections, but mere serous fluid, collecting with sense of local pain, and presently again dispersing.

Of the remaining sixteen of these cases of compound fracture, one only died, the others recovering with bones well united. The fatal case was also the only one in which amputation (primary) was resorted to, death occurring on the seventh day after. There had been compound fracture of both bones of the leg, with great accompanying damage to the soft parts. The patient was a male, æt. 40, and was much depressed by a recurrent hæmorrhage.

Of other cases, the following may be mentioned:—a female, æt. 75, recovered from a bad oblique compound fracture of both bones. A male, æt. 25, after a compound fracture high up, had a very great effusion of blood. He was well in eighty-two days. Convalescence in a male, æt. 32, was retarded by a severe

attack of erysipelas to one hundred and eight days. The rapidity of the recovery depended mainly, however, upon the extent of damage, not merely to the bones, but also to the adjacent muscular and other tissues. The most rapid repair was that in a male, æt. 39, in forty-five days. After a compound comminuted fracture of the tibia and fibula, a female, æt. 42, suffered from extensive necrosis, requiring the removal of many portions of dead bone. A labourer, æt. 17, sustained a compound fracture of the fibula alone, about and above the external malleolus, but failing to implicate the ankle-joint. Several portions of detached bone were removed from the side of the peroneal tendons; and he slowly mended, with good foot-movements, in one hundred and ten days.

Of five compound fractures of the femur, one only recovered. These injuries were most severe. In the case of a female, æt. 71, traumatic gangrene followed the hurt, and proved fatal in fifteen days. A male, æt. 15, who died on the third day after breaking his thigh, suffered also from compound fracture of the lower jaw, from fracture of the radius on either side, and from general contusions. A labourer, æt. 53, with compound comminuted fracture of the thigh, had also rupture of the femoral vein, and died from collapse a few hours after his admission. Amputation was here inadmissible. A policeman, æt. 32, stumbled over a dog and fell on the pavement, breaking the lower third of his thigh bone—an oblique split extending into the knee. Suppuration, joint mischief, and exhaustion depressed him so considerably that, after ten days, secondary amputation was resorted to. Gradual sinking, rigors, and supposed pyæmia preceded death, which occurred on the eleventh day after the operation.

It took a lad, æt. 10, two hundred and thirteen days to recover from a compound comminuted fracture of the femur, convalescence being retarded by attacks of erysipelas.

Whilst lifting a piano into a cart, a healthy male, æt. 29, had his left hand driven into by a cab, his wrist being crushed against the edge of the instrument case, his forearm being also squeezed. Considerable hæmorrhage followed. A torn wound extended across the entire front of the arm, less than one inch above the wrist. The mass of flexor tendons was exposed, some of them being rent across. The ulna artery was divided, and the nerve bruised. The carpal end of the radius was broken, so that the finger could be passed through its tissue into the wrist-joint. An attempt was made to save the limb, but traumatic gangrene ensued on the third day, and progressed so rapidly that by the sixth the patient was dead.

Of the six cases of compound fracture of the humerus admitted into the Hospital, four involved the elbow-joint. Two men, between forty and sixty years of age, died from pyæmia after secondary amputation. A woman, æt. 57, was so greatly hurt as to need immediate removal of the parts damaged. Her stump, up to the present date, has been persistently the seat of neuralgia, not relieved by treatment, including removal of the nerve ends. A fourth case, a male, æt. 65, recovered in sixty-eight days, with a useful joint.

Although the fracture did not involve the elbow, a male, æt. 25, gradually sank with extensive suppuration about the broken bone, and needed secondary amputation, from which he recovered. A lad, æt. 8, not only suffered from a badly compound and comminuted fracture of the humerus, but had his brachial artery obstructed, perhaps torn, by the accident, with great damage to the soft parts. The chance, which seemed a slight one, of his retaining the limb was given him, and, slowly, he convalesced. The arm was much shortened, and his getting well was hindered by the separation of necrosed bone fragments, but chiefly by the intercurrence of pleuritic mischief, requiring paracentesis thoracis.

A boy, æt. 8, sustained a compound fracture of his left clavicle, and, as it was at the time supposed, of the left first rib also. Between the hurt bones the subclavian artery suffered compression, for no pulse could be felt in the corresponding upper extremity. The wound over the clavicle became the seat of a sloughing phagedæna. However, he recovered in one hundred and eighty-eight days.

As showing the rapidity with which hurts about the face may be repaired, the case of a boy, æt. 9, may be instanced. He suffered a compound comminuted fracture of the lower jaw, from the kick of a horse, the bone being broken at the bottom of a badly bruised wound, which extended through the depth and thickness of the lower lip. In twenty-three days he was discharged, well.

A male, æt. 53, was admitted with an ununited fracture of the lower jaw, dating back four months. He was in a state of great exhaustion, not having been well looked after, and having been unable to take such coarse food as was at his command. His exhaustion, indeed, was such, that, despite every care, he sank, and died on the tenth day.

Many fractures of the skull passed under observation. The majority of those taken into the Hospital terminated fatally. For example — of eighteen fractures at the base, three only were recovered from; of seven at the vault, six compound, four

died. A male, æt. 27, was admitted with symptoms of severe concussion, and suffering from hæmorrhage from the left ear. He had also well-marked facial paralysis on the same side, so that an unfavourable prognosis, as for fracture at the base, was at once given. He roused out of his stupor, however, and in forty-two days he was comparatively well, the paralysis persisting. Also a male, æt. 34, suffered from concussion symptoms for one week, with bleeding from the left ear and from the nostrils, and from facial paralysis. The latter persisted, but he got well of his other symptoms of fracture at the base, and was discharged after one hundred and thirty-seven days. A train of symptoms almost identical with the preceding occurred to a labourer, æt. 25, who was discharged, at his own request, after forty-two days, facial paralysis persisting. In this case there was profound insensibility for several days after his admission.

Of fractures about the vault, a compound comminuted breakage of one of the parietal bones befell a labourer, æt. 39. At first unattended with severe symptoms, for neither was there compression nor yet concussion, the injury proved fatal in seven days, after three of signs of acute pyæmia. An important case was that of a male, æt. 10, who suffered from a compound comminuted fracture of the vault of his skull, the left parietal bone being broken in from the kick of a horse. Pieces broken away left a gap through which—the membranes being torn, bruised, and subsequently sloughing—brain substance was protruded. He recovered sufficiently to be allowed to get up and move about the ward, always, however, with the brain substance protruding, but shielded by apparatus from chance hurts. From time to time he had attacks of meningitis, or what seemed to be such, and after one of these he became comatose, and died, one hundred and sixty days after his admission. The brain membranes were laden with pus, and the substance of the cerebral masses was softened and infiltrated with puriform deposits. A lad, æt. 10, sustained a compound comminuted fracture of the frontal bone, from a kick, with depression, probably only of the external table. After eight weeks four considerable portions of bone separated, and were removed.

The following are selected from amongst the numerous cases of, so called, simple fracture:—

Two aged women made remarkably good recoveries. One, æt. 70, fractured both bones of both her legs, and was discharged well in one hundred and nineteen days; the second, æt. 85,

suffered from a comminuted fracture of the fibula, the bone being badly splintered in its lower third. In fifty-two days she was well. It took a broken-down porter, æt. 55, one hundred and sixty days to unite a comminuted fracture of both leg bones. A male, æt. 36, was brought to the Hospital with fracture of the tibia and fibula from direct violence, with damage to the soft parts. These sloughing, the fracture became compound. The wound, thus originated, was next attacked by sloughing phagedæna, which was recovered from, but there was left an extensive necrosis of the tibia. The dead bone eventually separated, and the patient got over his troubles, with good union, in one hundred and thirty days.

During the month of April, a traveller, æt. 32, was admitted with dislocation of the foot outwards, the fibula being broken in its lower third. The tibia, projecting forwards and inwards, was replaced with great difficulty, and the case is referred to on account of the treatment adopted. The hurt lower extremity was bent at the knee over a double incline plane. The parts beyond the ankle were firmly secured at a right angle with the leg to a foot-board fixed at the lower end of the incline. Extension was then made upwards from the knee by means of bandages secured to the upper part of the leg and adjacent lower extremity of the thigh, and thence carried to a cradle adjusted for the purpose by being fastened to the upper (thigh) division of the incline. By attaching a cradle to the lower (leg) division of the incline, and by thus enabling extension to be made from the pelvis downwards, a number of cases of fracture at the neck of the thigh were successfully treated, and will presently be referred to.

Passing to the femur, a male, æt. 9, fractured one of his thigh bones. He was the subject of rachitis, and had broken the same femur no less than five separate times, at different parts of its shaft. No other of his bones had been fractured. In twenty-one days there was firm union. A type-founder, æt. 54, fell and broke his right femur, at the junction of its upper and middle thirds. Probably from the original violence the lower fragment was driven up through the soft tissues on the outer side, and its sharp pointed extremity projected by the side of the anterior superior spine of the ilium, causing a remarkable shortening of the limb to the extent of about six inches. He recovered with loss of about one inch of the length of the femur. A carman, æt. 30, had his thigh bone broken through direct violence into many pieces and the adjacent soft parts so crushed and bruised that it was necessary to have a consultation respecting the propriety of amputating the limb. It resulted

from conservative treatment that he recovered in eighty-two days. The long splint was employed in this, as in nearly every other case of broken thigh shaft in adults.

Occurring as they did about the same time, and lying side by side in the same ward, five cases of fracture at the neck of the thigh bone—it was thought within the capsule—may be referred to. The plan on which these women were treated has been alluded to above. They recovered thus: æt. 67, in sixty-three days; æt. 63, in sixty days; æt. 73, in forty-two days; æt. 66, in seventy days; æt. 75, in forty-four days. In the last case there was a second fracture of the shaft of the same femur. In each instance it was believed that bony union had been secured. In the second case it certainly was so, for the woman dying within one hundred days, from independent disease of the ovaries, the fracture was found to have been within the capsule, and to be firmly joined.

A sailor, æt. 19, fractured his left humerus in its upper third. It had been treated on board ship. Originally it had been compound, now joined together (by bone it was believed), but the two portions fixed at right angles to one another; the upper one projecting straight out from the glenoid cavity. In operating for the remedy of the distortion the bone was found to have been united by dense fibrous tissue only. The extremities were sawn off, so as to permit of the proper bringing together of the two portions of the shaft, and presently they joined, and firm bony union was slowly obtained.

After a fracture of the radius and ulna, just below the elbow, the flexor muscles of the forearm became contracted, so that the fingers were bent in upon the palm of the hand, nor was this condition alterable under the influence of chloroform. Whether the cause lay in the extensors or in the muscles already named, or whether it resulted from some nerve damage, the patient, a male, æt. 7, was set right by the use of an extending apparatus, and his forearm, kept under observation for some time, recovered perfectly.

The following is a case of fracture of a cervical vertebra. Six months ago, so runs the history, a plasterer, æt. 15, sustained a fracture at the cervical portion of the spine, and also suffered from partial paralysis of the upper extremities. He could walk well. Being after a time discharged, he was pushed against and knocked down whilst walking along a street, for the paralysis of the upper extremities rendered him feeble to take care of himself. Complete paralysis of the lower extremities followed this second injury, and he died thirteen days after his admission. The body of the fourth cervical vertebra was

found to have been crushed and driven backwards, the intervertebral substance above and below coming into contact in front, whilst the spinal cord was much compressed by the angular projection thus produced.*

There were under notice during the year a good many troublesome abscesses. One, indeed, proved fatal to a traveller, æt. 37, who sank from exhaustion in seventy-two days from an extensive suppuration beginning beneath the pectoralis major and spreading round and about the adjacent left shoulder joint. It is needless to refer to many of these cases. In two, however, the suppuration was due to the presence of hydatids, once in the pectoralis major muscle, once amongst the muscles of the thigh. The latter was an abscess of very large size and had descended from the psoas. Both patients made good recoveries. In a third case an hydatid cyst was removed from the serratus magnus at the inferior angle of the right scapula. All three were females.

A male, æt. 50, was admitted for cancerous disease of his entire tongue; his difficulty in swallowing and speaking was so extreme that he was advised to have the organ removed. This was done under chloroform, and without any great difficulty.

The mouth was widely opened and firmly fixed so, and the tongue was drawn forward. To facilitate this latter step the mucous membrane and the soft parts on the floor of the mouth, including the attachment of the genio-hyo-glossi muscles to the inner side of the symphysis, were cut through close to the bone. The tongue was thus in great measure released from its anterior and inferior attachments, and could readily be drawn forward, so that the wire of an ecraseur was without difficulty passed round its root, including the entire organ to its connections with the larynx. The wire was tightened by degrees, and there was some free but not dangerous bleeding where the mass was detached.

The man's recovery was uninterrupted and very rapid. Indeed, he regained his power of swallowing in so short a time that he soon ceased to require special attention in feeding, and before the end of a week he could make himself intelligible by imperfect speech, so much so, that it would have been hard, without actual inspection, to have believed that the entire tongue had been removed. The patient continues well, with tolerable articulation, and it is now more than twelve months since the operation was performed.

* Museum of the Hospital. Series iv. 52.

The preliminary step of freeing the tongue from its connections was of great value in this operation. By this means the whole disease was brought within reach without the least trouble. Any more complicated proceeding, such as one involving the division of the symphysis of the lower jaw, would seem to be worse than unnecessary, since it is clear that with care the entire tongue can be removed by the comparatively simple plan employed in this case.*

Among the cases of medullary or soft cancer were many characteristic examples.

A male, æt. 18 months, had an indistinct tumour in the calf of the right leg for fifteen months; it showed no tendency to increase during the first ten months, and was looked upon as some form of scrofulous swelling. After that date it began to enlarge very rapidly, and acquired an arterial impulse. The child's health giving way, operative interference was demanded. In the hope that it might be some form of blood tumour, it was freely incised, but proving to be malignant, as indeed had been anticipated, the limb was amputated through the knee-joint.

A male, æt. 20, was admitted with a large elastic swelling over the left lower ribs, between their angles and the spine, of ten months' duration; the swelling had no impulse on coughing. From the course the case took, its real nature was presently revealed. It increased rapidly, not only outwards, but by steady encroachment on the left pleural cavity. Complete paraplegia ensued, and he died nine weeks after admission. At the post-mortem examination, the left lung was found completely enveloped by soft cancer. The bodies of several vertebræ were involved in the mass, and portions of two of the ribs were disintegrated. There were no secondary deposits.

A female, æt. 55, became a patient for the second time, with a large tumour involving the carpus. On the previous occasion the pisiform bone, having a medullary tumour connected with it, was removed, so that there was no doubt as to the nature of the swelling. The entire hand was amputated. Upon making a section through the tumour, the bones of the carpus were found to be more or less destroyed and imbedded in a mass of medullary cancer. The radius and ulna were healthy.

The following case illustrates the good that can sometimes be obtained by palliative treatment alone—

A male, æt. 54, was admitted with a large fungoid growth from the orbit, following removal of the eyeball for medullary cancer six months previously. On every occasion of dressing the wound, severe hæmorrhage occurred, which could only be

* From notes by Mr. Bowater Vernon.

arrested by such an amount of pressure as occasioned the patient extreme suffering. The shooting pains complained of in the tumour were most acute, and opium failed to relieve them, so that he was reduced to a deplorable condition. Operative measures were wholly out of the question, so that treatment was directed to the relief of his more urgent symptoms. He was ordered to keep some lint saturated with an infusion of matico and opium constantly applied to the tumour, the dressing being resumed once only in every two or three days. He was kept in bed with his head raised. Morphia was administered subcutaneously, and he took large doses of quinine in the hope of checking the neuralgic character of his pain. All stimulants were discontinued, and he was limited to a plain nutritious diet. He soon began to improve. The bleeding was stopped, and his sufferings were lessened, so that he was presently able to get about and occupy himself with such pursuits as the regulations of the Hospital permit. He was an in-patient one hundred and seventy-one days, and when he left the Hospital, the tumour was but slightly larger than upon admission. The bleeding and the pain had ceased to trouble him.

The following is a case of acute melanosis:—A male, æt. 33, emaciated and greatly exhausted, had only been ill for two months. Scattered throughout the subcutaneous tissues were countless nodules, of a blackish blue colour. The largest was about the size of a walnut, and was situated in the right groin. This was the first which he had noticed, but others quickly followed, and fresh deposits were continually appearing. Progressive emaciation and loss of strength and vigour had been the principal incidental symptoms. He died ten days after admission. At the post-mortem examination nodules of the same description were found diffused throughout the whole of the thoracic and abdominal viscera, the heart especially being thickly studded with them. They were of tolerably firm consistence, with the usual characteristic deposits of pigment.

During the year a case of cartilaginous tumour of the tibia was for some time under observation. An otherwise healthy lad, æt. 16, was admitted with a circumscribed swelling in the upper fourth of the tibia. The bone was expanded over an elastic prominence, which was conspicuous just below the tubercle. The swelling had existed for eighteen months, having rapidly increased during the last six, so that he had now much difficulty in getting about. It was decided to attempt the removal of the tumour. A flap of skin having been turned up and a thin layer of bone being cut away, a cartilaginous growth was exposed, and enucleated with ease. It was about the size of

an orange, enveloped in a membranous capsule, and was thus lodged in the bone, the walls of the containing osseous cavity being hard and smooth. The knee-joint was not involved. The lad walked out of the Hospital after a somewhat tedious convalescence, with a perfectly sound limb.

An instance of myeloid tumour of the femur occurred in the case of a female, æt. 25, married, with one child seven months old, who had suffered from a swelling about the knee for one year. It commenced during her pregnancy, but without an assignable cause. Since her confinement it had increased rapidly on the inner side of the knee, for the outer side did not deviate much from the natural condition of the parts. There was no pain so long as the limb was at rest. The swelling had, to a certain extent, the external appearances of pulpy degeneration of the synovial membrane; it was soft and elastic, and, on the inner aspect, took the shape of the joint. It continued to increase, despite treatment, and, her health giving way, the thigh was amputated. On dissection, the knee-joint was found to be intact, but the cartilage covering the femur was alone interposed between the articulation and a large cavity, which contained a soft brownish gelatinous material, by which the lower and inner part of the femur was almost entirely destroyed. Under the microscope, characteristic myeloid cells were found in abundance throughout the morbid growth.

Five cases of hæmatocele were under treatment in the wards, and as the diagnosis and treatment of this affection is always of interest, they may as well be briefly narrated.

A male, æt. 24, was tapped for an ordinary hydrocele three months before admission. It refilled in three days, but was described as feeling much heavier and more dense. It was again tapped, and a bloody fluid was drawn off, leaving a thickened tunica vaginalis. Wire setons were passed through, and kept in until suppuration ensued, and whilst this was in progress many broken-down coagula came away. The cure was complete.

In the case of a male, æt. 29, a similar trouble followed the operation of puncture for hydrocele, but, beyond a second tapping, he declined further proceedings.

A farm labourer, æt. 20, received a severe squeeze of the testis whilst riding on horseback, attended with immediate swelling of the scrotum, ten months before coming to the Hospital. Hoping that it would go away, he had put up with the inconvenience, but finding himself disappointed in this, and

suffering greatly from pain in the back, he applied, and was admitted. The right tunica vaginalis was filled with fluid, being also very heavy and impervious to light; the testicle itself could be felt behind. The left testicle and appendages were healthy. A quantity of thick treacle-like fluid was drawn off by tapping, leaving an enormously thickened tunica vaginalis. The serous sac was laid freely open, and the coagula removed. He never did well after this operation. Diffused cellular inflammation supervened, with extensive sloughing. He had a rigor on the twelfth day, and died on the sixteenth. Numerous small locular abscesses were found scattered through the kidney of the affected side.

A male, æt. 58, had a small 'watery ruptùre' for over twenty years, which never caused him inconvenience. Having, however, one day over-exerted himself, he was seized with acute pain in the part, and soon found the scrotum considerably larger. He applied for admission the next day, when he was tapped, and 20 ounces of apparently pure blood were drawn off, nearly emptying the cyst, but in the course of two days it was again of the original size. It was now thought advisable to lay open the tunica vaginalis, in doing which the testicle was found to be lacerated, and was removed. The patient ultimately recovered, although he was for some days in great jeopardy from an attack of diffuse cellular inflammation.

A male, æt. 69, was admitted for hæmatocele of two months' duration, caused by a severe contusion of the testicle. In this instance a small incision was made into the sac, and suppuration was induced, by which means a cure was effected in thirty-seven days.

The necessity of removing a limb in consequence of a burn arises so seldom, that the particulars are given of the following case:—

A female, æt. 19, sustained a severe burn of the right arm five weeks before admission. The integument had been destroyed from just below the border of the axilla to within two inches of the wrist, the intervening surface being one mass of granulations. There had also been a very deep burn on the thorax, yet unhealed. As it was evident that the condition of the arm was such as to preclude the possibility of its healing, amputation high up was resorted to. Her recovery was protracted in consequence of periodic hæmorrhage from the wound on the breast, probably vicarious of menstruation. At a later date she was placed under chloroform, and the left elbow-joint, which had become permanently straight, from disuse, was

forcibly flexed, and many adhesions were broken through. It is remarkable that, two days later, she was able to feed herself, being the first time for over twelve months; so readily had the elbow recovered its movements.

A lad, æt. 9, was admitted with a small circular penetrating wound opposite the lower margin of the internal condyle of the right femur, produced by a pea-bullet, fired, at a distance of two yards, in a direction forwards and slightly downwards, the knee being at the time flexed. The joint soon became distended with fluid, having been, in all probability, involved in the wound. An examination was made in search of the bullet, but it could not be found. It was supposed that it had lodged in the joint, for there was no wound of exit, and it did not seem probable that it had fallen out. Severe constitutional symptoms set in, accompanied by general inflammation of the lower half of the thigh, followed in a few days by free suppuration. The effusion into the joint gradually subsided, and for some time his condition was satisfactory. Three weeks after the accident, the bullet was detected in the original wound, and was extracted. Pain and swelling of the shoulder-joint supervened, and, as he was evidently losing ground, it was thought desirable to amputate the limb at the middle of the thigh. However, he died a week later, from pyæmia. On examination of the parts, it was found that the bullet, making for itself a groove along the under surface of the condyle, had thus entered the knee-joint.

Amongst other wounds a case of knife-stabbing occurred at the close of the year. A male, æt. 38, when seen was in a state of extreme collapse. There was a wound in the abdomen an inch and a half in length, situated one inch to the left of the umbilicus. About four feet of small intestine with some omentum had protruded, and there were three small wounds of the bowel, through which the mucous membrane projected. There was considerable venous bleeding. One large omental vessel having been secured, the wounds of the bowel were closed with fine silk continuous sutures, and the protruded viscera were returned. The wound in the abdominal parietes was then closed with the wire sutures, a pad and bandage being also applied. He rallied for a short time under the influence of stimulants, but died nine hours after admission. At the post-mortem examination three more wounds of portions of intestine which had not protruded, and a wound of the mesentery, were discovered. The abdominal cavity was full of blood.

Two cases occurred, in either of which the integument of a limb was severed in a perfect circle, and then dragged down for many inches: both required primary amputation.

A printer, æt. 13, got his hand entangled between two rollers, which quickly drew the limb in up to the armpit, when by a violent effort he succeeded in withdrawing it. The integument had been severed in a circle at the level of the axilla, and detached downwards with involution nearly to the elbow. There was no fracture. Primary amputation was performed at the shoulder-joint, no incision of the skin being necessary in performing it. The recovery was rapid.

The same description would apply for a male, æt. 15, only in this case the separation of the skin took place at the middle of the forearm.

Among other lacerations of limbs were the following:—

A male, æt. 17, got his hand entangled in machinery. When admitted, the entire length of the ulna from the wrist-joint up to the elbow had been wrenched away from its attachments, and was standing out at an acute angle to the upper arm, whilst the remainder of the forearm and the hand hung loosely from the elbow. It was thought possible that the ulna being less closely connected with the hand had been wrenched up by the brachialis anticus, in the desperate efforts of the man to disengage himself. A male, æt. 16, had his foot completely torn off by a locomotive engine, at the astragalo-calcaneal articulation; the foot, in its shoe, with the long extensor tendons attached, being separately brought to the Hospital. A male, æt. 32, employed in a menagerie, had his hand so severely lacerated by a lion that it became necessary to amputate it at the wrist-joint. The animal had seized the part in his mouth, crushing several of the metacarpal bones, and tearing between others. The fore-arm was lacerated in several places by its claws.

Cases of contusions, except of the abdomen, rarely possess much interest. Of the latter a few associated with damage to internal organs are given as a selection.

A male, æt. 45, whilst fighting, was knocked down and then jumped upon. He was brought to the Hospital in a state of collapse, complaining greatly of pain in the hypogastrium. He never rallied, and died on the third day. At the post-mortem examination a rent in the fundus of the bladder was discovered, permitting escape of urine, and so causing general peritonitis. A boy, æt. 6, was run over across the abdomen. A long period of collapse was followed by reaction, with stercoraceous vomiting. He lived five days, and after death the duodenum at its termination was found torn completely across. At that point, the

intestine being shut off from the general cavity of the peritoneum, only local inflammation had been set up, the lad dying rather from intestinal obstruction than from inflammation caused by the injury. A male, æt. 19, was run over by a fire engine, and brought to the Hospital in a state of collapse, from which he never rallied. After death laceration of the jejunum was found.

A male, æt. 18, was admitted on two occasions with a month's interval. On the first, with severe contusion of the loins and hæmaturia, the latter passing off in a few days. On the second, insensible with dilated pupils, convulsions, and a strong urinary odour. Under simple treatment these symptoms all passed off, and he recovered completely. Hæmaturia is not uncommon with contusions of this region, but is seldom of any serious consequence.

The following was presumed to have been an instance of rupture of the trachea—A male, æt. 32, suffered from a violent squeeze of his wind-pipe, instantly followed by emphysema of the neck. It was present for two days, and then slowly disappeared. Beyond pain on swallowing, he had no unfavourable symptom.

In succeeding notices groups of cases which the preceding sketch omits to include, will be duly referred to.

ARTICLE IV.—*Hypertrophy and Prolapse of the Tongue, occurring during Convalescence after Scarlatina; removal of the protruding portion with the Ecraseur and Scissors, with, ultimately, a good result.* By BOWATER J. VERNON.

ANNIE MORRIS, 3 years of age, a native of Durham, was brought to St. Bartholomew's, and admitted under the care of Mr. Paget, on account of a constant and unusual prolapse of her tongue. The mother said that her child had been weakly from her birth, and when fifteen months old had been seriously ill with scarlatina; this was followed by a very tedious convalescence, during which she had suffered much from 'soreness of the gums and edges of the tongue;' it was then noticed that the child's tongue was growing too large for its mouth, it was nearly always protruding, and that from that time until the date of her admission, the protrusion had steadily increased. Up to this time no special attention had been directed

to the case, and no local treatment of any kind had been adopted.

The child was pale and anæmic, but lively and exceedingly intelligent. Her tongue was constantly protruding, though, when told to do so, she could almost conceal it within her lips: under ordinary circumstances the projecting portion was an inch and a half long, and about the same in width; it was dry and very firm to the touch, and its tip was covered with a warty-looking brownish crust, which overlaid large and hypertrophied papillæ; its sides and margins were uneven, and scarred apparently from old ulcerations; one or two irregular fissures existed in the crust which covered the tip; behind this crust the surface was that of a healthy tongue, except that the papillæ were very large and in great numbers. The lower lip was everted, its mucous membrane much thickened, and large quantities of saliva dribbled freely from the corners of the mouth.

The lower jaw was misshapen, the incisor teeth being depressed and everted; the teeth were small, ill-developed, and thickly crusted with tartar, but the molar teeth in each jaw had their natural relation to one another when the mouth was closed.

The child did not seem to suffer any great inconvenience; she could breathe quite calmly through the nostrils while asleep, and there was no difficulty in swallowing; she could bite a sixpence firmly between her molar teeth, and it was remarkable what control she could exercise over the tongue when masticating her food.

Still, the disfigurement was very great, and the parents were anxious that something should be done to remove the overgrown tongue. Accordingly, as soon as the child's health was somewhat improved, Mr. Paget proceeded to remove the part which projected. When chloroform had been given, the tongue was firmly grasped and completely transfixed with three stout pins, from below upwards, the chain of an ecraseur was then made to encircle the tongue behind these pins, and then slowly to cut it through. There was no blood lost until the very last part of the section, which the ecraseur did not accomplish; this was effected with one touch of a scalpel, and the bleeding, which was but trifling, was entirely arrested by an application of a heated wire.

The immediate result of this operation was to leave the tongue on a level with, but not quite concealed by, the lips. Very considerable constitutional disturbance ensued, and lasted for some days, and the stump of the tongue became very much swelled and again protruded. On the subsidence of this disturbance the tongue was still left protruding, and too large for

the mouth, so that Mr. Paget operated a second time, and on this occasion removed a considerable portion with the scissors. The results of this second operation seemed to be more permanent, and the shape of the jaw and the position and direction of the teeth were undoubtedly becoming more natural.

Still, though every care was paid to the child's diet, her general condition did not seem to improve; and the tongue, though it did not seem to increase in size, very frequently became covered with thick white layers of epithelium, not very unlike the layers which are heaped up around an old callous ulcer upon the lower extremities; portions of its extremity seemed to slough as it were, and became detached, but this did not seem materially to lessen the size of the parts. Each of these detachments would be attended with feverishness and general disturbance of the child's health.

Large doses of chlorate of potash were now given very frequently, and were persevered with for some time, and with considerable benefit; the child gained strength and improved in appearance, and the tongue became smaller, cleaner, and very much more shapely. By this time, about two months after the first operation, the shape of the jaw was very much more natural, and though the tongue still looked unduly prominent, it was no longer a disfigurement, and, from the removal of pressure upon the lips, the escape of saliva was no longer an annoyance. The child was sent into the country after being in the Hospital nearly three months.

The portions of tongue which had been removed were carefully examined with the microscope; the superficial covering seemed to be composed of layers of epithelium, which completely encased the ordinary papillary structures: the individual papillæ were very numerous and very large. Deeper portions seemed to be composed of coarse bundles of muscular fibres, but there did not seem to be any excess of blood-vessels or other structures, nor was there any appearance of any inflammatory effusion.

The exaggerated growth and prolapse of the tongue in this child's case clearly owed their origin to some temporary and probably inflammatory enlargement, and when this increase in bulk had been once established, the pressure of the teeth would very materially tend to prevent the subsiding of the swelling, while the weight and constant pressure upon the teeth, in time produced the very remarkable changes in their shape and direction, ending in the whole of the anterior part of the jaw becoming distorted.

In a paper in the 'Medico-Chirurgical Transactions,'* Mr.

* Vol. xxxvi.

Humphry has collected nearly all the recorded cases of this disease; from these it would seem that the treatment which has been employed in these cases, and with satisfactory results, has been continuous and firm pressure, but in a case such as ours, where the subject is very young, such a plan of treatment must necessarily be tedious and difficult in its application, and when the case was not a recent one and the disease had already produced most serious changes in the shape of the jaw, it seemed more advisable to attempt the removal of the cause of the distortion by more speedy measures. That this was a right decision is shown by the very decided improvement in the shape of the parts, which was noted even after the first operation. The majority of the cases recorded have been treated by amputation, and now that there is less dread of bleeding after operations on the tongue than was formerly felt, this would seem to be the most advisable mode of treatment. But even the risk of bleeding has been most materially lessened by the employment of the ecraseur, an instrument of great value in such a case as this, combining as it does the rapidity of the knife with the safety of the ligature. The ecraseur in this case probably caused more local injury to the parts than the knife would have done, and consequently a greater amount of inflammatory disturbance was set up. As the disease does not seem to consist in any marked increase in the vascularity of the tissues, the details of the operation might be generally determined by the peculiarities of each case; but when the patient is very young, and any bleeding is of consequence, and is not easily controlled, the use of the ecraseur would seem the safer plan.

There is a noteworthy feature in this case which does not seem to have been present in the cases on record—the tendency of the stump to take on excessive growth again. This was so marked that, when a considerable time had elapsed after the operation—time amply sufficient for the subsidence of any temporary swelling—it became necessary to remove a considerable piece of the stump; this was done with scissors and without any further trouble. In the subsequent progress of the case this tendency to increased growth was still evident, but now there was no increase in the whole bulk of the tongue, but apparently an excessive and purposeless development of the epithelium, which was shed and cast off as soon as produced.

With the improvement in the general health of the child, this excessive action in the parts was no longer evident, and she left the Hospital very much improved in appearance and general condition.

ARTICLE V.—*Practical Observations upon Tumours of the Pelvis and neighbouring parts, complicating Pregnancy and impeding Labour, with illustrative cases.* By ROBERT GREENHALGH, M.D., St. And.

IT is not my object in the present communication to attempt any exhaustive treatise upon this most difficult and interesting subject. Its full consideration would extend far beyond the limits of a paper. I intend, however, to place on record my experience, extending over a period of more than twenty years, in cases of morbid growths complicating and interfering with the healthful progress of pregnancy and parturition, and to offer such practical remarks thereon as I trust may aid in the diagnosis and treatment of these important and perplexing cases, which, though rare, occur sufficiently often to merit our most attentive consideration. Nor is it my intention to discuss the etiology, symptomatology, or pathology of these affections, but merely to regard them from a mechanical point of view, in short, only so far as they lessen the dimensions of the pelvic and abdominal cavities during pregnancy and parturition. Further, my observations will be chiefly directed to pelvic tumours with which the accoucheur is more particularly concerned, while I shall content myself with simply alluding to enlargements affecting the osseous and soft structures in and about the cavity of the abdomen. It is important, however, that I should enumerate concisely the many affections bearing upon this subject which have been mentioned from time to time by various authors, and in so doing I shall follow the plan laid down by Puchelt in his 'Commentatio de Tumoribus in Pelvi Partum impedientibus.'

Tumours of the Pelvis may be thus classed:—

A. Those originating in the parts which form the parturient canal, which are—1. The osseous or hard; 2. The soft.

I. In the osseous or hard parts of the parturient canal, tumours arise from the bones of the pelvis, their articulations or ligaments.

a. Exostosis.
b. Osteosteatoma, osteosarcoma.
c. Fibrous.
d. Cancerous.

Tumours or projections may also be caused by—

e. Periosteal or osseous abscess.
f. Fracture with displacement.
g. Dislocation.

II. Those originating in the soft parts of the parturient canal. A. The uterus; B. the vagina.

A. In the uterus.
- *a.* Malpositions, anteversion, retroversion.
- *b.* Prolapse, procidentia.
- *c.* Inflammation, induration, abscess.
- *d.* Hypertrophy of neck and lips.
- *e.* Varix, thrombus.
- *f.* Tumours, benign and malignant.
- *g.* Tumours, benign and malignant, with extra-uterine pregnancy.

B. In the vagina, labia, nymphæ.
- *a.* Prolapse of walls.
- *b.* Hypertrophy, excrescences.
- *c.* Varix, thrombus.
- *d.* Tumours, benign and malignant.

B. Those originating in the parts in the vicinity of the parturient canal. A. Fallopian tubes; B. Ovaries; C. Rectum; D. Bladder; E. Cellular tissue; F. Hernia.

A. In the Fallopian tubes.
- *a.* Dilatations by blood, pus, or serum.
- *b.* Tumours, benign and malignant.
- *c.* Extra-uterine pregnancy.

B. In the ovaries.
- *a.* Congestion.
- *b.* Hypertrophy.
- *c.* Abscess.
- *d.* Tumours, benign and malignant.
- *e.* Extra-uterine pregnancy.

C. In the rectum.
- *a.* Fæcal accumulations.
- *b.* Foreign bodies.
- *c.* Tumours, benign and malignant.

D. In the bladder.
- *a.* Distension (by urine).
- *b.* Procidentia.
- *c.* Foreign bodies, calculus.
- *d.* Tumours, benign and malignant.

E. In the cellular tissues.
- *a.* Congestion, cellulitis, œdema, abscess.
- *b.* Hæmatocele.
- *c.* Pelvian bodies.
- *d.* Tumours, benign and malignant.

F. Hernia.
- *a.* Labial, vaginal, uterine, ovarian.
- *b.* Intestinal, omental.
- *c.* Vulvo and perineal.
- *d.* Vesical.
- *e.* Rectal.

C. Abdominal tumours involving the
- I. Spinal column.
- II. Liver.
- III. Stomach.
- IV. Spleen.
- V. Pancreas.
- VI. Kidneys.
- VII. Intestines.
- VIII. Peritoneum.
- IX. Lymphatic glands.
- X. Abdomimal walls.

I.—*Thrombus of the left labium impeding labour, artificially opened—Delivery by forceps of living child—Recovery.*

During the year 1845, I was requested to visit Mary O'C., æt. 39, married twenty-one years, had thirteen children at term, and two miscarriages. Her labours had always been lingering, which she attributed to the large size of the children; they did not require, however, manual or instrumental assistance. After her two last labours, she had very profuse hæmorrhage, which prevented her 'getting about' as soon as on previous occasions. During the last two months of her eighth pregnancy, she had stood 'a good deal at the wash tub,' which, she says, occasioned the veins about her ankles and up to her knees to swell. The varicose condition increased gradually during the two subsequent pregnancies, when the enlargement extended up both thighs to the groins and labia, especially on the left side. During her thirteenth pregnancy, the veins had become so large, and produced so much pain, irritation and itching, when she was in the upright posture, as almost entirely to prevent her performing her ordinary domestic duties.

At the time of my visit, the midwife informed me that the patient had been about seven hours in strong labour, the pains having been frequent and severe; that during a violent pain a tumour had suddenly made its appearance in the left labium, which she feared was increasing with each pain; that the

vagina, which was a short time ago capacious, had suddenly contracted, and she fancied that the head which had occupied the upper part of the sacral cavity had 'gone back.' The patient complained of being so weak that she could no longer follow the midwife's instructions 'to bear down and assist nature.'

On external examination, a swelling somewhat boggy to the feel, and about the size of a large fist, with its long axis upwards, was found occupying the left labium, extending upwards to the groin. Internally, it bulged so considerably into the vagina as nearly to close that canal. The integuments covering the swelling were much stretched and thinned, and presented a bluish-red blotched appearance, somewhat rough and eczematous externally, smooth and polished internally. The right labium was also much distended. During a pain, the swelling became larger and firmer, and felt as if it would burst; in the absence of pain, it was less tense.

The pains being frequent and expulsive, and the tumour increasing in size and extent, and evidently impeding the passage of the fœtal head, I made a free incision into the most prominent part externally, from which there escaped nearly a pint of partly-clotted, partly-fluid blood, of a venous colour. The swelling at once subsided, when I found the vagina capacious, and the head of the fœtus low down. I, without delay, applied the forceps, and speedily succeeded in effecting the delivery of a large living male child, which was shortly followed by the expulsion of the placenta. The patient subsequently lost a considerable amount of blood, partly from the wound in the labium, and partly from inefficient contraction of the uterus. She, however, made a satisfactory recovery.

II.—*Malignant disease of the right ovary, obstructing labour between the seventh and eighth months of uterine gestation —Spontaneous premature labour — Temporary recovery— Death.*

Eliza H., æt. 37, was admitted into St. Bartholomew's Hospital on the 22nd December 1862; married four and a half years; never pregnant; states that she enjoyed 'fair' health up to five months ago, when the catamenia, which had always been normal, ceased; shortly after the abdomen began to enlarge, followed by pains in each iliac fossa, which she attributed to 'wind;' there was also a slight dull aching pain beneath the 'right lower ribs.'

Three months after the cessation of the catamenia, the abdomen

began rapidly to increase in size, accompanied by a sensation of tightness in the hypogastrium.

On examination her breasts were found to be enlarged, but the usual characteristics of pregnancy were very imperfectly marked.

The abdomen was very prominent, especially on the right side; from the pubes to the umbilicus it was somewhat flattened, the navel being slightly retracted. The cavity of the abdomen was occupied by a large irregularly nodular and solid growth, which appeared to commence in the right inguinal and extended into the hypogastric, right hypochondriac, and epigastric regions, dull on percussion and yielding no fluctuation; the stethoscope placed over it detected a distinct bruit synchronous with the systole of the heart.

To the left and somewhat beneath a part of this growth, the uterus, much enlarged, could be traced with its fundus considerably directed to and even extending into the left flank. During manipulation it could be felt contracting under the hand. The stethoscope placed over it revealed a distinct uterine souffle; occasionally the sounds of the fœtal heart could be heard, and, when the child moved freely, a clear friction sound was detected. On placing the patient on her face, the lumbar regions were found to be resonant. The vagina was short but capacious. The pelvis posteriorly and laterally was occupied by a large firm nodular and immovable tumour, which extended to within an inch of the pubes, immediately behind which and as high up as the finger could reach, the cervix uteri, enlarged and soft, was detected; the os uteri could not be made out. As the patient was in feeble health she was placed upon a generous diet, and her secretions were attended to with a view to improve her powers prior to any attempt being made to effect delivery.

On the 14th of January I held a consultation with Mr. Lawrence and other colleagues, when it was ascertained that so limited was the space in the pelvis that it was considered improbable, even at that period of pregnancy, that the fœtus could be expelled or extracted, even by embryotomy, per vias naturales; consequently, I determined to wait, with the hope that as the uterus, which was partly beneath the growth, increased in size, it might raise the tumour out of the pelvis.

Up to March the 11th the patient continued to improve in health, and the growth gradually to ascend higher and higher into the abdomen, while the uterus came more within reach. At this period there was fully two inches between the tumour and the pubes.

Labour now set in spontaneously, and after about eighteen hours of severe pain a small male fœtus, dead, which presented by the feet, was expelled; the placenta speedily followed, and there was no hæmorrhage. She continued to progress satisfactorily until the 23rd of March, twelve days after her confinement, when symptoms of prostration ensued without any obvious cause, and she sank on the 24th at 1.30 P.M. Unfortunately the friends would not permit a post-mortem examination.

III.—*Medullary cancer of the ovary obstructing parturition—Spontaneous premature labour—Cæsarian section—Death.*

Elizabeth H., æt. 39; married twenty years; pregnant ten times, eight terminated at the full period; two miscarriages at the fourth month. All her labours were good with the exception of the last, twelve months ago, which was so much protracted by a 'tumour lodged in the back,' that the child had to be 'drawn from her with considerable violence by instruments.'

After this confinement she was three months before she could sit up, and another month before she could leave the house, owing to severe pains in the right iliac fossa, extending through to the back and down the thigh. She, however, suckled her child between nine and ten weeks, when she became so weak that the doctor made her wean it. About this time she became very feverish, and for nine days could keep no solid food on her stomach. The pains in and about the pelvis and thighs became greatly aggravated, and were only relieved by a free discharge of 'nothing but corruption' from the bowels, after which she slowly but imperfectly recovered.

She never had any discharge from the vagina. Her last catamenia, seven months ago, were profuse, clotted, lasted longer than usual, and were attended with severe pain. She says that shortly after their cessation she became pregnant, assuming so chiefly from the cessation of menstruation, occurrence of morning sickness, and enlargement of the breasts.

She states that during her last two pregnancies she was 'regular' up to the full period, the discharge lasting a day or two off and on, and she rarely went a week without a 'show.'

Shortly after the cessation of the third menstrual period, she observed a decided increase in the size of the abdomen, and in another fortnight fancied she first felt fœtal movements.

Previous to this, her ninth pregnancy, she never noticed any swelling in the abdomen, and beyond the existence of

tenderness and occasional pain in the right iliac region, was not aware that she was the subject of any local disease.

When she was admitted into St. Bartholomew's Hospital under my care, she complained more or less of pain in the abdomen, which she stated was considerably larger than at a similar period during any previous pregnancy, and of feeling weak, otherwise she was in 'fair health.'

On examination, the abdomen was found somewhat irregular, the left side, extending into the flank, being much more distended than the right. There was some flattening from the pubes to the umbilicus, which was on a level with the abdominal parietes; the uterus, pyriform in outline, could be distinctly traced, with its body and fundus inclining to the left side.

The abdomen measured from anterior superior spinous process of ilium to the same on the opposite side, twenty-nine and a half inches.

From ensiform cartilage to the pubes, twenty-three inches.

From the anterior superior spinous process of left side to lower rib on right side, twenty-nine inches.

From anterior superior spinous process of right side to lower rib on left side, twenty-four inches.

Circumference, forty-eight inches.

The whole of the right iliac fossa extending to the median line, was occupied by a firm, round, uniform, and immovable growth, dull on percussion and tender to the touch, above which and into the right flank a clear tympanitic sound was elicited.

The vagina, capacious and lax, was short posteriorly, long anteriorly; all traces of rugæ had disappeared. At its lower portion, the posterior wall was thrown into well-marked transverse folds. The right side of the pelvic cavity was filled by a growth somewhat nodular, of bony hardness, and immovable, in front of which and to its right, the cervix uteri high up could be reached with much difficulty.

The finger, when introduced a short distance into the rectum, came in contact with the lower portion of the growth; it could, however, be passed between it and the sacrum.

The patient was put upon good diet, and tonics were ordered with a view to improve her powers preparatory to the adoption of any steps which might be deemed essential to secure her safe delivery. About ten days after her admission labour spontaneously set in about ten o'clock one morning, and pains continued with little intermission for thirteen hours, when the membranes ruptured. As no portion of the fœtus could be detected, my obstetric assistant, Mr. Reynolds, sent for me. On my arrival, I found her suffering from regular and strong

uterine contractions, and complaining of feeling very weak, and begging to be delivered without delay. She was, accordingly, put under the influence of chloroform, when I introduced my hand into the vagina, which enabled me to reach the os uteri which was high up above the pubes, dilatable, and within which I could detect the fœtal head. I now made several attempts to introduce my hand into the uterus to secure a foot and deliver by turning, but so limited was the space that I was compelled to desist. At this period I sought the aid of Dr. Barnes, who also failed after similar attempts. Abdominal version was now resorted to, and although it was easily accomplished and the feet could be felt within the os uteri, so small was the space for manipulation that it was found utterly impossible to grasp the fœtal limbs by the fingers or instruments, although repeated attempts were made. The case assuming a very serious aspect, I requested the co-operation of Dr. A. Farre, who after a careful examination agreed with us, that nothing but the Cæsarian section could effect the delivery of the fœtus. This operation was performed by Mr. Skey while the patient was under the influence of chloroform, about sixteen hours from the commencement of labour. A male child, apparently between six and seven months of uterine gestation, was extracted, made several feeble attempts at respiration, and expired in a few minutes. Some hours after the operation, the patient sank, apparently from exhaustion.

A post-mortem examination was made by Mr. Skey, when the following particulars, relating to the obstruction during labour and the operation, were especially noted.

The wound in the abdominal wall had not united; the opening into the uterus, which extended from about the centre of the body into the neck of that viscus, was gaping. There was extravasation of blood into the peritoneal cavity.

The whole of the right iliac fossa was filled, to the mesial line of the abdomen, by a growth which extended also into the pelvis, closely attached behind to the sacrum and to the left side of the cavity and brim of the basin; in front and to the left it was adherent to the body and neck of the uterus, from which it had to be removed by careful dissection.

The tumour was considerably larger than two fists, roundish in shape, covered with numerous small elevations, of a bluish-red shiny aspect, and semi-elastic to the touch.

Upon careful examination it proved to be the right ovary in an advanced stage of medullary cancer. On a section of the growth being made, a small amount of a reddish milky fluid escaped, and it exhibited the usual characteristics of the form of disease above mentioned.

IV.—*Tumour of left ovary, complicating parturition—Induction of artificial premature labour—Recovery on three occasions.*

Eliza H., æt. 33; married eight years; has had six children; five at the full period. She states that her first three labours were perfectly natural, and the children born alive, but that her fourth and fifth labours had to be terminated by the perforator, and her sixth by the induction of artificial premature labour, the child being still-born. During her last three labours she had the aid of the late Dr. D. Davis.

She states that about four months after the birth of her third child, she was seized with sharp shooting pains, and tenderness in the left iliac fossa, with considerable constitutional disturbance, followed at first by a small swelling in the left inguinal region, which rapidly increased in size. About two months after she perceived this growth, her catamenia, which had always been normal, ceased, and she imagined from her general symptoms that she was pregnant, which proved to be the case. Artificial premature labour was induced when she was about seven months and a half advanced, and she gave birth to a dead child.

I first saw her on the 1st of March 1842, when she had passed over seven menstrual periods; she had experienced the ordinary symptoms of pregnancy. Her abdomen was enormously distended, so much so, that the skin had cracked in several places. It was extremely prominent on both sides and flattened in the mesial line, in which a slight linear depression, with its concavity directed to the right side, was evident, extending from the ensiform cartilage nearly to the pubes.

On the left side, the swelling was irregularly nodular, on the right, uniformly rounded. The abdomen, anteriorly, was dull on percussion, distinctly resonant in the right, obscurely so in the left flank; no fluctuation could be detected, nor could the sounds of the fœtal heart be heard; a slight beat was audible over the lateral halves of the abdomen. The vagina was capacious, but short, its posterior wall being somewhat prolapsed and thrown into deep folds; the anterior wall was apparently stretched, and at its upper extremity the os uteri, swollen and soft, could with difficulty be reached.

Occupying the sacral cavity was a large firm tumour, irregular to the touch, and immovable, through which little or no impulse could be conveyed to the finger by pressure upon the abdomen. The finger, introduced into the rectum, could be passed between the growth and the walls of the pelvis. Although the fœtus could not be detected either by the stethoscope

or ballottement, it was agreed, in consultation, that she was about seven months and a week pregnant, and that the case was complicated by an ovarian growth, probably of a somewhat solid character, and more or less bound down to the surrounding parts. As she was suffering severely from distension, considerable dyspnœa, want of sleep, owing to her being compelled to sit up, and œdema of the lower extremities, we were unanimously of opinion that something must be done, without delay, for our patient's relief.

Accordingly, artificial premature labour being agreed upon, infusion of ergot of rye was given every two hours, a bandage was firmly applied round the abdomen, and a stimulating enema was administered, which was followed, in about three hours, by labour pains, and in about thirty-two hours by dilatation of the os uteri, to the size of a crown piece, and protrusion of the membranes, which were artificially ruptured, giving exit to a copious flow of liquor amnii. The breech of the child was then found presenting. In about thirty-five hours from the commencement of labour pains, a living female child, about five pounds in weight, was born, followed by such profuse hæmorrhage as to endanger the patient's life. It was, however, arrested by the ordinary means. She made a good recovery.

I was again requested to visit this patient on the 19th of October 1844, when I learnt that she was about five months and three weeks advanced in her eighth pregnancy. She was suffering from general pyrexia, with severe vomiting and dyspnœa. Her abdomen was greatly distended, and so tender that she could scarcely bear to be touched. Under treatment the fever, vomiting, and tenderness of the abdomen subsided.

On the 29th of October, when at about the seven and a half months uterine gestation, artificial premature labour was again induced by the means above alluded to.

The presentation was natural, labour thirteen hours, and the child, a male, was born alive. She again suffered from profuse hæmorrhage, from the effects of which she slowly recovered. I discontinued my attendance towards the end of December. On examining the abdomen shortly after the birth of the child, the integument showed traces of its having been much stretched, and was very lax. A large nodular and immovable tumour could be distinctly traced, commencing in the left iliac and inguinal regions and extending upwards into the hypogastrium, about two inches to the right of the median line, partly into the epigastrium, and into the left hypochondrium. The tumour was dull on percussion, and yielded no trace of fluctuation.

V.—*Dropsy of the right ovary, complicating pregnancy—Spontaneous premature labour between the seventh and eighth months of uterine gestation—Turning—Recovery.*

During the year 1857 I was requested by Mr. Pritchett to visit M. C., æt. 27, who had been married twelve months. The catamenia had been suppressed (the first time since their commencement at 16 years of age), for seven months, followed by morning sickness, increase in the size of the breasts, moisture from, and development of, the nipple; blue veins very evident on the surface; worm-like feel of the gland; well-marked areola, with enlargement of the follicles.

The abdomen had greatly increased during the last four months. She imagined, but could not be certain, that she had felt something like the movements of a child for the last six weeks.

About ten days previous to my visit she had been seen by an accoucheur, who expressed a decided opinion that she was not pregnant, but was suffering from multilocular ovarian disease with retroversion of the uterus.

At the period of my first visit, on the 31st of October, she was suffering from a hot and dry skin, great thirst, brown and dry tongue, pulse one hundred and forty, very compressible, incessant vomiting, the urine scanty and high coloured, bowels relaxed, with severe tenesmus. She had also occasional recurring pain in the left side of the abdomen, extending through to the loins and back.

The abdomen, which was greatly distended, appeared divided by a sulcus in the mesial line into two lateral halves, the right side being more prominent than the left. Between these two halves the integuments were flattened, which was due to their extension over the abdominal growths. The umbilicus was much retracted.

The abdomen was dull over the whole of its anterior and lateral aspects, very resonant in the left, and dull in the right flank.

On placing the hand upon the abdomen, which was very tender, two growths could be distinctly traced; that on the right side, being the larger, was round, semi-elastic and fluctuating, whereas that on the left was more pyriform, much firmer, and non-fluctuating, hardening under the hand with each recurrence of pain. The stethoscope applied over the growth clearly detected a souffle and the sounds of the fœtal heart.

The vagina was small and moist, the rugæ well marked, the cervix uteri short and ill-developed, the os, undilated and very

high up behind the pubes, could be with difficulty reached. The cavity of the sacrum was filled up by a large, slightly irregular, firm, and apparently immovable swelling, tender on pressure, in which no fluctuation could be detected. As she had had little or no sleep for many hours and was extremely restless, three grains of opium were administered, which she stated gave her occasional 'snatches' of refreshing sleep. The vomiting ceased, pains became less frequent, but stronger.

I again visited her at 4 P.M., when I found the os uteri, through which the membranes protruded, more within reach, and dilated to the extent of a crown piece. The tumour in the sacral cavity was also forced more into the pelvis by the uterine throes.

Although the presentation of the child could not be made out, still it was deemed advisable to rupture the membranes, in order to lessen the abdominal distension, to allow of more efficient contraction of the uterus.

At 10 P.M. I was hurriedly sent for by Mr. Pritchett, who stated in his note that 'the right hand and part of the arm of the fœtus were protruding from the os externum.' On my arrival, the pains being then very frequent and powerful, the patient was at once placed under the influence of chloroform, and I proceeded to introduce my hand into the vagina, push up the tumour, and turn the child, which was accomplished with considerable difficulty. I succeeded, however, in about twenty minutes in removing a premature male child, still-born. The placenta was soon extracted, and no hæmorrhage followed. The patient speedily recovered from the effects of the chloroform. On placing the hand on the abdomen, the uterus, directed towards the left iliac fossa, could be felt firmly contracted, and on the right side of the abdomen, the large, firm, fluctuating tumour could be clearly defined. It may be remarked that, previous to her marriage, she had suffered on several occasions from retention of urine, requiring the use of the catheter; but she was not aware of the existence of any abdominal tumour after the bladder had been emptied. She progressed very satisfactorily for six weeks after her confinement, when I was informed by Mr. Pritchett that she was attacked with acute bronchitis which terminated her existence.

VI. — *A tumour, probably fibrous, of the uterus, complicating pregnancy — Natural delivery at the full period — Recovery.*

On the 8th of February 1862, S. F. presented herself among the out-patients of St. Bartholomew's Hospital for advice. She stated that she was 34 years of age; had been married sixteen years; had five children at term, good labours and 'gettings up;' had miscarried three times before the third month.

About the end of last October her catamenia ceased, and were followed by the ordinary symptoms of pregnancy.

Early in February she had, however, reached such a size, and her abdomen was enlarging so rapidly that she became alarmed.

About four years ago she accidentally noticed a small lump, the size of a walnut, nearly central, but extending into the right iliac region, which had gradually increased up to the present period. For the first time, about three or four days ago, she began to experience pain of a sharp character in the swelling. Since she first noticed the tumour she has been once pregnant, about two years and a half ago, ending with a miscarriage at about the sixth week. On examining the abdomen, a hard, round, and uniform swelling, about the size of a cricket ball, was found occupying the hypogastrium and nearly the whole of the right iliac region, slightly movable, dull on percussion, and in which a distinct bruit, synchronous with the first sound of the heart, could be heard. To the left of this tumour, and situated in the right iliac fossa, was a softer and less definable swelling, less globular in shape, over which a distinct murmur was detected. Vagina lax and short.

To the right of, and extending partly into the cavity of the pelvis, was a hard, round, and slightly movable tumour, to the left of which was the cervix uteri, which appeared to be thrust to the left of the pelvis. Impulse was readily communicated from the uterus to the tumour, and vice versâ, and any movement of one clearly affected the other. As it was probable that some difficulty might arise during labour, she was placed under the charge of my assistant, Mr. Milsome, who carefully watched her from time to time throughout her pregnancy.

When labour set in, about the end of July, the tumour had entirely risen out of the pelvis, and occupied the right hypochondrium. Her labour was normal, about eight hours' duration, but more painful than on previous occasions; beyond which there were no noteworthy facts. The child, a female, was born alive. For six weeks after her confinement she con-

tinued to lose blood, occasionally in large quantities, but the hæmorrhage was checked by the ordinary remedies.

On the 27th of September, when I last saw her, the tumour, but little increased in dimensions, was found in its old situation in the right iliac region.

The uterus was large, its texture soft, and was located in the left of the pelvis. The patient was in good health.

VII.—*Fibrous tumours of the uterus obstructing parturition—Induction of artificial premature labour—Expulsion of twins—Recovery.*

A. K. was admitted into St. Bartholomew's Hospital on the 23rd of January 1862. She was 33 years of age; married three years; never pregnant.

She stated that about eleven months ago her catamenia, which had, since the age of 18 years, been regular, scanty, and lasting five days, became frequent, profuse, and continuing upwards of a week, until five months ago, when they wholly ceased; this cessation was followed, in about a month, by a sensation of faintness, sickness after taking food, with darting pains in the abdomen and loins, accompanied by a feeling of bearing down, increased by exertion, micturition, and defæcation.

Occasionally she experienced a 'crampy' pain in the right iliac region; subsequently, her breasts and abdomen began to enlarge.

On examination, the breasts manifested the usual indications of pregnancy.

The abdomen was considerably enlarged, being rather more prominent on the left side; this swelling was occasioned by the uterus, the outline of which could be easily traced.

At the upper part of the fundus uteri a firm, globular, and movable tumour, about the size of the fist, was detected, occupying the right hypochondrium, and apparently connected with the uterus, over which a bruit could be heard.

There was a distinct murmur over the uterus, and the fœtal heart could be occasionally detected.

The vagina was small and elongated, its rugæ ill developed; the cervix uteri, enlarged, cushiony, and flattened from before backwards, was situated high up behind the pubes, where the os uteri could with difficulty be reached.

The cavity of the pelvis was occupied by a large, hard, somewhat irregular, slightly movable growth, not tender on pressure. The finger, introduced into the rectum, passed between the walls of the pelvis and the tumour.

On the 24th of January she was seen by a colleague, who, after a careful examination, agreed with me in opinion that the abdominal growth was a fibrous tumour, springing from the upper and outer wall of the uterus, and that the pelvic swelling was a considerable fibroid deposit in the posterior wall of that viscus.

As the pelvic cavity was so diminished as scarcely to admit of two fingers lying edgeways between the pubes and tumour, and as there could be no doubt about the existence of advancing pregnancy, and the probable daily increase in the size of the fœtus, it was at once deemed advisable to lose no time in inducing labour; accordingly, a sound, much bent, was, with difficulty, introduced into the uterus and the membranes ruptured; a gush of liquor amnii followed, which continued to drain away up to the 27th, when she was seized with slight pains. The discharge from the vagina now became more or less tenacious, and of a darkish brown colour, occasionally streaked with blood.

On the 29th, after experiencing, during the whole of the night, severe 'crampy' pains in the limbs and abdominal regions of a paroxysmal character, she was delivered about midday of twins, which were dead and very small. The first presented with the head, the second with the breech, both males. As the placentæ were detained for upwards of an hour and blood began to trickle freely from the vagina, I introduced my hand into the uterus and detached them without much difficulty. I was then able to confirm our previous opinion, that the pelvic tumour was situated in the posterior wall of the uterus.

The patient continued to progress favourably up to February 12th, when she was again carefully examined. The abdomen was much reduced in size, the parietes being very lax. The uterus was detected immediately above the pubes, extending upwards about three inches towards the umbilicus and slightly into the iliac fossa, it appeared to be fixed.

The vagina was lax, capacious, and slightly elongated. The cervix uteri was lying close to and behind the pubes. The os was patulous, and could be more easily reached than formerly.

The pelvis was still occupied by a large, firm tumour, apparently springing from the upper part of the cervix, at its junction with the body of the uterus, and involving largely the upper and posterior cavity of the pelvis.

The tumour attached to the upper part of the uterus descended with that viscus immediately upon the expulsion of the fœtus, and was now found occupying the right iliac region.

March 6th.—The patient is perfectly well in her general health. The abdominal and pelvic enlargements remain the same in size and situation, the uterus is somewhat enlarged, three and a half inches in its long axis, is nearly in its normal position, and can be freely influenced by pressure upon either of the growths.

VIII.—*Polypoid growth obstructing labour—Natural delivery, followed by severe hæmorrhage—Recovery.*

B. M., æt. 32; married seventeen years; has had twelve children at term, and ten miscarriages at various periods. Her labours, with the exception of one 'cross birth,' were natural, and her recoveries good. Fifteen months ago she began to suffer from considerable irregularities in the menstrual secretion, which would sometimes recur in a fortnight, frequently in about three weeks, and occasionally in a week, the discharge being sometimes scanty, at others very profuse, increased on any local irritation and even after moderate exercise. These discharges were usually attended with pains like the grinding pains of labour. When not suffering from a sanious discharge, she was much troubled with 'whites.' She also complained of pains about the sacrum, loins, and groins, and of some difficulty and irritation in micturition.

On examination, the vagina was found moist and lax, and there was some prolapse of its anterior wall, much increased when the patient strained. The uterus was enlarged, movable, and low, the os patulous, the cervix short and granular to the feel. The posterior lip was very indurated, and slightly tender on pressure.

The introduction of the speculum occasioned such pain that I was induced, especially as she complained of more or less discomfort in micturition, to make an ocular inspection, when a very red vascular excrescence, about the size of a pea, growing from a broad base at the lower margin of the meatus, was detected, together with a vascular state of the surrounding parts, and a varicose condition of the labia. Some nitrate of silver was applied to the granular neck of the uterus and within the os, but she declined any interference with the growth at the meatus.

The nitrate was applied three times, with marked benefit to her periodical discharges of blood.

I now lost sight of my patient for several months, during which she was staying at Brighton. When she returned to town she was about four months advanced in her twenty-third pregnancy. Since under my care she had enjoyed fair health,

but even up to the present time she had occasional discharges of blood, which she feared would end in a miscarriage. On the 18th of last October she was taken in labour, having reached the full period of uterine gestation, about 1.30 A.M., at which time she had slight pains but a very copious flow of blood, which alarmed her, and which had ceased on my arrival.

On making an examination I found the vagina moist and very lax, the uterus low down, the cervix short and very soft, except the posterior lip, which was extremely indurated. The head of the fœtus could be detected anteriorly through the lower segment of the uterus. About 2.30 the pains became very frequent and powerful, and continued up to 5.15 without producing any decided effects upon the os uteri, although the head was firmly pressed by each uterine contraction against the inner os uteri. She was now placed under the influence of chloroform, and lard was freely introduced into the vagina. At 6.30 the os uteri was dilated to about the size of a crown piece and through it I passed my fingers, with the view of ascertaining the extent of induration above alluded to, and which I regarded as the cause of the obstruction, when I was astonished to find a growth about the size of a small orange, somewhat flattened from before backwards, attached to the posterior lip by a broad pedicle. With each recurring pain this polypoid growth was firmly pressed upon by the head. At 8 A.M. the os uteri was fully dilated, and I had succeeded in keeping up the tumour by my fingers so as to allow the head to pass. I now ruptured the membranes; the head descended; and at 8.35 a living female child, above the average dimensions, was born. The placenta was speedily expelled, followed by such severe hæmorrhage that I feared to leave the house for some hours.

The patient has up to the present time (November 6th) gone on well, with the exception that the lochia have been very free, and that she has a great tendency to hæmorrhage on the slightest exertion.

IX.—*Enormous hypertrophy of the cervix uteri obstructing labour at full period, supported by air pessary—Successful delivery.*

F. G., æt. 34; married seven years; five children, the last fourteen months ago. Lingering labours, but good recoveries, with the exception of the last, which was extremely tedious, and was followed at the end of the month by 'falling of the womb,' which has continued gradually to increase up to the present time.

She is very fat and somewhat plethoric, has always enjoyed good health, but complains of constipation, with a sensation of great weight about the anus, and a dragging from the loins, which is sometimes so severe as to make her 'heart sick.' She has had frequent attacks of 'bleeding piles.' She also suffers much from leucorrhœa, which after exertion or fatigue becomes very profuse and occasions a feeling of great debility.

Her last menstruation occurred five months ago, and from the symptoms she has since experienced, there can be little or no doubt that she is pregnant.

She complains that during the last two months the womb never returns as formerly to its normal position when she is in the recumbent posture; that the parts swell, especially towards evening, when she suffers from a painful dragging sensation of a sickening character, more or less difficulty in micturition, profuse yellow discharges, and intolerable itching: moreover, during the last two months she has been unable to perform her marital duties. On examination, the uterus can be detected about midway between the pubes and umbilicus; the veins of the thighs, legs, and labia are remarkably varicose.

The cervix uteri, enormously large, spongy, and of a bluish-red and granular, is protruding to the extent of an inch through the vaginal orifice, which is considerably distended, the os patulous. The vagina is somewhat short, especially its posterior wall, which is slightly prolapsed and covered with rugæ; its mucous membrane is smooth and feels polished, all traces of rugæ having disappeared except at the portion indicated. The uterus is enlarged, soft, and elastic; its posterior wall can be easily reached, not so its anterior.

Rest in the recumbent posture, saline aperients, antacids, with occasional mercurials, sedative, and subsequently astringent applications to the parts, and frequent injections of cold water, greatly relieved her condition and enabled her to get about; not, however, without a perineal pad, from which she experienced considerable comfort and support.

She went on to the full period, and was taken in labour on the afternoon of the 16th of April. For the first two or three hours she progressed satisfactorily, and there was but little effect produced upon the parts; at the end of that time, however, and when the pains became more severe, the cervix uteri and labia became much distended, and the former began to protrude, and looked so turgid that I feared it would burst; the os uteri showed little or no disposition to dilate.

Finding that the local affection was hourly increasing, and that there was little prospect of dilatation being effected, I

procured an ointment of one drachm of extract of belladonna to half an ounce of lard, which I introduced into the vagina, and freely smeared over the surrounding ports. At the same time I pressed the cervix uteri into the vagina in the absence of a pain, and retained it in situ by an air pessary passed into the vagina, upon which a pad was placed and secured by a bandage tightly drawn between the thighs; further, I kept her in the recumbent posture with her hips slightly elevated. The pains, regular and of average power, continued for about four hours, when my patient complained there was great pressure on the plug, and that it was being forced out; consequently, I loosened the bandage and withdrew the plug, when, to my great delight, I found the os uteri well dilated, and the membranes protruding with each pain. As there was still a tendency in the anterior lip to protrude between the head of the child and the pubes, I kept the part well supported with two fingers during each pain, and in the course of about an hour and a half the membranes ruptured and the head escaped through the os, and emerged under the arch of the pubes. Finally, a small male child, alive, was expelled about fourteen hours from the commencement of labour; the placenta speedily followed, and there was no undue loss of blood. She made an excellent recovery.

X. — *Large epitheliomatous growth in the rectum obstructing parturition — Turning — Recovery from the effects of the labour.*

During the year 1854, my opinion was sought by the late Mr. Angus, in the following very interesting case.

E. R., æt. 39, mother of several children, stated that for many months she had suffered from what was supposed to be 'bleeding piles,' with occasional 'offensive mattery discharges' from the bowels. She also complained of a dull aching pain about the pelvis and over the sacrum, extending down the back of the thighs, especially the left, with frequent pains of a 'jobbing character.' She added that so great was her agony during defæcation that she 'dreaded any action of the bowels.'

Nine months ago she became pregnant, since which all her sufferings had been greatly aggravated.

When I first saw the patient she had been upwards of thirty hours in labour, notwithstanding that her pains had been frequent and severe.

On examination, the vagina was found normal, the os uteri high up behind the pubes, and apparently very dilatable; the

membranes had been ruptured for some hours when the head was ascertained to be presenting.

The cavity of the sacrum towards the left of the pelvis was occupied by a large, nodular, and elongated growth, extending from below upwards in the situation of the rectum, which appeared to arrest the progress of the head. On passing the finger into the anus it came in contact, when about two inches up the bowel, with a large granular mass, in parts feeling like condylomata, which easily broke down under the finger on the slightest pressure. On withdrawing the finger it was covered with bloody putrilage, possessing a decidedly carcinomatous odour.

As the patient was very anxious and much exhausted, it was agreed that I should at once make a moderate attempt to effect delivery of the fœtus, by turning, in which I was happily successful. The child, a female below the average size, was born alive; the placenta soon followed, and for a week afterwards the patient was doing well. Some months subsequently, I learnt that she had quite recovered from the effects of her labour, but that she was fast losing strength through the advance of her epitheliomatous affection.

XI. —*Cerebriform disease of the left kidney (twenty-seven pounds three ounces in weight) complicating pregnancy and labour at the full period—Death.*

E. H., æt. 24; married three years; has had two living children at the full period; good labours and recoveries.

She is very thin and anæmic, but states that she has always enjoyed excellent health. About four years and a half ago she first perceived a swelling in the left side of the abdomen, which increased very slowly up to the birth of her second child, about two years ago, since which time its growth has been far more rapid.

The only inconvenience she suffers from the enlargement is a sense of 'tightness,' with a 'crampy feeling' in the hypogastrium, and occasional cramps in the left leg. Of late she has been troubled with rather profuse leucorrhœa. Her urine, which she says has been somewhat scanty, is perfectly healthy, S.G. 1025, slightly acid, no deposit of any kind, no albumen. Her catamenia ceased seven months ago, and were followed by the ordinary symptoms of pregnancy. She does not think she is larger than usual at the same period.

On examination, the abdomen appears to be divided into two lateral halves with a sulcus between them. The left, which is

very prominent, is occupied by a firm, round, and uniform growth, extending into the iliac, hypogastric, umbilical, epigastric, and hypochondriac regions. The right side also contains a swelling, firm, regular, and somewhat pyriform in shape, with its base upwards, and occupying a more limited space. The stethoscope applied over the one detects the first sound of the heart with an indistinct bruit, whereas over the latter the uterine souffle, with the occasional pulsations of the fœtal heart, are audible.

The vagina, lax and moist, is short, its walls being thrown into folds. The uterus is low, the cervix short, developed, and very spongy, the os uteri patulous; ballottement most distinct through the anterior wall of the uterus. No part of the tumour can be detected from the vagina.

This patient went to the full period and was delivered naturally of a living female child beneath the average size; her recovery was favourable.

Within eighteen months she again became pregnant, reached the full term of uterine gestation, was again safely confined of a female child, of less size than the former one.

After this accouchement she did not recover her strength as usual, and as her abdomen had greatly enlarged of late and occasioned her much inconvenience by its weight and dragging sensation, the opinions of three physicians and one surgeon eminent in the diagnosis of abdominal tumours were sought, who one and all agreed that the enlargement was a very firm unilocular ovarian tumour. The expediency of its removal was about being entertained when she again became pregnant. She suffered much from this period up to the full term of uterine gestation, when she was easily and safely delivered, after a labour of between five and six hours' duration, of a puny male child, which survived its birth but a few hours; head presentation.

From this time she daily lost strength, and without any obvious cause suddenly sank at the end of the third week from her delivery.

Post-mortem examination twenty-six hours after death. On opening the abdomen, a large, round, bluish-red tumour, the surface of which was freely supplied with large vessels, came into view. It occupied the whole abdomen, especially the left side, and appeared to rest upon the brim of the pelvis; it was pulpy to the feel. At first it was supposed by those present to be an ovary, but a more attentive examination after its removal from the body proved it to be the left kidney, in a very advanced stage of cerebriform disease; its weight was twenty-

seven pounds three ounces. The uterus was large, flaccid, but healthy; the ovaries were of normal size and structure; all the other viscera were natural, with the exception of the right kidney, which was about double its ordinary size. Its texture, however, was normal.

XII. — *Extra-uterine fœtation (right fimbrial) with uterine gestation simultaneously progressing to the full period— Descent of the former into the pelvis, obstructing the passage of the intra-uterine fœtus— Turning—Death.*

On the 9th of December 1862, I was requested by Dr. Cooke to visit C. D., æt. 39; married seven years; had three children; natural labours, and good recoveries. She had now reached the full term of her fourth pregnancy.

When about five months advanced she remarked that she was unusually large for that period; but with that exception and considerable difficulty in locomotion, she considered her pregnancy 'about as usual.' During the afternoon of the 8th of December she was seized with labour pains, but as they were very irregular and not effective, an opiate was adminstered by Dr. Cooke, with marked benefit. Labour fairly set in on the following day at 6 P.M. with severe and irregular pains, which continued up to about eight o'clock in the evening, when my opinion was requested.

At that time her powers were tolerably good; her skin was warm and moist; and there was a total absence of any unfavourable constitutional symptoms. Her pains were not frequent or severe, and I was informed they were somewhat declining: the liquor amnii had drained away.

On examination, the abdomen was enormously distended by a large, round, prominent swelling, over which the integuments were tightly stretched, causing a flattening on either side. The abdomen was dull on percussion anteriorly and in the right, resonant in the left flank.

Dr. Cooke informed me that a distinct uterine souffle had been heard, on the day previous to my visit, over so large a surface as to suggest the idea that it might be a twin pregnancy. A careful examination clearly determined the prominent swelling to be the uterus, considerably anteverted by some tumour to the right of and posterior to that viscus, which, with each pain, was found to contract under the hand.

The vagina, which was lax, cool, and moist, was considerably elongated, especially its anterior wall, from below upwards; it was also much flattened from before backwards, and its course

was close to and behind the pubes. At its upper extremity, a firm body, feeling like a portion of the fœtal head, could be reached with great difficulty; but the outline of the os uteri could not be traced.

The cavity of the pelvis was nearly filled by a large, firm, and apparently fixed growth, which encroached so much on the brim that two fingers could scarcely be placed between it and the pubes. It was decided, after a consultation, that the patient should be at once placed under the influence of chloroform, when a more thorough examination could be made; and it was also further agreed, if the tumour could be raised from the pelvis by a reasonable amount of force, that I should then introduce my hand into the uterus and turn the child. Within half an hour of the passage of my hand into the vagina, I succeeded, with the assistance of Dr. Cooke, in delivering the patient of a child, still-born; the placenta rapidly followed; the uterus contracted, and there was no hæmorrhage of any moment. A very cursory examination of the abdomen after delivery detected a large, somewhat irregular, and solid tumour, situated across the brim of the pelvis, lying chiefly to the left of the abdomen and extending above the umbilicus, anterior to which, and immediately above the pubes, the uterus could be felt, firmly contracted and flattened from before backwards. We were of opinon that the growth was an unilocular ovarian tumour, but it was deemed advisable to defer any more minute examination until the patient had recovered from her exhausted state. On the following day (December 10) she complained of rather severe after-pains and of being very weak: ordered strong beef-tea, brandy and eggs. On the 11th her pains were remittent in character, never wholly ceasing; the pulse, one hundred and thirty, was extremely feeble; her countenance anxious; there was considerable dyspnœa. During the day she gradually lost power, and sank forty-five hours after delivery. Post-mortem examination twenty-one hours after death. On opening the abdomen some greenish fluid escaped from the cavity of the peritoneum, in which a fœtus lay in its unbroken involucra across the brim of the pelvis. On opening the amniotic sac a considerable amount of dusky fluid escaped, revealing a fœtus of full growth and in a perfect state; the funis, of the usual length, was traced into a very expanded and thin placenta, which was firmly attached to the fimbriæ, greatly developed, of the right Fallopian tube; the corresponding structures on the left side were perfectly normal.

XIII.—*Extra-uterine fœtation (twin) obstructing labour—Delivery by forceps—Recovery—Subsequent discharge of fœtal bones.*

During the year 1843 I was requested to attend H. S., æt. 36; married fifteen years; had four children at full period, and two miscarriages between the second and third months of uterine gestation. Her labours and recoveries were good, excepting the last, three years ago, when she was delivered by the forceps, owing to a tumour 'blocking up the passage.'

She stated that between eight and nine years ago, when in the enjoyment of perfect health, her catamenia ceased, followed by morning sickness, increase in the size of the breasts, and, at about the fourth month, of the abdomen, and in short by all the ordinary symptoms of pregnancy. She advanced nearly to the eighth month without one unfavourable symptom, when she was suddenly seized with faintness and great prostration, which was followed by 'inflammation of the bowels,' and in about three days by swelling of the breasts and secretion of milk.

She was leeched, poulticed, and salivated, and after some weeks gradually 'got about again' and recovered her wonted health.

Occasionally, however, she had pains of a sharp character in the left 'groin,' extending into the left side of the abdominal cavity, where, she stated, a soft, irregular, immovable, and tender swelling could be felt, which had latterly become smaller and firmer. About nine months ago she became pregnant for the seventh time, went to the full period, and was in due time taken in labour.

Previous to my visit she had had almost constant pain of an acute character for about two hours, with occasional exacerbations. She had vomited violently, and complained of considerable tenderness in and about the left inguinal region, in which part she had had frequent 'spasms' during her pregnancy. She had passed water freely, and the bowels had been recently relieved; her skin and pulse were normal.

The abdomen was much distended, and the uterus could be distinctly traced diverging considerably to the right side. In the left iliac fossa a firm, irregular swelling could be detected, very tender to the touch.

The vagina was lax and moist, the cervix uteri short; the os, high up and patulous, was to the right of the pelvis. To the left, and beneath the brim of the pelvis, was a hard, irregular, immovable growth.

Her pains were frequent and severe, and she complained that the pain in the left groin was occasionally agonizing. In about four hours from the commencement of labour, the os uteri was fairly dilated and very soft, and the head could be detected within the unbroken membranes, which remained slightly tense in the absence of a pain. The head not descending, I ruptured the membranes, giving exit to a free discharge of liquor amnii.

As the pains were frequent and vigorous and the head made but little progress, I sought the advice of the late Mr. Lonsdale, who agreed with me that the tumour was the cause of the obstruction.

As there were no urgent symptoms, we resolved to wait, hoping that the pains, which were very expulsive, might effect the descent of the presenting part.

In about three hours, the upper part of the head having passed through the brim, it was deemed expedient to terminate the labour, if possible, by the forceps, which I applied with some difficulty.

In extracting, the head was directed towards the right side of the pelvis, so as to avoid any injury to the tumour. In about three quarters of an hour I effected the delivery of a male child of average size, which was speedily followed by the placenta; there was no hæmorrhage.

After the labour, she continued to complain much of the pain in the left groin, where there was a decided swelling about the size of the fist, hard, irregular, and very tender to the touch. Her skin became hot and dry, she suffered much from thirst, and had occasional chills. Pulse one hundred and ten, and wiry. Salines, leeches, poultices, and opiates were prescribed, and on the twenty-fourth day after her delivery, there was marked redness of the integuments, together with a prominence about the inguinal ring, and slight fluctuation. The swelling was opened with a lancet, when about six ounces of very offensive sero-purulent fluid escaped. On examining the part on the following day, a hard structure was detected blocking up the opening, which, when extracted, proved to be the femur of a fœtus, apparently at about the eighth month of gestation.

In succession, and over a period of about five weeks, nearly the whole of the bones of two fœtuses were discharged, when the wound healed, and the patient became convalescent. On examining the vagina at this time the only trace which could be detected of the original swelling was some thickening in, and somewhat anterior to, the left broad ligament. The uterus was fixed, its body enlarged, its cervix short.

XIV.—*Extra-uterine pregnancy complicated by fibrous tumours of the uterus—Rupture of the fœtal cyst at five and a half months—Death from internal hæmorrhage.*

I was requested by the late Dr. Wildbore to visit M. P., æt. 41 years; married seven years, and had three children at term; good labours and fair recoveries; the last labour between two and three years ago. About a year and a half ago she began to suffer from menorrhagia, and subsequently metrorrhagia, which continued up to four and a half months ago, when the catamenia wholly ceased, the ordinary symptoms of pregnancy following. As she experienced considerable pain of a 'colicky' character, and was, to use her own expression, 'all on one side,' my opinion was sought. On examination, I could easily detect, in the left iliac region, beneath the thin abdominal parietes, a round, elastic, and tender swelling, which she was confident had been in existence from six weeks to two months, in which I thought I could feel obscure fluctuation. It was dull on percussion, and no sounds could be detected by the stethoscope. To the right of this swelling, and immediately above the pubes, was another tumour, firmer, non-fluctuating, and but slightly tender, which yielded a distinct bruit synchronous with the mother's pulse.

The vagina was much elongated anteriorly, the posterior wall to the left bulging considerably, owing to a firm nodular growth which could be distinctly defined. The cervix uteri was high up to the left, and immediately behind the pubes.

We had no hesitation in determining the case to be one of uterine gestation, complicated with fibrous tumours of the uterus. A month after this interview Dr. Wildbore was hurriedly sent for to the patient. On arriving at the house, he learnt that, about an hour before, she had been seized with severe pain in the left iliac fossa, followed by faintness, tremors, and cold, clammy, perspiration, and that she had partially rallied under the administration of repeated doses of brandy. He found her deathly pallid, pulseless, and gasping; shortly afterwards she expired. A post-mortem examination was made twenty-six hours after death, when the true nature of the case was revealed.

On opening the abdomen a large quantity (about two quarts) of fluid and coagulated blood was found in its cavity and in the pelvis, which, when removed, brought to view the ruptured cyst of an extra-uterine fœtation, situated between the ovary and tube of the left side. The fundus and body of the uterus,

chiefly on the same side, were occupied by one large and several small fibrous tumours.

XV.—*Extra-uterine pregnancy complicating normal uterine gestation—Miscarriage at third month—Recovery.*

About a year and a half ago C. R., æt. 28, came under my care at St. Bartholomew's Hospital. She had been married about twenty-two months. Two months after her marriage she ceased for the first time to menstruate, the cessation being followed by morning sickness, enlargement of the breasts, and fulness in the lower and left side of the abdomen, where she, from time to time, experienced very severe pains. When about seven months, as she supposed, advanced in pregnancy, she sought the advice of a medical man for the pains in the abdomen. He examined her breasts very carefully, and pronounced her to be pregnant, but owing to the small size of the abdomen, which had not increased since the end of the fifth month, predicted she would have a very small child. Having completed the ninth month, paroxysmal pains came on, followed by a sanguineous discharge; the pains soon ceased, but no child followed; subsequently, milk was secreted, which also speedily ceased, the breasts becoming flaccid. The abdomen, however, remained large in the left inguinal region. Being puzzled about her state she sought the opinion of an accoucheur, who is reported to have said that 'her's was a curious case.' When she came under my care every trace of advancing pregnancy had disappeared. There was, however, an ill-defined and somewhat tender swelling in the left iliac fossa about the size of an ordinary orange, dully tympanitic on percussion. Per vaginam, the uterus was found to be situated to the right of the pelvis, to the left of which was a round, somewhat firm, tender, and slightly movable swelling. The sound passed three and a half inches into the uterus, which was nearly fixed; any attempt to move it from left to right occasioned much pain. She complained of bearing down and occasional spasms in the swelling, of an irritable condition of the bladder, and of a forcing sensation during defæcation. I and others who saw her had little or no doubt but that it was a case of extra-uterine fœtation arrested at the fifth month of gestation. Under general and local treatment her health improved and her pains became less and less, and her menstruation, which had been suppressed several months, again returned; shortly after which she became pregnant. All her former pains were renewed and continued with increased severity, until she had reached the third month

of uterine gestation, when a blighted ovum was expelled from the uterus about eight hours after the commencement of pains. At this time I saw her in consultation with Dr. Dunderdale, under whose care she had placed herself.

It will be seen by the accompanying Table, page 94, that out of fifteen cases of affections complicating pregnancy and obstructing labour, the nature of the cases and the results were as follows:—

One case of thrombus of the labium and vagina.

Four cases of tumours of the ovaries.

Four cases of tumours of the uterus.

One case of tumour of the rectum.

One case of tumour of the kidney.

Four cases of extra-uterine fœtation.

Eight of the patients reached the full period of uterine gestation, in the remaining seven pregnancy terminated at some period between three and seven and a half months of gestation.

In four cases labour set in spontaneously.

In two cases labour was induced artificially.

Four patients were delivered by the natural efforts at the full period, one at the third month.

In fourteen cases the labours lasted for periods varying from five to thirty hours.

Of the fourteen children, eleven presented with the head, one by the feet, one by the arm, and another by the breech.

Twelve were males, four females.

Turning was had recourse to in four cases, but was completed only in three, the fourth being subsequently terminated by the Cæsarian operation.

Two were delivered by the forceps.

Five of the mothers and eight of the children were lost; of the former three died from exhaustion and two from hæmorrhage.

Having recorded somewhat in detail and tabulated the results of fifteen cases of pelvic and abdominal tumours which form the basis of my observations, I trust I shall be pardoned for calling to the recollection of my readers the ordinary changes affected in the abdomen during the progress of normal uterine gestation.

No. of Case	Age of Patient	How long Married (Years)	No. of Labours at Term	No. of Miscarriages	Nature of Complication	Duration of Disease	Period of Pregnancy	Natural Labour	Spontaneous Premature Labour	Artificial Premature Labour	Duration of Labour (Hours)	Presentation of Child	Sexes of Children	Turning	Forceps	Cæsarian Section	Hæmorrhage or other Complications	Result to Mothers	Result to Children
1	39	21	13	2	Thrombus of left labium	1 hour	Term	...	...	...	8	Head	M	...	F	...	Post-part. Hæmorrhage	L	L
2	37	4½	...	...	Malignant disease of right ovary	5 months	7 & 8m.	...	S	...	18–20	Feet	M	...	...	...	Exhaustion	...	D
3	39	20	8	2	Medullary cancer of right ovary	Uncertain	7¼ m.	...	S	...	16	Head	M	T	...	C	Hæmorrhage from wound	...	D
4	33	8	5	1	Tumour of left ovary	,,	7½ m.	...	...	A	13	,,	M	...	...	...	Post-part. Hæmorrhage	L	L
5	27	1	...	...	Dropsy of right ovary	,,	7¼ m.	...	S	...	15–16	Arm	M	T	...	...	...	L	D
6	34	16	5	3	Tumour of uterus (fibrous?)	4 years	Term	N	...	...	8	Head	F	...	...	...	...	L	L
7	33	3	...	...	Fibrous tumours of uterus	Uncertain	5 & 6m.	...	...	A	20–30	Head / Breech	M / M	...	...	...	Post-part. Hæmorrhage	L	D / D
8	32	17	12	10	Polypus from interior of neck of uterus	,,	Term	N	...	...	7	Head	F	...	...	...	Post-part. Hæmorrhage	L	L
9	34	7	5		Hypertrophy of neck of uterus	...	,,	N	...	...	14	,,	M	...	...	...	...	L	L
10	39	...	...	...	Epitheliomatous growths in rectum	Many months	,,	...	...	...	32	,,	F	T	...	...	...	L	L
11	24	3	2	...	Cerebriform cancer of left kidney	4½ years	,,	N	...	...	5–6	,,	M	...	...	...	Exhaustion	D	L
12	39	7	3	...	Extra-uterine and uterine gestation	9 months	,,	...	...	...	6–8	,,	M	F / T	...	...	Exhaustion	D	L / L
13	36	15	7	2	Extra-uterine fœtation (twin)	8 & 9 years	,,	...	...	...	7–8	,,	M	...	F	...	...	L	L
14	41	6	2	...	Extra-uterine fœtation and fibrous tumour	Uncertain	5½m.	...	...	...	...	...	M	...	...	...	Internal Hæmorrhage	...	D
15	28	1·10m.	...	2	Extra-uterine and uterine gestation	20 months	3m.	N	S	...	8	...	...	...	...	...	...	L	...

I may premise, that it is of the utmost importance before instituting any examination, that the intestines and bladder be empty, and that the abdominal and vaginal investigations be carried on separately and conjoined. They should be conducted with the patient lying on the left side, the knees being flexed upon the trunk. In obscure or doubtful cases much additional and valuable information may frequently be obtained by placing the patient on the back, with the shoulders raised and the knees flexed, and supported by a firm pillow, and every now and then by putting the patient in the upright posture.

What, then, are the changes effected in the abdomen during normal uterine gestation?

But slight and almost inappreciable alteration takes place in the abdomen until between the second and third months, when the hypogastrium is slightly flattened and tympanitic, the iliac regions being somewhat fuller and resonant, the umbilicus drawn inwards and downwards.

At or about the end of the fourth month, the hypogastrium becomes perceptibly enlarged to the touch and sight, and dull on percussion immediately above the pubes, where the uterus may now be detected.

Towards the completion of the sixth month, the hypogastrium, as high as the umbilicus, becomes considerably increased and somewhat prominent, and in this region the uterus can be distinctly traced, causing the umbilicus to rise to a level with the abdominal parietes.

Between the seventh and eighth months the abdomen generally is considerably enlarged and prominent. The uterus can now be detected midway between the umbilicus and ensiform cartilage, which it reaches at eight and a half months, when it fills the abdominal cavity, the intestines being above, behind, and to its sides, the umbilicus protruding beyond the surrounding integuments.

During the last fortnight the uterus usually sinks lower in the abdomen, at the same time rendering it more prominent.

Thus it will be perceived that the abdominal enlargement of pregnancy is gradual, uniform, and progressive from below upwards, following nearly the median line, the uterine ovoid inclining to the right; that it produces well-marked and progressive effects upon the umbilicus, and usually lasts over a period varying from five to five and a half months; besides which, the abdominal swelling, resonant above and on either side, is elsewhere dull on percussion, and non-fluctuating.

Moreover, the enlarged uterus is resistant, elastic, and de-

fined, regular and somewhat pyriform in shape, its base upwards, its apex downwards, retaining its outline in varying positions of the body, more markedly so when the patient is in the upright posture. Not unfrequently, after a more or less prolonged manipulation, especially if the hand be cold, the uterus will be found to contract under its pressure, thereby rendering its outline and texture more evident—a most important fact from a diagnostic point of view.

In addition to these material indications, and as aids to diagnosis, it should be borne in mind that the uterine souffle may generally be detected about the fourth month, at or about the situation of the right Fallopian tube, varying in position but little with the advance of pregnancy. Again, the pulsations of the fœtal heart, to be detected early in the fifth month, together with the situation of the fœtal movements and limbs, may clearly point out the situation of the uterus, and thus materially aid our investigations.

Having thus given a brief and very imperfect sketch of the changes usually occurring in the abdomen during a healthy uterine gestation, I shall now make a few general remarks upon morbid growths in and about the abdomen and pelvis. They may occupy any part or parts of those cavities, and present every conceivable variety in origin, progress, size, shape, consistence (solid, fluid, or gaseous, or a combination of two or more), mobility or fixity, and number. They may be due to alterations in the natural structures, or may be composed of new and adventitious tissues, and even of some extraneous body, as an extra-uterine fœtus. They may obscure or displace organs by their size or adhesions, and, strange as it may appear, very frequently attain considerable dimensions without attracting the attention of the patient. It is also worthy of remark that there is scarcely any condition of the general health, or any amount of local disease, which can be regarded as wholly precluding the possible coexistence of pregnancy; patients having become pregnant during the last stage of phthisis and in far advanced cancerous disease of the uterus. It might, a priori, be imagined that indications, more or less defined, would almost invariably point out intelligibly, not only the existence of some abnormal condition, but also the nature and seat of the complication. Such, however, is not the case. It has more commonly happened, at least in my experience, that not only do these enlargements occasion few or no symptoms during pregnancy, but that they have not even been suspected in many cases, either by patient or practitioner, until the full term of

pregnancy has been completed, or until labour has set in or been far advanced—a fact well illustrated by Case XII.

There are, however, two conditions which usually arouse suspicion and lead to inquiry; viz. the undue size of the abdomen in relation to the period of pregnancy, and its peculiar shape; but here again it must be admitted, that so prone is the patient to regard these indications as due simply to the pregnant state, that she commonly disregards them, and attributes them to twins or some other unimportant condition; an opinion in which the practitioner is likewise too apt to acquiesce. These tumours, morbid or adventitious, usually present, as I have just remarked, few or no distinctive features whereby their pathology or nature can be determined; their importance being referable rather to their situation, bulk, fixity, and contents, than to symptoms due to their special morbid structure. Still, it must be admitted, that every now and then symptoms arise during their progress which, apart from size and shape, lead to the detection and nature of the complication. More frequently, these morbid growths exist prior to the commencement of pregnancy, but it often happens that they commence and progress with that condition, or appear to originate during the puerperal state. Again, experience has amply demonstrated that swellings even of large size have not interfered in the slightest degree with the completion of the full term of uterine gestation, in fact, in a few cases they seem to have delayed that process beyond its customary limits; whereas, in others, they have occasioned the premature expulsion of the fœtus. Moreover, these growths, especially where firm in texture, appear to have occasionally impeded, probably by their pressure, the proper development of the uterus and fœtus. This fact was remarkably illustrated in Case XI.

Hitherto it has been assumed that the existence of pregnancy complicated by some abnormal growth or adventitious body has been clearly established. Before proceeding further, however, it may be as well briefly to glance at some of the fallacies which surround this subject; and I feel I cannot do better than instance a few out of the numerous cases which have from time to time come under my own notice.

Six months ago I was consulted about the following case.

J. M., æt. 32, married six years, never pregnant, states that about a year and a half ago she had a severe attack of low nervous fever, which arrested her menstruation for some months. Seven months ago the catamenia returned, since which, however, they had been very scanty and irregular, sometimes re-

turning in ten days, at others not returning for five weeks, and then only lasting from one to two days (six days being their normal duration). About seven months ago she began to increase much in size, especially about the abdomen and breasts; at the same time she began, on exertion, to suffer such severe pains in and about the hips as to prevent her taking her customary exercise. She also experienced such acute pain during defæcation, that she allowed the bowels to be confined for a week or ten days at a time. She had not had any morning sickness, nor were there any changes in the breasts, beyond their size, indicative of pregnancy. The abdomen was generally enlarged, more especially on the left side, and dully tympanitic all over; absolutely so above the pubes and to the umbilicus, which was depressed.

No bruit, or fœtal heart, limbs or movements, could be detected, nor was the patient conscious of any such last-named indications. The rugæ of the vagina were well developed, its canal being narrow and long, so that it was with much difficulty the cervix uteri could be reached. It occupied the centre of the pelvis, was small and spongy. Ballottement could not be detected. Notwithstanding I had an opportunity of examining this lady again and again within the following fortnight, still so obscure was the case, that I declined to express a positive opinion as to the existence of pregnancy. The usual sympathetic and local indications of that state being absent, I was inclined to the belief, in which her medical attendant concurred, that she was not pregnant, but the subject of some obscure abdominal tumour. Six weeks after our last examination she was suddenly seized with paroxysmal pains, followed in about ten hours by the expulsion of a fine male fœtus, presenting all the characteristics of a fully developed child at the completion of term. The head presented.

Between three and four years ago, a patient, aged 38 years, who had been married about five months, was admitted under my care into St. Bartholomew's Hospital. She stated that her menstruation, which had always been regular and free, had recently become irregular and scanty, with some sickness of stomach. Her breasts had increased in size, and manifested some of the characteristic changes due to pregnancy. She had noticed during the last month or five weeks a swelling in the hypogastrium, in which she had experienced occasional severe 'crampy' pains. A careful investigation of the history of her case, coupled with an abdominal and vaginal examination, convinced me that she was the subject of ovarian disease. After she left the Hospital she sought the

opinion of a surgeon, who considered the enlargement due to an extra-uterine pregnancy. She was subsequently seen by a well-known accoucheur, who expressed an opinion that her case was one of normal uterine gestation. Not many months elapsed before her abdomen became so distended that an operation was deemed advisable for her relief, when a large, solid, ovarian tumour was successfully removed.

About a year ago my opinion was sought in the following case:—A patient, about 28 years of age, married eight months, began to suffer shortly after marriage from menstrual irregularity, and enlargement of the breasts, which manifested the usual characteristics of the pregnant condition. About four months ago her abdomen began to increase in size 'all over.' At the time of my visit, the abdomen was uniformly distended and prominent, fluctuation most distinct. While examining the abdomen, very distinct movements could be detected, which, coupled with the peculiar shape of the body moved, left little or no doubt upon my mind, and upon the minds of many present, that they were fœtal movements. A vaginal examination revealed an enlarged, soft, and movable uterus, into which the sound was easily passed four inches, taking a lateral direction. No bruit or fœtal heart could be detected. After a careful consideration of the history and physical signs, it was agreed that she was the subject of an extra-uterine pregnancy. Under the circumstances it was deemed advisable to recommend the operation of gastrotomy, with the view of giving the patient a fair chance of recovery, as well as of saving the child. On opening the cavity of the peritoneum, a large quantity of dirty-looking serous fluid escaped, when a firm, multilocular, ovarian tumour was discovered in close proximity to the diaphragm, attached above by long adhesions, and below by a long pedicle, which permitted its free movement in the ascitic fluid during respiration; hence the fallacy.

I have lately heard of a well-authenticated case, in which a surgeon, well versed in the examination of abdominal tumours, declared that he heard distinctly the beats of the fœtal heart: it turned out that the woman was not pregnant.

Similar cases are recorded by the late Dr. Labatt and M. Dubois.

I saw a case some time ago, in which an accoucheur of great eminence declared that he felt the foot of a child during a vaginal examination, the patient not being pregnant.

I well remember a case, to which I was accompanied by Dr. Routh, in which a surgeon mistook a distended bladder, coupled with other suspicious symptoms, for pregnancy.

On many occasions I have known cases where there have been menstrual irregularities, enlarged breasts, fat abdominal parietes, probably fatty omentum, and distended colon with movement of air in the intestines simulating fœtal movements, mistaken, even by careful observers, for pregnancy. Not long ago I was sent for to see a lady, whose abdomen was greatly distended, to decide upon the propriety of either tapping, or of inducing artificial premature labour, in whom neither dropsy nor pregnancy existed.

A most interesting case has come to my knowledge, in which an intra-uterine pregnancy existed with fibrous tumour of the uterus, and so closely simulated an extra-uterine pregnancy as to deceive several medical men of great practical experience and dexterity. In this case, gastrotomy was about to be performed, when, I believe, a living child was expelled from the uterus, after a normal labour. And last year I was requested by Mr. Clifton, to see a lady who was suffering from an abdominal enlargement, accompanied by severe spasmodic pains, which had existed about four months and a half. Although Mr. Clifton was of opinion that his patient was the subject of extra-uterine pregnancy, still, so obscure were the history, symptoms, and signs of that condition, that an experienced physician considered she was suffering from ovarian disease, whereas, an eminent accoucheur expressed a decided opinion that her affection was pelvic cellulitis or abscess. Shortly afterwards I saw this patient, and confirmed Mr. Clifton's diagnosis. About six weeks after this interview, the patient began to suffer so severely from constant pain, severe sickness, and great debility, with jaundice, that it was deemed necessary to recommend gastrotomy for her relief. Before proceeding, however, to such a desperate alternative, it was considered expedient first to obtain Dr. A. Farre's opinion as to the nature of the case. After a careful investigation of the history and symptoms he declined to give a positive opinion as to the existence of pregnancy, but quite agreed in the recommendation that an exploratory operation should be undertaken, with a view to determine the nature of the case. Gastrotomy was at once performed, and a living fœtus, between six and seven pounds in weight, was extracted from the cavity of the peritoneum, in which, between the right ovary and Fallopian tube, it had been developed.

It is, therefore, evident, from the foregoing cases, to which many others might be added, did space permit, that intra and extra-uterine pregnancy may be obscured by the absence of the signs and symptoms of those conditions; that ovarian tumours, in their history and other phenomena, may simulate uterine

and exta-uterine fœtation; that sounds in and about the abdomen may closely resemble the beats of the fœtal heart and uterine bruit; that, owing to the various shapes assumed by abnormal growths, especially when more or less movable, fœtal limbs and their movements may be closely simulated; and, lastly, owing to certain functional changes taking place in the viscera and in the coverings of the abdomen, coupled with other concurrent circumstances, that pregnancy may be erroneously assumed to exist.

In addition to the sources of fallacy already mentioned, may be added multiple pregnancy, especially when accompanied with dropsy of the amnion; pregnancy with hydrocephalic fœtal head; an ascitic or decomposed state, or monstrous formation, of the fœtal body.

To be continued.

ARTICLE VI.—*Restoration of the Lower Jaw after its entire Removal. A Case; with Remarks.* By THOMAS SMITH.

GEORGE W. ELDONE, æt. 35, a lucifer-match maker, was under my care at St. Bartholomew's Hospital in September 1864. He had suffered from symptoms of necrosis of the lower jaw for three years. When admitted there was great external swelling over the bone; and extending from ear to ear along the line of the jaw was a chain of ulcerated openings, from which there was profuse discharge, and through any of which a probe reached dead bone. Inside the mouth the toothless alveolar process was seen bared of soft parts in its whole extent; the bone being rough and of a brownish black colour. The gums gaped widely away from the dead jaw, and had receded so as to leave it above the natural level of that bone: a probe could be passed easily either in front or behind the bone towards the sinuses in the neck. Apparently there was a mass either of very firm fibrous tissue or bone in front of and below the symphysis; elsewhere there was no new bone to be felt.

September 17th.—Under chloroform the jaw was removed by dividing it at the symphysis and dragging the two halves out separately. Considerable force was required to detach the bone from its connections, but it was not necessary to make any use of the knife; the dead bone came away completely denuded of soft parts and without the slightest remnant of periosteum;

indeed in the same condition, as regards all but colour, as it is at the present time. After the removal of the bone, on introducing the finger into the mouth, a firm fibrous mass was found occupying the substance of the gum in front of the chasm that had contained the jaw; but its outline was fused in the surrounding swelling and induration; the only spot where bone was to be felt was in front of the position of the symphysis.

The patient made a good recovery, though he was in feeble health from his previous inability to take solid food. A fortnight after the operation he was able to take fish, and at the end of a month he asked to be put on meat diet. The wounds in the neck rapidly closed, and the swelling of the soft parts quickly diminished so as to disclose the framework of a new jaw, which felt firm, and seemed to gain in consistency every day. He could open and close his jaw, and could masticate without pain or inconvenience.

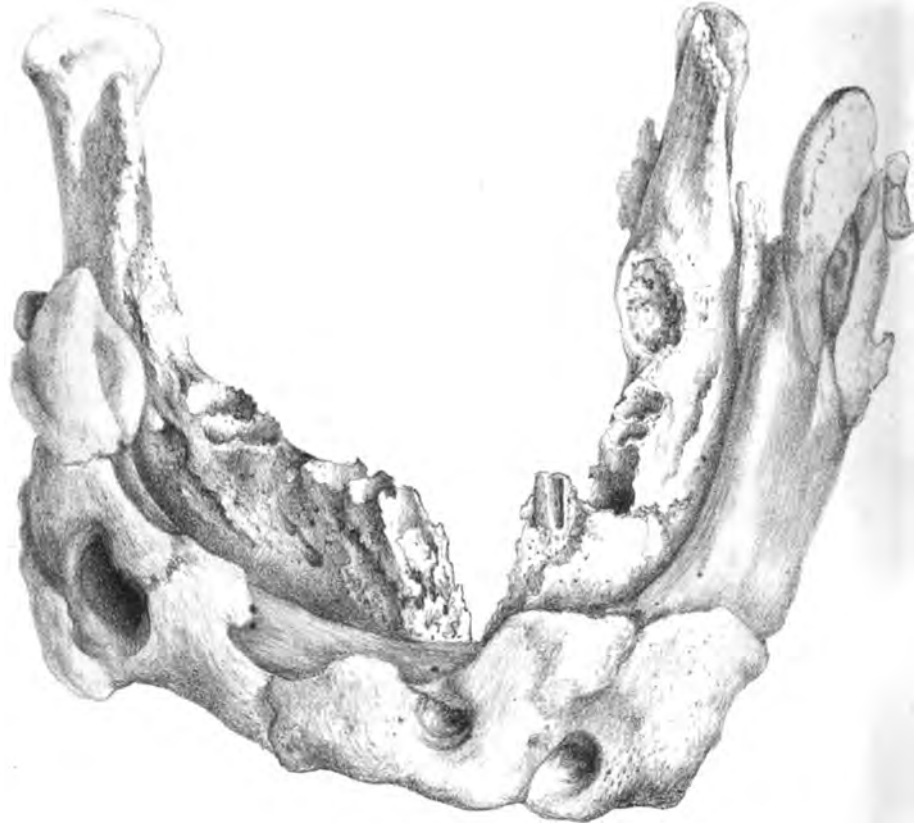
At all times this patient's voice was thick and guttural, and his respiration noisy, and partly obstructed, as if his tongue were too large for his mouth. He never lay down flat in his bed, but slept either sitting up or with his head raised. He said 'he should choke if he lay down.' At night-time not unfrequently he would wake up in great agitation, saying he was choking, and exhibiting all the symptoms of urgent dyspnœa: these attacks would pass off in a few minutes after regaining the erect position. He was discharged on October 28th, six weeks after the operation.

The evening after his return home he is reported to have indulged rather freely in stimulants, and during the night he awoke suddenly with symptoms of suffocation. His wife states that he caught at his throat with his hands, and after gasping for breath for a minute or two, he sank back and died.

A post-mortem examination was made two days after death under very disadvantageous circumstances, and the jaw was brought away with some difficulty.

The only morbid change found in the body which could account for death was an œdematous condition of the mucous membrane of the upper part of the larynx, and this may have been sufficient; indeed there can be but little doubt that it contributed towards the fatal issue of the case. I cannot but think, however, that death was in a measure due to a kind of prolapse of the tongue towards the upper opening of the larynx, and that this tendency of the tongue to slip backwards was the cause of the patient's inability to lie on his back when in the Hospital, and that it also produced the attacks of dyspnœa from which he occasionally suffered.

Plate I.



The altered relations of the tongue to the larynx by reason of its disconnection from the jaw would be sufficient to account for a tendency in the former to slip back. The newly-formed jaw, to which the tongue and hyoid bone were attached by means of the genio-hyoid and genio-hyoglossi muscles, lay altogether lower in the neck than the original bone, and thus the tongue was brought much nearer to the hyoid bone and the upper opening of the larynx than was natural.

The diseased bone, removed by operation, comprises the whole jaw, with the exception of the condyle on the left side, which looks as if it were worn away. The general outline of the bone is normal; the surface is rough, and has a worm-eaten appearance. There is a perforation opposite the last molar tooth on the right side. On the left side, partially surrounding the angle, and a small portion of the contiguous ascending and horizontal rami, is a piece of hard white new bone, which is firmly adherent to the dead bone, and was found at the time of the operation within the periosteum of the dead jaw, and closely adhering to that membrane. This piece of bone, on microscopic examination, exhibits all the characters of well-formed bone, having lacunæ and Haversian canals. It seems to have formed no part of the bony framework which eventually replaced the jaw, as it lay within the periosteum of the jaw, having been formed from the osseous surface of that membrane. The newly-formed jaw presented, before the soft parts were removed, much more resemblance in external outline to its predecessor than it does at present. Before dissection the intervals between the formations of bone in it were filled up by firm fibrous tissue, which gave to the whole a consistence and regularity of outline that it has now to a great extent lost.

The new jaw was situated in front of, and on a lower plane than, the bone it replaced; it was distinctly embedded in the soft parts between the anterior layer of the periosteum of the old jaw and the integuments of the face. The relative position of the old and new bone is shown in the accompanying drawing. Plate I.

On the posterior aspect some of the fibrous texture of the gum has been left, so as to show a groove in the soft parts that was originally occupied by the dead bone.* This groove had very greatly diminished in size before the patient's death, and has still further shrunk by maceration in spirit.

The temporal muscle was found attached to the coronoid

* In the specimen, a piece of wire is placed in this groove.

process; the masseters were blended with the outer surface of the angle and ramus of each side; while behind the symphysis there still may be seen in the specimen the remains of the genio-hyoid, genio-hyoglossi, and digastrici. No other muscles were found attached to the bone; indeed, the remaining large muscles of the jaw, namely, the external and internal pterygoid, were separated from their normal points of attachment to the jaw by the dead bone, so long as it remained, and after its removal by the double layer of periosteum and gum, which had formed the bed in which the dead bone lay.

The inferior dental nerves were found lying in the fibrous texture of the old gum. There is apparently no provision for them in the new jaw, from which they lay quite separated by both layers of the periosteum of the necrosed jaw.

The new bone consists chiefly of three portions, of which two are formed by the coronoid process and condyle together, of either side; while the third and largest portion represents the right ascending ramus, the angle, horizontal ramus, and symphysis, and extends as far as the position of the eye-tooth on the left side.

The part of the jaw that is wholly deficient in bony structure is included between the position of the eye-tooth and last molar of the left side. The parts in which most bone is found, being apparently those points where ossification commenced, are the coronoid processes, the angles, and especially the neighbourhood of the symphysis, where the bone is more abundant, denser in its structure, and more perfectly formed than elsewhere.

The newly-formed jaw, on microscopic examination, shows all degrees of development, from a finely fibro-nuclear matrix substance up to perfect bone. See Plate II. fig. 1, 2, 3, and 4.

The bone differs from ordinary compact bone in being excessively vascular, the Haversian canals being very large, near together, freely anastomosing, and here and there in their wall presenting fusiform and pouch-like dilatations; in fact, resembling in their outlines veins slightly varicose. See Plate II. fig. 2 and 4.

The bone is thickly studded with lacunæ, and these are peculiar in being very large in their cavities, less uniform in their general outline, and bearing fewer canaliculi than is usual in well-formed bone. See fig. 3. In the newest parts of the bone the lacunæ are merely irregularly-formed cavities without distinct canaliculi.

From the relation of the dead bone to the soft parts, lying as it did in a fossa formed by the gaping gums, from the relation

Plate II.

Fig. 1.

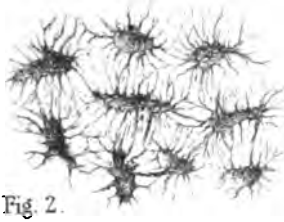


Fig. 2.

Fig. 3.

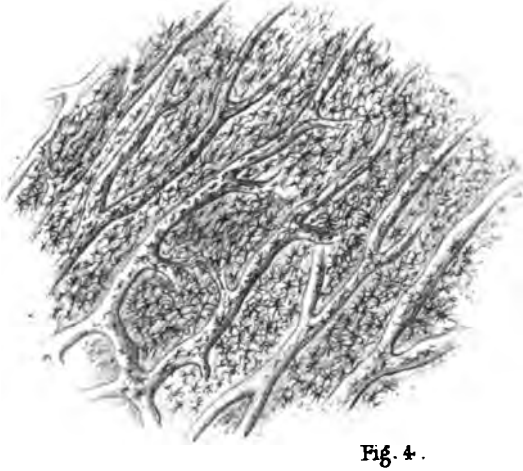


Fig. 4.

T. Godart. del.

J. Sowerby Imp.

of this fossa to the new bone, as seen in the specimen, it is evident that the regeneration of bone in this case did not take place from the osseous surface of the periosteum, but rather from the fibrous structure of the gum in front of the original jaw.

The only portion of bone, in this case, formed directly from the detached periosteum, was removed at the time of the operation, and may be seen in the necrosed jaw adhering to the ramus and angle of the left side. It formed no part of that system of bone formation which eventually reproduced the jaw.

The period between the removal of the necrosed bone and the death of the patient was forty-two days, yet it seems highly probable that in this comparatively short time the principal formation of new bone had taken place, as at the date of the operation the only part where there was any appearance of ossification was a doubtful portion in the neighbourhood of the symphysis.

Mr. Syme gives a case* where five weeks after the first symptoms of necrosis of the tibia a dense case of bone was found beneath the periosteum enclosing the sequestrum. In my own possession is a specimen of new bone removed from beneath the periosteum thirty days after the first symptoms of acute necrosis of the tibia; in microscopic appearance it is almost precisely similar to the bone forming the jaw in this case; it exhibits the same preponderance of cell cavity in the lacunæ, and the same varicose appearance of the Haversian canals.

It is generally considered that there are four distinct sources of reproduction which may be severally concerned in the formation of new bone: 1. the periosteum; 2. portions of the original bone detached from its surface, and remaining connected with the periosteum; 3. the articular ends of the original bone; 4. the soft tissues around the periosteum, or around the bone if the periosteum has been destroyed.†

Of these the latter seem to have furnished the nidus of the new bone, its growth having taken place among the soft tissues in front of the jaw, the periosteum apparently taking no part in the process.

To this fact I venture to direct passing attention, since of late the office of the periosteum as an osteogenic membrane has been much magnified, at the expense and to the disparagement of other sources of bone reproduction.

* Edinb. Med. and Surg. Journ. Jan. 1836.

† Stanley on Diseases of the Bones.

The foregoing case is a somewhat exceptional instance of the removal of the whole lower jaw at one operation,* of a true bony reproduction of the same, the completeness of the restoration being interrupted by the patient's death. Mr. Stanley, in his work on the bones, speaks of the grey pumice-stone-like osseous deposit that occurs in phosphorus necrosis 'as a peculiar morbid product from a diseased tissue,' and as being unorganisable. To refer to a more recent authority, Mr. Salter, while he admits that in phosphorus necrosis of the lower jaw, 'the removal of the sequestrum leaves a supplemental bony representative which, for a time, more than makes up for the loss of dead bone,' remarks in the next paragraph that, 'though it has not been stated in books, this repair of the lower jaw is but temporary, for after a time, often a considerable time, the new bone diminishes by absorption to a mere narrow arch, and ultimately there is scarcely enough bone to keep out the lower lip, and the chin is utterly lost. I have had an opportunity of examining this state of the parts after the jaw had been lost ten years.'†

The bone forming the new jaw in this case had evidently not been developed from the grey pumice-stone deposit which ordinarily surrounds the sequestrum in phosphorus necrosis, since it did not lie in contact, nor was it connected, with the dead bone.

Its microscopic structure, though it corresponds with that of the pumice-like deposit as described by Dr. von Bibra‡ and Dr. L. Geist,§ yet differs essentially in the direction of its Haversian canals, which are parallel to those of the original bone; whereas, Bibra mentions as a characteristic of this deposit that its blood-vessels were at right angles to those of the sequestrum.

It is a well-known fact that, although there is an abundant formation of earthy material in phosphorus necrosis of the lower jaw, in the same disease of the upper jaw no such deposit is found. Of this circumstance there have been various explanations offered. Geist has ascribed the difference to the effect of gravitation. The writer on this disease in 'Holmes' Surgery' attributes it to the 'vis medicatrix naturæ.' Whatever term be applied to designate the influence which directs the repara-

* Mr. Coote removed, at one operation, all the lower jaw except one condyle; while Mr. John Adams removed the whole jaw, but by two separate operations. Medical Times and Gazette, July 1862.

† Holmes' System of Surgery, vol. iv.

‡ Brit. and For. Med.-Chir. Rev. April 1848.

§ Die Regeneration des Unterkiefers nach totaler Necrose durch Phosphordämpfe. Erlangen, 1852.

tive process, I venture to submit that the difference in reparative power exhibited by the two jaws is exactly analogous to that shown by a compact long bone as distinguished from a cancellous or solid bone, and that the lower jaw, in its structure and in the disposition of its periosteum, is comparable to a long bone, while the upper, in the same particulars, resembles a bone of the tarsus or carpus.

Article VII.—*On the Local Effects of Blood-poisoning in relation to Embolism.* By William S. Savory, F.R.S.

THE idea is an old one that the blood may be poisoned, not only by various substances from the mineral or vegetable kingdom, but also by inoculation with putrid or morbid animal matters. But more recently has the great fact been disclosed that the blood may be poisoned, not only from without, as in fevers, but also from within, by matters formed in the body itself.

It has also been long recognised that abscesses may form in various and distant parts as the consequence of a wound or local injury; and at length, after many years of vague speculation, the belief was generally entertained that these secondary abscesses, as they are called, were caused by the absorption of pus from the original wound. It is true opinions differed on the mode in which pus, thus circulating with the blood, led to secondary purulent deposits, but for a long time there was wonderful unanimity of opinion that pus in the blood was a necessary condition of what was accordingly termed Pyæmia. Of late years, however, this doctrine has been assailed and almost set aside by the advocates, among whom the chief is Virchow, of a different view. According to this school these secondary abscesses are due neither to the admixture of pus nor to the contamination of the blood by any morbid fluid, but to the mingling with the blood of minute solid particles, for the most part of disintegrated fibrine, which, arriving at the capillaries or smaller vessels, block them up, and thus become the foci of changes which lead at length to pus. Thus, this last doctrine, at present the prevalent one, sets forth a mechanical action as the origin of the collections of pus which constitute the most striking feature of the affection still called pyæmia.

Now in investigating this subject it is necessary at the outset to examine the mode of formation of the secondary abscesses.

This may be most conveniently studied in the lungs, for in pyæmia, of all organs the lungs are, by far, most frequently affected. They are often affected alone. It is a rare exception for them to be free when other organs are affected.

If then in the lungs, or indeed in any other organ, so far as observation goes, the mode in which these secondary abscesses are produced is examined, it is found that in the first instance spots and patches of congestion more or less intense appear; that the smaller of these—the spots—are, for the most part, well defined and regular in shape, with usually a circular outline upon the surface of the lung. They are of a dark red or livid colour, sometimes slightly raised, and often indurated. In the larger patches all these characters are usually less pronounced. The colour is less intense, being generally of a more dusky hue, and less defined. Then these spots and patches of congestion, after remaining for a while, may either clear up and gradually disappear, or may pass on into suppuration. In the latter case they gradually soften towards the centre, which at the same time becomes paler, until at length a puriform fluid oozes out when a section is compressed. Afterwards there is a distinct collection of pus in the centre, with a halo of livid indurated substance, which gradually passes outward into healthy tissue.

The exact condition of parts in the spots and patches which first appear is an interesting subject of inquiry. The term ecchymosis is commonly applied to these spots, but it does not appear that usually there is any evidence of actual rupture or extravasation. A careful examination of these spots with the naked eye and lenses shows that there is intense congestion and even stagnation in the focus of the mischief, with perhaps subsequent coagulation and staining of the surrounding tissues from exudation of colouring matter, but there is no evidence, except in extreme cases, of actual extravasation of blood. Hence the term ecchymosis thus applied is not always strictly correct. The sequence of phenomena sketched above is indeed what might have been expected. One can see no reason why any rupture of the vessels should ordinarily occur.

Dr. Wilks* lays great stress upon the coagulation of the blood. The result of the introduction into the blood of morbid materials furnished by unhealthy suppurating or sloughing wounds, he says, is to cause it to coagulate either in the larger

* Guy's Hospital Reports, vol. vii. 1861, pp. 122, 123.

vessels or in the capillary system of the viscera. He continues, 'This effect,' viz. coagulation, 'though we believe denied by some, we have always considered to be the most important part in the whole process, and, indeed, this result, when witnessed in the congestion of various parts, we may sometimes look upon as almost characteristic of the affection. The first stage of the morbid condition which is produced in the viscera is a coagulation in the vessels, and the last stage is a suppuration.' Coagulation may be of frequent occurrence, but is it not subsequent to the stagnation; and is it a necessary step in the process? I am sure that after death from the injection of the putrid fluids which I employed in my experiments, the coagulation of the blood in general was much less complete than in health. The clots which formed were dark, soft, and loose. The cause or condition, however, which interferes with natural coagulation may nevertheless provoke the formation of these abnormal clots.

But however this may be, the relation of the spots and patches of congestion to the abscesses has been clearly shown. They constitute the first stage of the process. Suppuration follows; not always, it is true. The mischief may fall short of this. The morbid process, after reaching a certain point, may recede, and the deep red or livid spot, instead of passing on into suppuration, may clear up. This result is by no means uncommon in healthy animals subjected to experiment. But still there can be no doubt, and it is important that this should be understood, that these congested portions of tissue, or spots of ecchymosis as they are generally called, represent the early stage of the formation of abscesses.

Indeed it is hardly necessary now to insist upon this fact, for all observers seem to agree that the points of suppuration, the secondary abscesses, commence as petechial spots or patches of congestion or stagnation, and that it is the natural tendency of such spots or patches to pass on into suppuration.

In the same organ after death purulent collections in all stages may be seen. Livid or petechial spots, some softening in the centre, others exhibiting well-formed pus there, which is gradually lost as it is traced outwards, passing into grey and then into red hepatisation, until nothing beyond congestion appears; or simple collections of pus with little or no surrounding disturbance, passing insensibly into healthy tissue, or it may be, abruptly defined, even encysted. Then these purulent collections at length become more concrete at the circumference while towards the centre they are still fluid. But, by-and-by, they become caseous throughout, and, if life

lasts, they will pass through still further degenerative changes. Thus they may assume the appearance of tubercle.*

The significance of the stage of congestion has been well pointed out by Dr. Wilks. 'We have very little doubt,' he writes, 'that, as a rule, a lobular congestion of the lungs (taking these organs as examples, as most usually affected) implies, in the absence of some few very evident causes, a poisoned state of the blood; it is thus seen in all those cases where we suppose the existence of a blood disease, and associated with it is generally an ecchymosis of the surface. And here, at the very outset, the question arises, whether this ecchymosis or spotted condition of the viscera is due to the same cause. In purpura arising from any source we regard the spots as simple extravasations of blood, whereas in the disease under consideration we have spoken of the red patches and spots on the organs as due to congestion or stagnation in the blood-vessels. It would be desirable to ascertain in some cases how much of a particular red spot is due to congestion and how much to extravasation, but this is very difficult to do. . . . . Although, then, we regard a lobular congestion of the lung as the first stage of the pyæmic process indicating a blood disease, yet we look upon a mere ecchymosed condition of the organ as affording additional evidence of death by this affection.

'The importance of this condition is gained from the fact, not only that it is found where the symptoms of pyæmia are well marked during life, but also where other undoubted results of this state are found after death.

'Thus in numerous cases where the disease is well marked and one lung affected with abscess, the other shows merely congested lobules and spots of ecchymosis, and so with other viscera, as the liver and spleen.'†

Although, as previously remarked, it may be interesting from another point of view to determine whether in these patches and spots there is congestion only, or stagnation, coagulation, or even extravasation, yet, so far as the cause is concerned, they represent only different degrees of effect.

And such effects are more or less common to cases characterised by a morbid condition of the blood. Witness purpura and scurvy, the petechiæ and petechial rashes, the congestions and extravasations of fevers, and the ecchymoses in poisoning by arsenic.

The puriform collections in pyæmia have been generally

* Velpeau, Leçons Orales, 1841, p. 14; Cruveilhier, Anatomie Pathologique.
† Op. cit. pp. 124, 125.

assumed to consist simply of pus, yet this view has not been adopted by some who have particularly investigated the subject.

Mr. Rose in the 'Medico-Chirurgical Transactions' of 1828 thus described these secondary deposits:—

'The disease consists apparently of depositions in the cellular tissue of the affected organ, partly of a white or yellowish coloured lymph, and partly of pus. These depositions vary in size, from beyond the bulk of the largest walnut to something less than a common pea. Where the lymph is most abundant, they may be described as a soft white tubercle of irregular shape, not contained in a cyst, but imbedded in the cellular substance of the part and gradually blending with its natural structure. When pressed, some pus exudes from them. Where the pus collects in greater quantity, it is lodged in an irregular cavity, probably in the middle of some of the tubercles, and the walls of the abscess are formed of flakes of lymph.'* This is not the description Mr. Rose would have given of a simple collection of pus.

Mr. Erichsen, in alluding to the fact that these so called secondary abscesses usually contain what appears to be a thin and oily pus, says, 'The more oily-looking fluid, though opaque and yellow, and closely resembling true pus, will, on microscopic examination, be found to differ from this in the absence of the true pus corpuscles, though it contains an immense number of granular cells. After removal it often forms a fine fibrinous coagulum.'†

Mr. Gamgee asserts that there are no true pus cells in the puriform deposits. He says he learnt the fact from J. Lister.‡

In truth the so called secondary abscesses are by no means always simple collections of pure pus. Not only does the pus itself vary in quality and present all degrees of consistency, from a thin sanious fluid with semi-solid flakes to a thick uniform glutinous substance, but it is often mingled with more or less lymph, which is either tolerably tough and cohesive, or soft, even fluid, with firmer shreds. At other times the whole collection has the character of softening tubercle. Still more rarely it is throughout of a rust colour, tinted with blood.

Yet I think there can be little doubt that, as the rule, these purulent collections, when rapidly produced, consist of well-formed pus. For by its physical and other characters, both to the naked eye and to the microscope, the matter cannot usually be distinguished from that of any ordinary acute abscess. It

* Vol. xiv. p. 265.
† Science and Art of Surgery, 1864, p. 463.
‡ On Pyæmia, p. 7.

seems, indeed, as if the character of these collections, in this respect, was mainly influenced by their rate of formation and the time which subsequently elapses before they are examined.

Thus, then, these so called ecchymoses begin to soften in their centre, and the changes they pass through may be enumerated thus:—

Petechial spots or patches—congestion and stagnation, perhaps extravasation.

Inflammation: degeneration.

Subsequent changes in products and subsidence of surrounding disturbance.

Now the great question arises, What causes are competent to produce such mischief? In the first place, can it be produced by mechanical obstruction—by emboli? In other words, What effects result from the introduction of disintegrated fibrine into the circulation?

The following experiment was performed:—

Experiment I.

A few grains of fibrine were obtained from blood clot, and kept in distilled water for some days, until the mass became disintegrated, so that the fragments could be readily suspended in water, and drawn through the pipe of a syringe not more than half a line in diameter. This disintegrated fibrine, which was free from odour, was thoroughly washed, and then, in three or four drachms of distilled water, it was injected into one of the superficial veins of the thigh of a large dog. The operation itself was a very trifling one. No obvious effect was produced by the injection. The respiration was not accelerated nor embarrassed. The dog lay quite quiet, apparently free from suffering.

Three days afterwards, a few more grains of disintegrated fibrine, odourless and previously washed, the particles of which were somewhat coarser than in the first instance, were injected, in water, into the corresponding vein of the opposite thigh. No obvious effects were produced by the operation.

The dog was killed one week after the last injection, and examined immediately.

Throughout both lungs were numerous spots and patches, some of a dark livid, others of a brilliant scarlet, colour. Some of the patches and larger spots presented a dark livid centre, surrounded by a bright scarlet ring. Some of them were firm, and in great part indurated; a few were slightly raised above

the surrounding pulmonary substance. All these spots and patches were, for the most part, well defined, terminating abruptly, and contrasting strongly with the pale pulmonary tissue. The smaller ones were regularly circular in outline.*

The heart and all the other organs were healthy.

This experiment illustrates, by the way, a noteworthy fact—the absence, during life, of all symptoms by no means implies the absence of any local mischief. Many experiments are vitiated and rendered comparatively worthless by the assumption that, because none of the usual symptoms of disturbance, indeed no symptoms whatever, have followed an injection, that, therefore, no morbid effect of any kind has been produced. A thorough examination after death can afford the only sure guarantee of the absence of mischief.

Are the effects here produced due simply to the mechanical action of the minute particles of fibrine? If so, the same effects ought to follow the injection of solid particles of other substances which could undergo no change, and should, therefore, be afterwards discovered unaltered.

Experiment II.

I injected into the femoral vein, towards the heart, of a large vigorous cat thirty minims of distilled water, rendered cloudy by oxide of zinc. The animal soon after became languid, and seemed inclined to lie down. The respiratory movements grew rapid; one hundred and forty in a minute. The next day it was rather dull, but it gradually recovered.

A week afterwards it seemed quite well. The small wound was healing. Then thirty minims of distilled water, rendered cloudy by oxide of zinc, were injected as before, by the other femoral vein. The cat was not sensibly affected. The next day it was almost well, and in three days had quite recovered. A week after the second injection it was killed, and at once examined.

In either lung, especially at the apex, were small dark livid and somewhat indurated patches.

All the other organs were quite normal.

Experiment III.

I injected into the femoral vein of a puppy, weighing about 12 lbs., two drachms of distilled water, made opaque by oxide

* A coloured drawing of the lungs is in the Museum of St. Bartholomew's Hospital.

of zinc suspended in it. No obvious effect was produced. In a day or two it was quite well, and very lively.

A week afterwards, the wound having healed, one drachm of distilled water, opaque with oxide of zinc, was injected into the other femoral vein. Soon after, the animal appeared dull, lying down, and disinclined to move. The respiration became very rapid, and somewhat laboured. But in the course of a few hours the dog recovered, and remained quite well.

Another week after, a drachm of distilled water, with much oxide of zinc suspended in it, was injected into one of the veins of the neck, towards the heart, by means of a glass syringe with a silver canula, which was previously secured in the vein. Almost at once the respiration became embarrassed, and the animal died in a few seconds.

It was examined immediately. Both wounds in the thigh were closed. The first one was a mere linear scar. The right femoral vein, the first one used, was partially plugged, and the canal was contracted for about an inch. The left vein was only contracted at the wound, elsewhere free and normal.

The right side of the heart was loaded with soft coagula and grumous blood, mixed up with oxide of zinc, and frothy. (Although I was not aware of it at the time, it appears that some air must have been accidentally injected in the last operation). The large veins leading to the heart were full of the same mixture.

The lungs were generally pale. Two or three livid and indurated patches, well-defined and circular, the size of a pea, were scattered over the surface. When these were cut into, small grains of oxide of zinc appeared in the centre, no doubt the result of the former injections. Throughout both lungs numerous grains of oxide of zinc appeared on section, but without any surrounding congestion. Doubtless these had been just introduced.

The liver was congested, and the larger veins loaded with grumous blood, mixed with oxide of zinc, which escaped on section.

The spleen, kidneys, intestines, and other viscera were healthy.

Experiment IV.

Into the femoral vein, towards the heart, of a large dog, weighing upwards of 40 lbs., ten or fifteen grains of oxide of zinc, suspended in a drachm of distilled water, were injected. Almost immediately after the respiration became very rapid and panting. The next day, however, the dog appeared well.

He was lively, and took food freely. The respiration was natural; but the leg was sore.

A week after, when he seemed quite well, and the wound was granulating, a scruple of oxide of zinc, suspended in two drachms of distilled water, was injected into the other femoral vein. The respiration became at once rapid and panting; but he took food freely after the operation, and gradually recovered.

In another week, when he seemed quite well, he was killed. The body was examined immediately.

The first wound was closed. The last wound was granulating. Both femoral veins were healed, healthy, and pervious.

The heart was rather full of blood, but healthy.

Scattered all over the surface of both lungs were numerous spots and patches; the circular ones varying in size from that of a pin's head to that of a large pea; others, more irregular, were larger. Some were raised above the level and felt hard, resisting pressure. When divided, most were solid throughout, but some appeared to be softening towards the centre. From these a small quantity of grumous fluid exuded upon pressure. The spots and patches were of a dark purple colour, livid, and contrasted strongly with the surrounding lung tissue, which was perhaps more vascular than usual, and still more with certain large pale irregular patches, which appeared here and there upon the surface of the lung. These were crepitant, and when cut into, presented only very pale lung tissue. Were they portions which had been deprived of a due supply of blood? *

The liver was very much congested, and presented one or two paler patches, from which, when divided, blood, somewhat more grumous and opaque than natural, escaped.

The spleen was healthy.

The right kidney was healthy. The left was apparently healthy throughout, except a portion which formed a pale patch, two-thirds of an inch across, on the convex surface of the organ. When divided, this pale greyish or buff-coloured patch appeared conical, its base at the surface, its apex towards the pelvis. It was sharply defined, and contrasted with the surrounding dark renal substance. When minutely examined, it was found to consist of urinary tubes, showing only a basement membrane, all containing, most of them filled, some crowded with, granules, molecules, and globules of oil. No epithelium or gland cell was visible. Was this due to embolism of some branch of the renal artery by oxide of zinc?

* One lung (Series xiv. 82), and a coloured drawing of it when recent, are in the Museum.

In the small intestine some of Peyer's patches were congested; and patches of congestion appeared on some of the lymphatic glands.

The muscles, &c. were apparently healthy.

The blood was natural, and coagulated in the ordinary way.

No pus was found anywhere.

Experiment V.

Into the femoral vein of a dog, weighing about 18 lbs., one or two grains of oxide of zinc, suspended in three drachms of distilled water, were injected. After the operation the animal was less lively, but no further effect was apparent. In a very short time it seemed quite as well as before the operation.

In three weeks from the date of the operation it was poisoned with prussic acid, and examined immediately.

Nothing wrong was found in any organ, except two or three well-defined livid spots upon the front surface of the right lung.

The wound in the thigh had quite healed.

Experiment VI.

Into the femoral vein, towards the heart, of a healthy dog, weighing about 12 lbs., a scruple of oxide of zinc, suspended in distilled water, was rapidly injected. In the course of a few seconds the dog was dead. It was examined forty-four hours afterwards.

The heart, especially its right side, was distended with dark fluid, or slightly coagulated, blood.

The lungs were mottled all over with patches of congestion, irregular in shape, and variable in size and colour, but all more or less livid. Almost the whole of the posterior surface of the right lung was of a dark livid colour, which extended deeply into its substance. This was, however, crepitant.

The liver was loaded with blood. All over its surface were seen patches of a pale buff colour, for the most part of about the same size—that of a split pea or larger, and irregular in shape. In one or two parts, towards the margin, these patches were more extensive and ran along in streaks. When cut into, many granules of oxide of zinc could be squeezed out with blood, which appeared somewhat grumous and frothy as it exuded, and paler and more opaque than natural. There was no doubt whatever of the presence of oxide of zinc; the microscope showed it.

The spleen and kidneys were healthy.

Decomposition was rapidly advancing. The abdomen was distended with gas.

In this case the presence of oxide of zinc in the blood was less obvious than in the instances in which it was injected into the jugular vein. No doubt when thrown into the femoral it becomes more thoroughly mingled with the mass of the blood.

This experiment illustrates the rapidity with which patches of congestion may be formed around the points of stagnation.

Experiment VII.

Into the jugular vein of a fine healthy rabbit I cautiously injected a drachm of distilled water, rendered cloudy by a grain or two of oxide of zinc. The animal immediately struggled once or twice, and then died. It was examined half an hour afterwards.

The heart was distended with blood, especially on the right side. It contained oxide of zinc.

The lungs were pale and somewhat collapsed.

Experiment VIII.

Into the jugular vein of a fine healthy rabbit I injected two drachms of distilled water without any obvious effect. Then very cautiously and gradually half a drachm of distilled water, containing in suspension one or two grains of oxide of zinc, was passed in. The animal at once struggled, and, when set free, fell on its side, and after gasping once or twice, died. It was examined half an hour afterwards.

In the right auricle, which was still feebly contracting, was much fluid blood, and in the midst a small mass of oxide of zinc. The other cavities were moderately filled with blood.

The lungs were pale and collapsed.

Experiment IX.

I injected into the femoral vein of a dog, weighing about 14 lbs., two drachms of distilled water, with much oxide of zinc suspended in it. Almost immediately after the respiration became hurried, then gasping, and presently the dog was dead. It was examined forty-eight hours afterwards.

The right auricle of the heart was much distended with imperfectly coagulated blood, with which oxide of zinc was mixed. The other chambers were moderately contracted.

The lungs and other organs were healthy.

In these last three experiments the circulation did not continue long enough after the injection for the production of the local effects in the lungs.

It is not difficult to understand the manner in which the local effects just described are produced. A minute examination of these spots and patches shows that they consist of accumulations of blood, blocking up and distending the vessels; that this condition is most marked and intense towards the central portion of the mass, and here, in the midst, the particles of the injected substance may be discovered, while towards the circumference the congestion passes, sometimes gradually, sometimes abruptly, into the surrounding healthy tissue. In a word, some of the finer vessels are obstructed by the foreign particles, which have become impacted, and hence the stagnation and congestion.

Now, can similar effects—patches of congestion and spots of stagnation, such as have been described—be produced by any other agency? What effects will follow the injection into the blood of putrid fluids which contain no solid particles?

Experiment X.

Into the jugular vein of a fine healthy rabbit I injected two drachms of distilled water without any effect. Then half a drachm of putrid fluid—formed by macerating muscle four days in distilled water—previously filtered, was injected. Almost immediately after the respiration became very rapid and laboured, and the animal lay on its side. After some minutes it was able to sit up, and the respiration became calmer, but was still unduly hurried. On the two following days the rabbit appeared to be better, but on the morning of the third day it died. It was examined two hours after death.

When the body was opened the odour was remarkably unpleasant.

The ventricles of the heart were moderately contracted, but the auricles were distended with blood.

The lungs were, for the most part, pale, but here and there was a large, irregular, but well defined patch, of a deep livid colour. When these patches were divided black blood, with much blood-stained froth, escaped. No pus. The largest and best marked patch was on the posterior surface of the right lung, which was more affected than the other, but there were smaller patches on the front surface of the left lung.

The other viscera were healthy.

Experiment XI.

Some pieces of the flesh of a cat were macerated in distilled water for ten days. The fluid became very putrid. Some of this was filtered through paper, and two hundred minims were injected into the femoral vein, towards the heart, of a large cat. For some time the animal did not seem to be much affected by the operation. The next day, however, it was languid, but still it took food. On the following day it was dead. It was examined twelve hours afterwards.

The right side of the heart, and venous system generally, were congested.

On the posterior surface of both lungs, which were throughout unduly charged with blood, there were large patches of a dark claret colour, from intense congestion.

In the liver there was marked congestion of the hepatic vein.

The blood was dark and fluid.

The wound had almost healed. There was no mischief about the vein.

Experiment XII.

I injected into the femoral vein, towards the heart, of a cat, a drachm of very putrid fluid—formed by maceration of cats' flesh in distilled water for eleven days—carefully filtered. The respiration became at once very rapid, and she passed one large soft fœcal mass. She did not seem to be very ill, but died in the course of a few hours. The body was examined the next day.

Rigor mortis was well marked. No obvious decomposition.

The heart was moderately filled with dark fluid blood.

The lungs were somewhat congested throughout. One or two spots and small patches on the posterior surface of lower lobes.

In the liver there was a moderate degree of congestion of the hepatic vein.

In the intestines some Peyer's patches were mottled with clusters of highly congested vessels, having points in their centre looking like ecchymoses.

The spleen and kidneys were healthy.

Experiment XIII.

Some pieces of the flesh of a cat were macerated eighteen days in distilled water. A portion of the fluid, which had become abominably fœtid, was filtered, and two drachms were

injected into the femoral vein, towards the heart, of a healthy puppy, weighing about 8 lbs. Immediately after the injection the respiration became hurried, and remained so for a short time. Some fluid and very fœtid fœcal matter was discharged from the bowels, and then the stomach ejected a full and recent meal. There was great depression. The next day the dog was found dead. It was examined twenty hours afterwards.

The whole venous system was much congested. The right side of the heart was distended. The pulmonary arteries were engorged with black loose coagula.

The lungs, in some parts, were pale; in others, especially along the free margins, livid with congestion.

The liver was intensely congested; some of the lobes were almost black.

The spleen was somewhat congested.

The kidneys were normal.

Experiment XIV.

A portion of very putrid fluid—formed by macerating cats' flesh in distilled water for twenty-two days—was filtered, and two drachms of this were injected into the femoral vein, towards the heart, of a dog weighing about 12 lbs. Soon after, the animal appeared to be rather dull, and was sick, but in a short time he seemed tolerably well again. But there was much vomiting and purging during the night, and the next morning he was found dead. Examined about six hours afterwards.

The body was not rigid, but it exhaled a very fœtid odour. When cut into, this was most offensive.

The blood was dark, and, for the most part, fluid; hardly coagulated.

The heart was rather full of dark blood with clots, especially the auricles.

The lungs presented a very remarkable appearance. They were much congested; the upper lobes dusky, and mottled here and there with a black patch; the lower lobes uniformly livid, but crepitant and floating. The apex of the right lung was of an intensely bright scarlet colour abruptly defined below.

The liver was soft and pliable, and there was much congestion of the hepatic vein.

The spleen rather dark, but not otherwise altered.

Kidneys healthy.

The mucous membrane of the small intestine was unnaturally vascular, with some of Peyer's patches congested.

Experiment XV.

Into the femoral vein of a large dog, weighing between 40 and 50 lbs., half an ounce of putrid fluid—formed by macerating cats' flesh in distilled water for nine days—previously filtered, was injected. Both before and after the injection there was much hæmorrhage from the aperture in the vein, and the dog became very faint. Besides the prostration there was no obvious effect. In the course of a few hours it died. It was examined forty hours afterwards.

The heart was distended with dark fluid blood.

The lungs were pale and anæmic, but mottled throughout with patches of congestion of a dark livid colour.

All over the liver, especially on its upper surface, were scattered numerous patches closely resembling those described in Experiment VI. but smaller and paler. Nevertheless, the resemblance between these and those found after the injection of oxide of zinc was remarkable.

Both liver and kidneys were softened, very friable, almost pulpy; but the kidneys were otherwise healthy.

Spleen healthy.

Decomposition was rapidly advancing.

Experiment XVI.

Into the femoral vein of a dog, weighing about 10 lbs., three drachms of very putrid fluid, previously filtered, were injected. The fluid was formed by maceration of flesh in distilled water for forty-eight days.

After the operation the animal vomited and seemed depressed, but no other visible effect was produced. In the course of a few hours, however, the dog died. It was examined shortly afterwards.

With the exception of one or two petechial spots, the left lung was of a natural pale rose pink colour and healthy, but the right lung was throughout of a deep dusky red colour from congestion; and scattered over its surface were a few round or oval livid patches. The contrast between the condition of the two lungs was very marked.

The other viscera were healthy. Perhaps the liver was somewhat congested.

In this experiment it would appear that the diffusion of the putrid fluid through the blood had been more limited than usual.

Experiment XVII.

Some pieces of the flesh of a cat were macerated in distilled water for four days. A portion of the fluid, which was putrid, was then filtered, and two drachms were injected into the femoral vein, towards the heart, of a large cat. The animal appeared to be but very little affected. The following day or two it was rather dull, but at the end of a week it seemed quite well, and the wound was granulating healthily.

At the end of another week—that is a fortnight after the first injection—a hundred and fifty minims of the same fluid, previously filtered, were injected in like manner into the other femoral vein. The flesh had now lain in the water eighteen days, and the fluid was abominably fœtid. In a few minutes after the operation the animal became very languid and feeble. The most marked change was great increase in the rate of the respiration. The next day the cat was found dead. It was examined twenty hours afterwards.

There was intense congestion of the whole venous system. The right side of the heart, venæ cavæ, and pulmonary vessels were distended.

The lungs were much congested, particularly at the back part. Here and there were small livid or black patches.

The liver was much congested; the spleen in a less degree; the kidneys slightly.

Dark fluid blood freely escaped when the vessels were divided. There were no purulent deposits.

Experiment XVIII.

Into the femoral vein, towards the heart, of a young dog, weighing about 12 lbs., I injected a drachm of putrid fluid, previously filtered, and mixed with an equal quantity of distilled water. The putrid fluid was formed by macerating cats' flesh in distilled water for fifteen days. No obvious effects were produced. The next day the dog was apparently well, with a good appetite.

Three days afterwards, two drachms of the same filtered putrid fluid were injected into the other femoral vein without any obvious immediate effect, but soon after he vomited and the bowels acted. The next day he took food freely, and did not seem very ill.

Four days afterwards he seemed well. Then two drachms of the same filtered putrid fluid were injected into the jugular

vein. Soon after this he was affected with vomiting and purging, but before long recovered, and remained tolerably well.

For three weeks after the last operation he continued apparently well. He was then killed by division of the medulla. There was considerable hæmorrhage. The body was examined immediately.

Nothing morbid or unusual was discovered in any part but in the lungs.

The lungs, especially the right, were mottled over the surface with irregular patches of a dark red or livid colour, for the most part continuous with each other, which, from the pale tint of the rest of the lungs from hæmorrhage, contrasted strikingly with the surrounding substance. When divided, a frothy, reddish yellow fluid escaped, but no pus could be found. When cut across, the patches were not abruptly defined, but gradually faded as they extended some depth into the pulmonary tissue, but on the surface their line of demarcation was distinct. The lungs were crepitant throughout, but there was a sense of greater resistance to pressure about these congested portions than elsewhere.*

Experiment XIX.

I injected into the femoral vein of a dog, weighing about 15 lbs., a drachm and a half of very putrid fluid previously filtered. The fluid was formed by macerating flesh in distilled water for thirty-two days. The animal seemed hardly affected by the operation. Perhaps it was not quite so lively afterwards as before, but no other change was perceptible, and this soon passed off.

Nine days afterwards, I injected into the other femoral vein another drachm and a half of the same very putrid fluid previously filtered. The dog, which before the operation, seemed perfectly well, and was very lively, soon after was dull and disinclined to move. But no further effects appeared. The next day he seemed well.

Another week afterwards, I injected into the jugular vein, towards the heart, half an ounce of the same putrid fluid, now forty-eight days old, previously filtered. After the operation the animal vomited and seemed dull, but not ill. In a short time he recovered, and remained apparently quite well, active, and playful.

In five weeks from the date of the last operation he was poisoned with prussic acid, and examined immediately after.

* One lung (Series xiv. 83), and a coloured drawing of it when recent, are in the Museum.

No trace of mischief was found anywhere but in the right lung, and here was only one small oval well-defined livid and somewhat indurated patch upon its posterior surface.

The wounds had quite healed.

Experiment XX.

Some liquor amnii, which had been kept nine days and was very putrid, was carefully filtered through blotting paper. Two drachms of the filtered fluid were then injected, by an Anel's syringe, into the femoral vein, towards the heart, of a healthy terrier of about 15 lbs. weight. A few minutes after the dog was sick and the bowels acted copiously. The next day it seemed tolerably well.

Five days afterwards, the animal then appearing to be quite well, a hundred minims of the same fœtid liquor amnii, now fourteen days old, which was again filtered, were injected into the other femoral vein. The animal was obviously depressed after the operation. It was disinclined to move, was soon sick, and the bowels acted. It breathed quickly and with much effort. On the third day it died, and was examined one hour afterwards.

The heart was flabby; the chambers containing but little blood.

The lungs were generally healthy. Some little blood escaped upon section. But scattered over their surface were some dark livid spots, varying in size from a mere point to that of a mustard seed. One or two of these appeared paler in the centre, but there was no distinct evidence of pus.

The liver was much congested.

Experiment XXI.

Some liquor amnii, which had been kept for seven days and was fœtid, was carefully filtered through blotting paper. Thirty-five minims of this were injected, by an Anel's syringe, into the femoral vein, towards the heart, of a fine healthy cat. The animal was obviously depressed almost immediately. It lay down, and seemed disinclined to move. But it soon recovered, and remained apparently well.

Two days afterwards eighty minims of the same filtered liquor amnii were injected into the other femoral vein. The cat did not appear to be much affected by this, and seemed tolerably well the next day. But the day after it was languid.

Five days afterwards, it not having then recovered, half a

drachm of the same filtered liquor amnii, now fourteen days old, and very putrid, were injected into the brachial vein. For awhile it did not appear the worst for this last experiment, but soon after a considerable quantity of loose fœcal matter was expelled. It gradually became depressed, and died on the third day. It was examined six hours afterwards.

The heart was somewhat flabby. The cavities were almost empty.

The lungs generally were slightly congested, with one or two dark livid spots on the surface.

The liver was somewhat congested.

I would not have performed these experiments if I could have made use of any others. But I could find none which, for the purpose I had in view, were free from objection. Gaspard,* in his numerous experiments of injecting putrid fluids into the circulation, produced the usual effects—congestion, even to engorging, infiltration, of various parts, stains, ecchymoses, petechial spots in the lungs, liver, and spleen, mucous membrane of the alimentary canal, stomach, &c. But he did not previously filter the putrid fluid he employed, so these experiments are open to the objection, that minute solid particles, which escaped observation, produced the effects mechanically. Sedillot,† indeed, relates some experiments of injecting filtered putrid fluids. And in some of these, besides other effects, patches of congestion and spots of ecchymosis were found in the lungs and elsewhere after death. Moreover, in some cases distinct abscesses were formed. But these experiments were complicated by the fact that the jugular vein, which was injected, was discovered after death either to contain 'pus' or a 'sanious and purulent clot,' and to be otherwise affected. It might therefore be urged against these experiments that they fail to establish clearly and exclusively the fact, that effects not distinguishable from those of embolism, may be caused by the mingling of filtered putrid fluids, that is, of morbid fluids which contain no solid particles with the blood.

Again, Professor Panum, in his experiments on putrid infection,‡ never found any inflammatory changes in the lungs, provided the putrid fluids had been carefully filtered. I cannot account for these negative results.

It may be added, that although Cruveilhier and others have performed many experiments of introducing globules of mercury

* Journal de Physiologie, tom. ii. iv. 1822–24.

† De l'Infection Purulente, ou Pyoèmie, 1849.

‡ Virchow's Archiv für Pathologische Anatomie, xxv. 441.

and other substances into the circulation, yet from the descriptions which have been given of the result—suppuration—I could not compare the changes induced by solid particles with those induced by the injection of putrid fluid. There was no alternative, then, but to make experiments for myself, and to examine and compare the effects produced by different agents.

I may mention here, that in my experiments I usually injected by the femoral vein. In most recorded experiments the jugular vein was injected. I prefer the femoral, because the fluid or solid particles have more time to mingle with and diffuse through the blood before reaching the heart and lungs.

Now, how do these local effects, these engorged portions of lung which are produced by the injection into the blood of putrid fluids, previously filtered, differ from those which are produced by the injection of minute solid particles? Beyond some differences of degree and variations in detail to be presently alluded to, I cannot discover any essential distinction which can be set up to show that these manifestly similar effects are not produced in the same way. At first I naturally sought for such marks of distinction, but was at length led to conclude that these local lesions, which are similar in their main features, have a common origin. Nor when one reflects upon the subject is it perhaps so difficult, as at first sight it may appear to be, to account for the fact that the same effects are produced by such different agents as poisonous fluids and passive particles of solid matter.

To take the second case first. It cannot be doubted that these minute particles act mechanically only, at least at the outset, by blocking up capillary vessels, and so inducing stagnation and congestion, which gradually spread, the further consequences being determined by other circumstances, such as the amount of irritation thus set up and the constitution and state of health of the subject.

In the first case also stagnation is likewise induced, but by a different process. It is essential to a free capillary circulation that the changes between the blood and the tissues which there occur should proceed in a normal manner. It has been shown that whatever interferes with those mutual changes constitutes an impediment to the capillary circulation.* Hence, then, the congestion and stagnation, more or less extensive and widely spreading, which ensue upon, or can be induced at pleasure by, the introduction of morbid matters into the blood. These may be altogether in the fluid form, yet, mingling with the

* Med.-Chir. Review, vols. xv. xvi.

blood, they must affect profoundly its constitution, and consequently the relation which it will hold to the tissues through which it circulates. Healthy nutrition is checked, the normal changes are obstructed, and therefore the capillary circulation is no longer free. The transmission of blood through the capillaries being hindered,* it there accumulates, and at length stagnates. Thus obstruction to the circulation of the blood through the capillaries is the common condition arrived at in either case.

It is a significant fact, that these different agents not only produce the same result, but affect principally and particularly the same organs—the lungs. In the case of solid particles, which obviously act by blocking up the capillaries, the lungs are the sole or chief seat of the mischief, by virtue of their position —their capillaries being the first that the blood reaches after its contamination—their vascularity, and the minuteness of their capillary network. What other explanation, in the case of morbid fluids, can be offered of the fact, that here also the stress of mischief falls upon the lungs, than that the cause of it is likewise lodged in the pulmonary capillaries? In either case the organs beyond are more or less protected by the total or partial arrest of the mischievous matter in the lungs.

It may perhaps be said that, generally speaking, the spots of stagnation and congestion produced by the injection of solid particles are smaller and more regular in outline than the patches produced by the injection of poisonous fluids. This variation, which constitutes of course no essential distinction, may be due to the fact, that a fluid is more readily and widely diffused through portions of the blood than are solid particles.

It has been abundantly shown that these spots of stagnation and portions of congested tissue constitute the initiative stage of the process of suppuration, the first step in the formation of secondary abscesses. It is remarkable however that, in my experiments, the stage of suppuration was never fairly reached. This, I think, may be attributed to the fact that healthy animals were the subjects of my observations. The tendency to recovery, like the power of repair, is, it is well known, much greater in animals than in man, even when healthy subjects are compared. And in man, pyæmia is, to say the

* I would say, the normal forces which there operate to assist its movement are suspended (op. cit.). But, whatever opinions may be still entertained by some in question of the existence of a force at the capillaries assisting the circulation, all agree that a healthy condition of the blood is necessary to a full and free circulation through the capillaries; and that whatever interferes with the normal characters of the blood interferes to a corresponding degree with its circulation.

least, rarely witnessed supervening upon a state of perfect health. There is, therefore, to the natural difference of constitution added the difference between a previous state of perfect health and a state of debility engendered by disease.

The results of my experiments accord, in this respect, with the majority of those which have been performed by others. Whatever the general impression of the subject may be, actual suppuration has been proved to be by no means a common event. It has been only very rarely provoked.

And, moreover, it may be remarked, that in the experiments recorded by others, in which suppuration was established, the animals were subjected to repeated operations, and otherwise treated so that they were doubtless reduced to a sickly condition. Under these circumstances the morbid action set up would tend rather to advance than to recede.*

I may add, too, that during the whole time the animals were under my observation they were carefully attended. They were kept clean, well fed, and allowed to move about in a large, dry, warm, and freely-ventilated apartment.

And, with all deference, I would suggest the question, whether pus was really produced in some at least of the cases in which its presence is affirmed? As the result of change—disintegration and degeneration—collections of granular and oily matter often appear which, to the naked eye, may present all the characters of pus. That such a suggestion is not an impertinent one, is shown, I think, by the history of our knowledge of the changes which clots undergo when formed in veins. What was for many years, and by the most skilful and accomplished observers, regarded as pus, has been demonstrated to be nothing more than the result of disintegration of the clot.

The effects of putrid fluids in the blood will be more extensive and profound than those of solid particles, not only because fluids are more readily diffused throughout the mass than solids, and more liable to escape in part through the first set of capillaries, and then to set up further mischief; but chiefly because, beyond the local effects produced by stagnation in the capillaries, they no doubt induce changes in, and so damage the constitution of, the blood itself.

* It has been affirmed, that repeated injections of small quantities of pus produce very different results from those of a single injection of a larger quantity; and that the former process is more analogous, in its effects, to the cause of pyæmia in man. Probably there is some truth in this. Certain of the more chronic forms of the affection may be thus kept up. But the symptoms of pyæmia often arise so suddenly and abruptly, and are so acute and severe in man, that they can hardly be referred to the repeated introduction, at intervals more or less prolonged, of small quantities of poisonous matter.

That the blood is really and truly poisoned by the introduction of putrid matters is strikingly shown in the following experiment. Gaspard, having injected much putrid matter, which destroyed a dog, drew some blood from its uninjured jugular vein which was without any putrid odour. It was defibrinated, passed through linen, and then four ounces and a half were injected lukewarm into the jugular vein of another very vigorous dog. The injection was followed by the usual symptoms of blood-poisoning, although the dog recovered, after vomiting and purging. After relating this experiment, Gaspard says, 'It is certain, then, that putrid substances injected into the veins affect the general mass of the blood, notwithstanding their successive passage and their filtration through the two systems of the lungs and other organs.' 'It is evident that putrid liquids injected by the jugular circulate through the whole body, and are not arrested in the capillaries like mercury, fat, oil, viscid substances and powders, or any others too coarse.'*

Nevertheless, although the poison partly passes through, it produces obstruction in the capillaries, for in the dog, from which the poisonous blood had been drawn, petechial spots were found after death in the lungs and left ventricle of the heart, considerable ecchymoses in the cellular tissue around the thoracic aorta, in the mesenteric glands and gall bladder, and something like inflammation of the mucous membrane of the intestines.

So the effects during life, or the symptoms of injection of putrid fluids, are more diffused and severe than those of solid particles. In both cases the obstruction of the pulmonary circulation is indicated by rapid and laborious respiratory movements, but in the case of poisonous fluid, there are added general debility and prostration, with vomiting and purging.

There can, I think, be no doubt that death in pyæmia is often to be referred to the condition of the blood rather than to any local effects. Thus during life the symptoms of what is called pyæmia are the symptoms of blood-poisoning, not of embolism.

The results of the injection of putrid matters into the blood vary according to the amount and intensity of the poison. But I think all the morbid conditions induced may be referred to an alteration of the blood, whereby its circulation is hindered. It has been laid down as a general law by Dr. Robert Williams,† 'that when a morbid poison acts with its greatest intensity, and

* Op. cit. tom. iv. p. 59.
† Elements of Medicine, vol. i. p. 12.

produces the severest forms of disease, fewer traces of organic alteration of structure will be found than when the disease has been of a milder character.' In the worst cases almost immediate death may be produced by injection into the veins, and an examination reveals the effects of almost complete obstruction of the pulmonary circulation. When death rapidly supervenes upon the introduction of putrid animal matter into the blood, the only morbid condition to be discovered upon examination is general congestion of the venous system with dark fluid or very imperfectly coagulated blood. The right auricle of the heart, and to a less extent the right ventricle, are thus unduly distended, and when punctured dark fluid blood escapes and they collapse. The large veins leading into the auricle stand out prominently, filled with blood, for the most part fluid, and from these the veins generally may be traced containing much more blood than usual. What does this condition signify? Is not all this due to some insuperable obstruction to the passage of the blood through the capillaries of the lungs? Is not the blood thus contaminated by the admixture of a poison so altered that it is no longer able to pass through the capillaries? These effects correspond with those produced by the injection of powders* or other solids, or of air, which, mixing with the blood, produce a mechanical obstruction to its passage through the lungs. Thus, mechanical and chemical alteration of the blood alike tend to obstruct its circulation. When the poison operates in a less degree, the circulation is not at once completely arrested, but impeded; the degree of obstruction corresponding no doubt to the intensity of the poison. After death a general fulness of the venous system may be discovered, with congestion of the internal organs, the lungs, liver, spleen, &c. and, if the effects be sufficiently prolonged, with patches of congestion more or less circumscribed, stains, ecchymoses of the lungs, or other viscera. Surely we have some insight into the pathology of these cases.

The effects described above may be produced, as one would naturally conclude, by putrid infusions of vegetable as well as of animal matters. Gaspard, in his experiments, found that, while the general results were the same, the former act upon the economy to a less degree than the latter,† and so even with solutions of mineral substances. Gaspard,‡ by injecting about a grain and a half of corrosive sublimate, dissolved in water, into the vein of a dog, produced, among other effects, a crowd

* See Experiments vii. viii. and ix.
† Op. cit. tom. ii., p. 20.
‡ Op. cit. tom. i. p. 182.

of little abscesses in the lungs. 'The lungs were strewn with a crowd of little abscesses, separated from each other by pulmonary tissue, almost healthy.'

Even oil, bland and harmless in other ways, will, by blocking up the capillaries, produce like effects. Majendie, as others had done before him, injected oil into the veins, and, examining the animal after death, saw that the oil had blocked up the smallest ramifications of the pulmonary artery, and that it had thus arrested the circulation and respiration by preventing the passage of the blood to the left side of the heart by the pulmonary vein. 'The oil,' he says, 'had thus acted as an inert, impalpable powder, suspended in water, and which produces death immediately if injected into the jugular vein, because it obstructs the finest divisions of the pulmonary artery.'* He says exactly the same phenomena were produced by a somewhat thick solution of gum.† Gaspard has pointed out that oils, fats, and viscid substances may circulate through the capillary vessels in small quantity when in a state of minute subdivision, as an emulsion, the effect being no doubt determined by the size of the molecules.‡

Experiment XXII.

Into the femoral vein of a healthy dog, weighing about 25 lbs., I injected two drachms of olive oil, shaken up with an equal quantity of water. No apparent effect whatever was produced by the operation. The dog seemed as well after it as before.

Five days afterwards three drachms of olive oil were injected into the other femoral vein. The dog was sick after the operation, and seemed dull and depressed, but beyond this, no obvious effect was produced. The respiration remained tranquil.

A week after the last injection the dog was killed by division of the medulla. Much blood was lost. It was examined immediately.

The cavities of the heart were moderately distended with blood.

The lungs throughout were pale and anæmic. Here and there were a very few spots and patches of congestion of a dusky tint. The colour of these was not intense, but it contrasted with the pallor of the lung substance generally.

The other organs were healthy.

* Journal de Physiologie, 1821, tom. i. p. 37.
† Loc. cit. ‡ Op. cit. tom. i. p. 247.

Experiment XXIII.

Into the femoral vein of a healthy dog, weighing about 25 lbs., I injected three drachms of olive oil. No apparent effect whatever was produced by the operation. The dog seemed as well after it as before.

Five days afterwards three drachms of olive oil were injected into the other femoral vein. The dog seemed somewhat less lively after the operation, but beyond this no obvious effect was produced. The respiration remained unaffected.

A week after the last injection the dog was killed by division of the medulla. No blood was lost. It was examined immediately.

The chambers of the heart were moderately distended.

Here and there, on the surface of the lungs, were one or two livid patches of congestion. The colour was dull, and not intense, and was not particularly well-marked from that of the surrounding lung substance.

The other organs were healthy.

Cases of embolism of the capillaries of the human lung, &c. with fluid fat, have been recorded by E. Wagner and others.*

In the same way similar effects, but of course more limited and intense, may be produced by injecting an artery. Gaspard† and others have shown this by experiment.

From these considerations, and a knowledge of the constitution of pus, one might be led to anticipate the result of its injection.

Experiment XXIV.

After an unsuccessful attempt on the right femoral, I injected into the jugular vein of a remarkably fine rabbit about a drachm of fresh, well-formed pus. The animal appeared to be somewhat depressed by the operation, and the respiration became hurried and rather laboured, but shortly afterwards it took food freely. The next day it seemed tolerably well, but on the following day it was obviously weak, and it gradually grew worse until it died, on the third day. It was examined eight hours afterwards.

The right auricle of the heart was distended with a large soft dark clot. The other chambers were moderately contracted.

The lungs were mottled throughout with dark red or dusky

* Archiv der Heilkunde, 1862, p. 241. Two cases of this have been recently related by Dr. Arnold Uffelmann, Zeitschrift für rationelle Medicin, 1865, xxiii. p. 217.

† Op. cit. tom. v. p. 339.

confluent patches of intense congestion. The upper lobe of the right lung was almost uniformly thus affected, and here and there, in the midst, were one or two small well-defined patches, almost black. Towards the lower portions of both lungs congestion was less abundant, and the tissue generally paler. No pus could be detected anywhere.

With the exception of one or two points of congestion on the liver, the other organs presented nothing remarkable.

Experiment XXV.

Into the femoral vein, towards the heart, of a healthy dog, weighing about 12 lbs., two drachms of fresh pus, from a case of empyema, were injected. Except vomiting, no obvious effect was produced. The next day the dog seemed well.

Nine days afterwards, the animal having remained apparently well, two drachms of fresh pus were injected into the other femoral vein. The respiration became at once rapid and laboured, and, as soon as the animal was released, it fell on to its side prostrate, and lay breathing irregularly. In a quarter of an hour it became better, and walked about feebly, panting. There was a healthy evacuation from the bowels. But the dog died in a few hours. It was examined sixteen hours afterwards.

Nothing morbid was discovered beyond congestion of both lungs generally, and one or two very small patches of engorgement in the right lung.

That the action of fresh healthy pus in this respect is mechanical—due to the arrest of its solid particles, its globules, in the capillaries—is proved by the negative result of the injection of its fluid portion alone.

Experiment XXVI.

Some fresh healthy pus was allowed to stand at rest for a short time, and the upper thinner portion was then filtered through blotting paper. Two drachms of this filtered fluid, which was clear and transparent, were injected into the femoral vein of a puppy, about seven months old, weighing about 10 or 12 lbs. The dog vomited a hearty meal, which it had previously taken, a few minutes after the operation, but beyond this no obvious effect whatever was produced. The dog was killed one week afterwards, and immediately examined.

The lungs and all the organs were in a perfectly healthy state: no morbid change of any kind could be detected.

Sedillot * has shown by experiments that the filtered serum of good fresh pus may be injected, even in very large quantity, without producing any ill effects.

When pus is putrid, however, the other cause comes into operation. It now acts both by its solid particles, and by its poisonous fluid.

Experiment XXVII.

Into the femoral vein of a dog, weighing about 12lbs., two drachms of putrid fluid, filtered from pus, were injected. There was much hæmorrhage after the operation. No obvious effect beyond weakness. But the animal died in a few hours. It was examined forty hours afterwards.

The heart was moderately distended with dark blood feebly coagulated.

The lungs were congested, and scattered over their surface were petechial spots and small livid patches.

The liver was somewhat congested.

The spleen and kidneys were healthy.

Decomposition was advancing rapidly. The abdomen was distended with gas. (The weather was warm.)

This last experiment was perhaps hardly needed to establish the fact.

From these experiments one is justified in concluding:—

That spots and patches of congestion and stagnation, with perhaps ecchymosis in the lungs and other organs, may be produced by the injection into the veins—

Of minute particles of solid matter suspended in water, which can undergo in the blood no decomposition or induce any chemical change, and consequently can only act mechanically.

Of putrid fluids which have been previously carefully filtered, and so deprived of any solid particles.

Of pus.

That in either case the local effects are the same. The most critical examination fails to detect any distinction in the engorged portions of tissue produced by these different means, except that when solid particles which undergo no change are employed, they may be discovered in the midst.

The action of fresh pus in producing these effects is mechanical. Either its cells, or the clots which it may form in the blood, become impacted in the capillaries. When putrid no doubt it acts in both modes.

Pus, then, has no peculiar or specific action when present in

* Op. cit. See especially Experiment 42.

the blood. If putrid it will act like putrid matters generally do. Or its globules may, under certain circumstances, like other foreign particles, become arrested in and block up the capillaries, producing effects already described.

In these experiments abscesses were not more readily induced by the injection of pus than of simple fluids or even of solid particles.

The chemical relation of pus to the production of pyæmia appears to be this,—

Suppuration is a common occurrence either on the surface of wounds or ulcers, or in internal parts.

Pus, as pus, cannot be absorbed; that is, its solid particles, its corpuscles, cannot enter the circulation except through some lesion of the blood-vessels. Pus may pass into the circulation through an orifice in a vein; this occurrence, however, must be extremely rare. But the fluid part of pus may be absorbed. If this be not putrid no mischief will supervene.

Even if healthy pus should, by some rare chance, find its way into the circulation, no secondary abscesses would perhaps be, under ordinary circumstances, produced. For healthy pus may be, very often has been, injected into the circulation without being followed by any purulent deposit whatever. None of the effects which are ascribed to pyæmia are necessarily produced by the injection of healthy pus.

But pus may become putrid, more especially if exposed to air in a wound, and the putrid fluid may be absorbed; and this, like any other putrid fluid, will produce the effects to which the term pyæmia is applied. It will poison the blood. For when putrid pus is injected the symptoms of blood-poisoning, as after the injection of any putrid matter, will supervene.

It is undoubtedly a rare circumstance to find a case of well-marked and fully developed pyæmia without any evidence of the previous existence of pus in some part of the body.

The previous existence of an external wound, indeed, is by no means necessary to the development of pyæmia. In the young, on the contrary, it is perhaps most frequently seen in connection with acute necrosis. But suppuration occurs in these cases. Erichsen declares, 'Pyæmia is never, I believe, an idiopathic or primary affection, but either occurs subsequently to an injury or wound of some kind by which inflammation is excited, which has, in most cases, reached the stage of suppuration before the pyæmic symptoms come on, or it appears in connection with some low form of specific suppurative inflammation.'*

* Loc. cit.

Now one of the chief arguments of those who affirm that the passage of pus into the blood is the sole cause of pyæmia is drawn from the assumed fact of the constant pre-existence of a local suppuration.

But the fact that pyæmia is so commonly preceded by the formation of pus admits of another, which I believe is the correct interpretation.

Pyæmia may be due to the absorption of a putrid or morbid fluid. But such a fluid is hardly ever, can hardly ever be, poured out except under the circumstances in which pus will be formed. Nay, more; no doubt this morbid poisonous fluid is often the changed or partially decomposed fluid of pus. The conditions under which suppuration occurs are almost always the conditions under which a putrid fluid will be formed and can be absorbed. Admitting fully, however, this relation of pus to pyæmia, it is nevertheless to be understood that there is nothing peculiar to pus upon which the production of pyæmia depends.

In this investigation experiments upon animals are undoubtedly to be relied on up to a certain point. The broad questions which relate to cause and effect are well defined and may be thereby determined. But when we pass from questions of kind to questions of degree * much must be allowed to the difference which prevails in the two cases. For example, the effects of substances which act chemically, and of those which act mechanically, may be demonstrated on animals previously healthy. The effects of putrid fluids may be compared and contrasted with those of solids in a state of minute disintegration. But when the rate at which purulent collections may be formed has to be investigated, and the circumstances which influence their production, we must bear in mind, what has been already noticed, the wide difference which prevails between an animal previously in robust health and a man previously subjected to morbid or depressing conditions. Whether the congestion and stagnation produced by the injection or absorption, by man or animals, of various substances into the blood, run on into suppuration, or eventually clear up, depends mainly, no doubt, upon the constitution and state of health of the individual subjected to the experiment. Hence the fact that local suppurations rarely follow a single injection, but are more frequently induced by repeated injections; for, in the latter case the health and strength of the animal are more and more shaken by each successive operation, and so, becoming

* Lancet, Jan. 11, 1862.

enfeebled, it succumbs at last.* But, even assuming a previous state of vigorous health, in either case, still much must be allowed for difference of constitution, not only between animals and man, but also between different animals. For one instance out of many. Suppuration is more easily induced in rabbits than in dogs or cats; and the former succumb to injury much more readily than the latter. Speaking generally, it may be said that while experiments on animals are available and reliable for the solution of questions of kind, all conclusions from them must be drawn with the utmost caution in relation to questions of degree.

There is evidence of a different kind, but of itself conclusive, that the effects of a morbid poison upon the system must be, at least in some measure, determined by the nature and constitution of the animal body upon which it operates. For not only are some poisons, as that of syphilis, so far indeed as is at present known, incapable of being transferred from man to animals,† but others, as that of glanders, which are capable of being transferred from animals to man, by no means always produce the same effects in the latter as in the former. Yet the essential nature of the poison itself can hardly be destroyed, for when matter from the abscesses which have been produced by inoculation of the human subject, has been introduced into the system of the horse or ass, ordinary glanders has been the result.‡

It must be observed that the effects produced by the introduction of different matters into the blood is by no means uniform. They may differ widely. Thus, after the mingling of certain poisonous substances with the blood, instead of suppuration, gangrene of the lungs and other organs may be produced. This fact seems to be well established both by experiment and by observation. But does this result, gangrene, represent a difference of kind or only of degree? Are suppu-

* See Callender on Pyæmia, in Holmes's System of Surgery, vol. i. p. 285, where this is clearly set forth. While division of the sympathetic nerve in the neck of a healthy rabbit produces simply congestion of the corresponding side of the head, Bernard (Leçons de Physiologie, 1855, p. 352) tells us, that if the animal be weak or made ill by the operation, forthwith all the side of the head passes into a state of inflammation and suppuration.

† As in the negative results of the experiments of Hunter and others. See Williams, op. cit. vol. ii. p. 186.

‡ See Travers on Constitutional Irritation, 1827, p. 398. He says, after stating that the poison of glanders retains its properties after passing through the human system, 'there is no evidence of its acting on the human body otherwise than as the poison of dead animal bodies' (op. cit. p. 397). But surely all the symptoms of glanders, in their most characteristic form, may be produced in man by contamination from a horse so affected.

ration and gangrene—to take these striking results—distinct effects of different poisons, or are they only different degrees of morbid action, determined by the intensity or quantity of the poison operating and the condition of the system? All I can say is this, that the evidence before us does not warrant the conclusion that these effects are due to the action of different poisons.

An attempt has been made by Sedillot,* under the idea that the cause of pyæmia is pus in the blood, to distinguish between the effects of purulent and putrid injections; but I think without success. In summing up his conclusions he says: 'There is a simple purulent affection signalised by an inflammation having obvious and well-defined characters, and by the development of abscesses, called metastatic. There is a true gangrenous affection, and the abscesses are not, in this case, primitive, but the result of an eliminative inflammation, and dependent on the presence of parts already struck with death.'

'These are two distinct maladies, although united by common appearances. The one is determined by the solid elements of pus, the other by the putridity of any animal substance whatever.'

I cannot think the distinction between the effects produced thus laid down, borne out by facts. No doubt, in the case of putrid fluids, there are, in addition to the local effects, the stasis, which they produce in common with solid particles, the far more fatal general effects of actual poisoning of the blood. There can be little doubt also that the more intense action of a subtle poison may far more frequently provoke gangrene, but with regard to the spots and patches of congestion and stagnation, the abscesses of pyæmia, I believe that solid particles and poisonous fluid lead in the same way to the same result.

Dr. Budd states,† and I venture to say with more truth, 'The portal blood may be contaminated by *pus* formed by suppurative inflammation of one of the small intestinal veins, or by matter of other kind resulting from softening of the tissues, or by the fœtid, gaseous, and liquid contents of the large intestine in dysentery, which must be absorbed and conveyed immediately to the liver. It seems probable that contamination of the first kind usually gives rise to small scattered abscesses, of the last to diffuse inflammation, and a larger, perhaps single, collection of pus. If the morbid matter be such that it does not mix readily with the blood—as globules of pus or mercury—it will cause small circumscribed abscesses, the rest of the liver

* Op. cit.

† Diseases of the Liver, 1857, p. 89.

being healthy. If, on the contrary, the morbid matter be readily diffusible in the blood, all the blood will be vitiated, and diffuse inflammation result, which may or may not be suppurative, according to the quality or concentration of the contaminating matter and the general state of nutrition at the time. In the course of dysentery the liver is very generally disordered, and congestion of it, and inflammation, that does not go on into suppuration, not unfrequently occur.'

It is more than probable that all morbid poisons produce certain effects in common, and within these, each poison perhaps produces effects peculiar to itself, and by which, if we were sufficiently informed, its action might be recognised. But at present, even the common effects of poisons in general, the larger results, often escape detection, still oftener are misinterpreted.

The causes of the local congestions and suppurations in pyæmia may therefore be thus classified:—

Stasis due to mechanical action. A blockade produced by the impaction of solid particles. According to their size:—

Arterial embolism. By fragments too large to pass through the smaller arteries.

Capillary embolism. By fragments small enough to pass into the capillaries.

Stasis due to change in the blood produced by the admixture of morbid fluid. The local effect of blood-poisoning, properly so called.

Capillary obstruction.

Stasis due to a combination of the two above-mentioned causes.

In all cases stagnation and congestion first ensue. The subsequent changes, whether towards resolution, suppuration, or gangrene, are determined by—

The action of the morbid fluid or obstructing substance. The changes it provokes.

The constitution and state of health of the individual.

But if pyæmia be thus caused by the circulation of morbid matter with the blood, how comes it, considering the absorbing power of raw surfaces, and the frequency with which wounds are bathed in fœtid fluids, that pyæmia is not even much more common than it is? Why, in the case of every putrid collection in contact with living parts, is there not infection? The apparent discrepancy between cause and effect, in this regard, disappears when the circumstances which affect absorption are taken into account. Since the time when the mingling of fluids through animal membranes was demonstrated much has been

added to our knowledge of the subject. Especially have the conditions which influence the transmission of fluids been studied both in relation to the fluids themselves and the membranes through which they pass. Absorption, or the transmission of fluids through membranes, no longer appears the simple process it was formerly supposed to be. Not only is it much modified according to the nature and surface of the tissue, but also by the character and composition of the fluid. It has been shown that the constituents of a fluid, apparently uniform, may be thus separated by a membrane through which one can, and the other cannot, pass; and that in this there is a means of analysis more subtle than the chemist can accomplish. Moreover, it is probable that absorption of poisonous matter, even when it does occur, may be sometimes so gradual as not to exceed the rate of elimination, and therefore not to accumulate in the blood to an extent sufficient to produce obvious results. When all this is considered in relation to the absorption of poisonous fluids, the objection just now alluded to loses all its weight. Unhappily, pyæmia is of no rare occurrence; but it would be far more frequent than it is if there were no difficulty in the way of absorption of putrid fluids from raw surfaces.

Clinical observation furnishes results completely corresponding to these of experiment. As in experiment, so in practice, the worst cases, those in which death is most rapid, reveal afterwards the least signs of local disease. Indeed, in the very worst cases there has been no time for the local effects to supervene. The whole mass of the blood is so poisoned and spoiled that it kills outright. It is in the milder cases only that the local effects have time to develope, and to pass through their subsequent changes. Up to the occurrence of these local effects —the spots and patches of stagnation and congestion—and in the mode in which they are produced, experiments upon animals and clinical observation are uniformly parallel in their results. But from this point they commonly, yet not always, diverge. In animals, there is usually a tendency to resolution of these spots and patches; in man they too often degenerate and become puriform. Both in experiment and clinical observation, although the local effects of putrid fluids and solid particles are essentially the same and produced in the same way, it must ever be borne in mind that, in the case of putrid infection, there are added to these the more terrible effects of universal poisoning of the blood. And, in truth, it would be difficult to suggest any subject more worthy of study than the influence which this poisoning of the blood has upon these local lesions in determining the changes they subsequently undergo.

Article VIII.—*Two Cases of Poisoning by Mercuric Methide.* By George N. Edwards, M.D. Cantab.

Case I.

C. U., æt. 30, admitted into Matthew Ward, February 3rd 1865, under the care of Dr. Jeaffreson.

A well-nourished man of fair complexion and somewhat listless expression; pupils slightly dilated and brows knitted; skin hot and dry; pulse 86, easily compressed; tongue large, coated, and moist; appetite impaired; no thirst; bowels confined, but open last night; urine albuminous, and contains triple phosphate crystals, and casts.

Patient slept badly last night, but did not wander. He complains of a feeling of general debility and inability to stand without support, and states that his feet feel very cold, although they are quite warm to the touch. He moves both arms and legs slowly and with some difficulty, but sensation in them is unimpaired. He speaks indistinctly, and is deaf. Has no headache. Gums are somewhat swollen and tender on pressure.

History.—He is a German, assistant in the Laboratory at St. Bartholomew's Hospital, and of irregular habits. Has been in England about five years. Had epilepsy as a child. With the exception of syphilis, has since that time always enjoyed good health till about six years ago, when he had a fit. Three years ago he had two more fits, following each other at short intervals. From these he recovered completely. A month ago he was again seized with a fit (epileptic), and for two hours was quite insensible. He was taken home, but was able to return to his employment two days afterwards, although he has never quite recovered his speech since the attack, nor has his general health been so good as it was before that time. For nearly three months past he has been employed in the preparation of mercuric methide, and has complained during this time of impairment of sight. Upon examination by the ophthalmoscope, however, no abnormal condition of his eyes could be discovered. Two days ago he was seized with numbness of the hands, deafness, and great weakness, and found that his gums became sore. These symptoms increased up to the time of his admission. Another of Dr. Odling's assistants has been affected with symptoms similar in character but less in degree. —Ordered Emplast. Lyttæ nuchæ; Potassii Iodid. gr. iij. ter die; H. Sennæ Co. pro re nata; beef tea; brandy ℥ij.

Feb. 4th.—Slept well, and expresses himself as feeling better

to-day, although he still complains of great weakness and the sensation of cold in his feet; deafness continues the same; pulse 84, feeble; bowels open once after a dose of Haust. Sennæ Co.

Feb. 5th.—Did not sleep so well last night. Deafness and dulness of manner increased to-day, and it is with difficulty that he understands what is said to him. He has also less power in his hands. Pulse 90, small; tongue coated and moist; bowels have not acted since last note; urine pale, slightly turbid, acid, specific gravity 1018, containing a considerable quantity of albumen, and showing renal epithelium and granules under the microscope.—Ordered to continue the medicine and to take Hydrarg. Chlorid. gr. ij. hac nocte.

February 6th.—Passed a very restless night; has less power in his hands, his fingers being drawn together and stretched out unnaturally; pupils dilated; gums spongy and swollen; bowels open twice since the calomel.—Potassii Iodid. gr. iij. Sp. Ammon. arom. ʒss.; ex Mist. Camph. ℥j. ter die.

February 7th.—Passed another restless night, and appears more dull and drowsy to-day. His deafness is increased, and he scarcely appears to understand when spoken to, answering 'yes' to every question; sensation in his limbs continues unimpaired; pulse 96, very small and weak; tongue coated with a yellowish fur; bowels open, motions dark-coloured, fluid, mixed with scybala.

February 8th.—Had another very restless night. His countenance is much heavier and duller, and he now evidently does not understand when spoken to; his breathing is rather noisy, and there is a distinct mercurial fœtor in his breath; pulse 72, very small; bowels open yesterday.

February 9th.—He became so restless and noisy during the night that his hands had to be strapped to the bedstead. This morning his countenance is pale and sunken; lips covered with sordes, and breath very fœtid; tongue dry, and covered with a yellowish fur; bowels not open since the seventh; urine passed in bed, and very offensive. He lies muttering incoherently, refuses to take his nourishment, and struggles and becomes furious upon any attempt being made to force him to drink.—Ordered enema of beef-tea.

February 10th.—Was again very noisy during the night, and this morning lies for a time quiet and in a semicomatose condition, but at intervals raises himself suddenly and utters incoherent howls. He appears to move well and to have no paralysis of either side; his expression is very vacant, and pupils dilated; the odour of his breath and body is still very

offensive. In consequence of his noise, which disturbed the other patients, he was removed to a separate ward.

February 11th.—Slept at intervals during the night. Is still very restless and strapped to the bed, but is, perhaps, rather more quiet on the whole, although he attempts to start up in bed, and utters incoherent noises at frequent intervals. His countenance is more sunken, pale, and somewhat dusky; respiration is peculiar, his breathing sometimes appearing to cease altogether for a few seconds, and then to become quick and stertorous; pupils—at one time contracted, at another dilated—act equally; breath very offensive; pulse 80, small; lips and teeth dry, covered with sordes; bowels still not open; urine passed beneath him; when he attempts to sit up he stares vacantly about him, and now does not move the left side. The left wrist is rather rigid, and the left knee almost completely so; he never bends it voluntarily, but it can be slightly bent by using considerable force. He had an injection of gruel and opium last night, after which he became quieter for a short time.—Ordered to continue injection of beef-tea with two eggs.

February 12th.—Slept very little during the night; countenance pale and sunken; eyes suffused; pupils dilated; lips and teeth covered with sordes; lies with eyes and mouth half open; is evidently weaker, struggles much less, but still moans at intervals. There is now no sensation or motion in the left leg, which is extended, rigid at the knee, and the foot turned slightly inwards; sensation is also somewhat impaired in the left hand; breath continues very fœtid; pulse 90, very feeble; bowels still not open; has continued the injections at intervals.

February 13th.—Had again a little sleep during the night; countenance flushed; expression a little more natural; pupils more widely dilated; breathing stertorous. There is some reflex movement of the left leg upon irritation.

February 14th.—Passed a restless night. Had two injections yesterday. Continued in the same condition of complete insensibility till his death at 11.30 A.M. to-day.

Post-mortem examination eighteen hours after death.

Rigor mortis well marked, equal in both hands and both feet; right pupil more dilated than left; scalp does not readily separate; dura-mater congested externally, not adherent; watery fibrinous clot in longitudinal sinus; vessels of the pia-mater intensely congested; numerous white specks embedded in the substance of the membrane, principally over

the left hemisphere; the substance of the brain also intensely congested and œdematous, the cortical substance being of a well-marked pink tint, as is all the grey matter of the brain; ventricles not distended with fluid; the septum lucidum entire, and the fornix turned back without laceration; there is rather more cerebro-spinal fluid than usual at the base of the brain, and it is perhaps a little more turbid; the membranes and vessels of the brain appear to be healthy, and the brain substance is throughout natural, with the exception of the intense congestion of the grey matter; there is no tubercle.

Pericardium contains about half an ounce of fluid.

Heart natural; weight ten oz.

Pleuræ, right free, left adherent laterally.

Kidneys: right congested, tissue soft, weight rather less than six oz.; left capsule separates readily; surface smooth, congested, and ecchymosed in patches; on section congested throughout; weight six oz.

Liver congested, but apparently natural; bladder contains a considerable quantity of slightly turbid urine, but appears to be healthy.

Case II.

T. S., æt. 23, admitted into Matthew Ward, March 25th 1865, under the care of Dr. Jeaffreson.

A delicate-looking young man, of fair complexion; expression somewhat dull, but he appears to take notice of what is going on around him; his cheeks sometimes flushed, sometimes pale; a dark margin round his eyes, pupils dilated, but act equally to light, conjunctivæ rather injected, sclerotics slightly yellow; there is no dropping of either lid, and no squint; breathing natural, respirations 20; skin generally warm and dry, that of hands and feet cold; pulse 90, regular, and of fair volume; lips dry, gums rather spongy, and of whitish colour; tongue protruded naturally, moist, coated on the dorsum with a white fur, red at tip and edges; breath offensive, the odour closely resembling that of the patient whose case has been previously recorded; appetite tolerable; he has been very thirsty, but is not so now; bowels not open since March 20th; urine natural in quantity, rather pale, Sp. Gr. 1011; no albumen. He has no pain, either in his head or elsewhere, and no giddiness. States that he has a nasty taste in his mouth, which he describes as being like brass. Has no rash on any part of his body; no tenderness on percussion over the spine; no swelling of the abdomen; no enlargement of the salivary glands. He has perfect control over the sphincters.

Sight slightly impaired, but equal in both eyes. Hearing appears to be entirely absent, and he is unable to hear very loud sounds even when uttered quite close to his ear. Powers of speech, taste, and smell are also much impaired. Sensation is less than natural, although he is aware when his hands and feet are touched; he says the latter feel warm to himself, although they appear cold to others. He can move his limbs perfectly, but slowly; can grasp only very imperfectly, and takes some time to close his hands, but has equal power in both. His great toes are not retracted. When admitted, he was led into the ward, and is said to have dragged his legs after him in walking.

History.—He resides at Dalston, and has been engaged as assistant in the laboratory of St. Bartholomew's Hospital for the past twelve months, during the last four of which he has complained of not feeling well. In January last he was employed for about a fortnight in the preparation of mercuric methide, but has not worked with this or at any other mercurial compound since that time. During the illness of the other assistant, Case I., he stated that he felt weak, and complained of soreness of his gums and looseness of his teeth; he had also dimness of vision, pain and redness of his eyes, giddiness, nausea, and vomiting, the vomited matters being greenish and watery. After about a fortnight his eyes got better, but at the beginning of the present month the dimness of sight returned, and he could only see to read imperfectly. At this time also he was obliged to give up work, being too weak to walk out. His taste became imperfect, all things tasting alike to him; his tongue numb, his gums sore, and he was observed to spit and wipe his mouth very often; two or three days ago the numbness of his tongue diminished. About a week back he quite lost his hearing, and his hands became numb, and three or four days ago his feet also became affected. Five days ago, March 20th, after his bowels had acted freely from medicine, he fainted, and remained unconscious for about twenty minutes, during which time he snored a good deal. His weakness has gradually increased from the first. He has had medical attendance during the whole of his attack. He never had fits, nor is there any family history of disease of the brain or nervous centres. As a child he had some obscure abdominal attack, supposed at the time to have been of a strumous nature, since which he has never been very strong. All his brothers and sisters are delicate, and one of the latter has phthisis.—Ordered Wine ℥iv.; Brandy ℥iv.; Quinæ Disulph. gr. ij. Ammon. Sesquicarb. gr. iij ter die; Enema c. Ol. Ricini ℥j.

March 26th.—His face is a little more flushed than yesterday, but he expresses himself as feeling better, and has no pain or giddiness; skin warm and dry; pulse 93, regular, and of fair volume; tongue protruded naturally, moist, coated on dorsum with white fur, longitudinally fissured; bowels not open after the injection; slept badly the earlier part of the night, but tolerably the latter part; he appears to have some pain in the right hypochondrium on pressure; takes all his nourishment, and swallows easily; he seems to be quite conscious, but is very deaf, hearing nothing, but answering questions accurately when they are written down for him, although he takes some time before he can clearly make them out, owing to the impairment of his sight, and his speech when he answers is very imperfect.—Ordered Pil. Coloc. Co. gr. viij. hâc nocte. Rep. Enema c. Ol. Ricini. ℥j.

March 27th.—Very little change in his symptoms. Tongue dry and brown; bowels not open; urine passed voluntarily. —Ordered Emplast. Lyttæ nuchæ; Sp. Terebinth. ℥j. Ol. Ricini ℥ij. pro enemate; acid Sulph. dil. ♏xx. Magnes. Sulph. ℥ij. 4tis. horis; brandy, ℥vj.; beef-tea; two eggs.

March 28th.—Bowels open three times yesterday after the injection; motions liquid, dark, and offensive, two passed beneath him; urine passed voluntarily. No material change in his condition.

March 29th.—Expression still a little dull; eyes surrounded with a dark ring; conjunctivæ rather less injected; pupils dilated, contracting equally to light; skin natural, rather cold on extremities; pulse 82, regular, and of good volume; lips dry; breath less offensive; tongue a little dry in centre, whitish and moist at sides; gums white and slightly swollen; bowels moved once this morning; motion liquid, dark, and offensive; urine passed voluntarily; sleeps well, takes all his nourishment, and is free from pain; is still very deaf; recognises persons, and knew Dr. Odling to-day, pronouncing his name with tolerable distinctness; sensation is slightly impaired in his hands and feet; his great toes are a little retracted; he moves his limbs slowly and imperfectly, and appears to have lost the power of bringing his hands directly to the point that he wishes; he can still grasp, but very imperfectly.

April 3rd.—There has been very little variation in his symptoms since last report. His intellect seems rather duller, and he does not appear to understand so readily when spoken to. Skin warm and dry; pulse 62, regular, and of fair volume; tongue moist, furred in centre, and clean at tip and

edges; he appears unable to protrude it; gums whitish and slightly swollen, and he has some excess of saliva; bowels not open since March 31st; urine passed voluntarily; sleeps well and takes all his nourishment.—Ordered Potass. Iodid. gr. v. Sp. Ammon. Arom ℥ss. Tinct. Cinchonæ Co. ℥j. 6tis. horis. To continue nourishment.

April 6th.—No decided alteration. Breath rather more offensive; bowels acted last night after an injection (Ol. Ricini ℥i. Ol. Terebinth. ℥ii.), not previously since March 31st; motion copious, liquid, and containing scybala.

April 7th.—For the last few days he has been less able to sit up in bed without support, and is to-day entirely unable to do so. He has also some difficulty in swallowing. In other respects the same.

April 10th.—Has continued much the same. Is, if anything, a little brighter. Skin natural; pulse 54, feeble and regular; lips dry, with some sordes; breath less offensive; gums still white and spongy; tongue protruded with difficulty, moist, with brown fur on dorsum, and clean at the edges; bowels acted yesterday; passes urine voluntarily. Sleeps well and takes all his nourishment, swallowing with less difficulty; is still very deaf, and is unable to speak, but his sight and taste appear now to be perfect; sensation and motion in his hands and feet are much impaired; he is still unable to direct his hand to any object, and grasps very imperfectly, rather less feebly with the right hand than with the left; lies on right side, with knees drawn up.—Ordered to continue medicine and nourishment; sulphur ℈j. quotidie mane.

April 12th.—Passed water involuntarily; distension of his bladder; no change in other symptoms.

April 18th.—He has continued much the same in all respects, but is rather weaker, and his aspect is still dull and heavy; is unable to protrude his tongue; bowels confined, but open this morning; generally passes his urine beneath him, but occasionally voluntarily.—Ordered to continue nourishment and draught; sulphur ℥j. bis die.

April 24th.—Does not look so well, and is becoming gradually thinner; skin slightly jaundiced; moves his arms about apparently without object and in an idiotic manner, and grasps with much less power; his toes are more retracted, and can move his legs less; he appears to be gradually losing both sensation and motion in his limbs; takes all his nourishment, but swallows with more difficulty; skin sometimes cold on one side and warm on the other; pulse generally about

68, good volume; cannot protrude his tongue; bowels act rather more frequently; passes all his urine beneath him, Sp. Gr. 1017, alkaline, no albumen; crystals of triple phosphate under the microscope.—Ordered Ferri Citratis c. Quina gr. v. ter die.

April 27th.—For the last day or two he has been much more restless and at times even violent, shrieking out, making loud incoherent noises, or laughing or crying in an idiotic manner. Occasionally makes efforts to get out of bed. He then becomes quiet and lies still on the bed, generally with his legs drawn up. When his feet are touched the violent movements of the limbs immediately commence. He is as deaf as ever, but appears quite conscious, making frequent efforts to speak. His movements resemble, in a marked manner, those observed in the former patient. Skin warm and natural generally, cold over the feet; breath still very offensive; tongue slightly coated, moist, and more easily protruded; pulse sometimes very feeble, at others of fair volume, about 100, irregular; bowels more freely open; motions and urine passed beneath him; occasionally refuses food, and swallows with some difficulty.—Ordered Ext. Belladon. gr. ss. 6tis horis.

May 12th.—He has been gradually becoming weaker and thinner since last report. Swallows with greater difficulty, and refuses his food. His expression is quite idiotic, although he appears sometimes to recognise persons around him. The violent movements of his limbs continue, and are much increased on tickling his feet. He is still very deaf, makes constant efforts to speak, but only utters incoherent noises. For the last few days he has had some inflammation of both conjunctivæ with a muco-purulent discharge; breath is still offensive; gums slightly spongy and swollen; passes all his evacuations beneath him. The skin over the sacrum is red but not broken.

June 4th.—His symptoms have very little, if at all, altered for some time past. He is getting weaker and thinner, and does not know anyone now. Is, perhaps, rather less violent, although he frequently throws his limbs about violently, laughing, crying, or howling incoherently. The conjunctival inflammation has somewhat diminished. Skin natural; pulse 84, fair volume, but slightly irregular; tongue, not protruded; bowels, generally confined, have been acted upon several times by injections; takes nourishment only with great difficulty.—Ordered Brandy ℥iv.; beef essence; eggs; Liq. Cinchonæ ♏xv. ter die; Ol. Morrhuæ ʒij. ter die.

July 4th.—Since the last note was taken he has continued much in the same state, except that he now takes his food well,

and also takes his oil, and has gained flesh slightly. He is, however, quite idiotic, recognises no one, is deaf, and unable to speak any words, but still mutters, cries out, or laughs, and is frequently violent, and his limbs move convulsively; sometimes sleeps well, but is often restless at night; his back is not now sore; skin natural; pulse 84, feeble; bowels still generally confined; motions and urine always passed involuntarily.

These two cases are of extreme interest, as well from the unique character of their symptoms, which do not resemble those produced by any known disease, or by the action of any hitherto known poison, as from the nature of the substance to which they are supposed to be due, and of which Dr. Odling has kindly given me the following account:—

'Mercuric methide and ethide may be regarded as varieties of corrosive sublimate $HgCl_2$, in which both atoms of chlorine are replaced by the alcohol radicles methyl and ethyl, as shown by their formulæ $HgMe_2$ and $HgEt_2$ respectively. Intermediate compounds are also known, in which only one of the atoms of chlorine is replaced, namely, mercuric chloro-methide, HgClMe. and mercuric chlorethide, $HgEt_2$. The methide and ethide were discovered by Buckton, but are usually made by the process of Frankland and Duppa, which consists in acting upon sodium amalgam with the iodides of methyl and ethyl under special conditions, whereby the iodine combines with the sodium, and the ethyl or methyl with the mercury. They are both colourless, heavy, inflammable liquids of a mawkish ethereal smell and taste. The smell of their vapours, when diffused into the atmosphere, is, however, extremely nauseous. Mercuric methide contains 87 per cent. by weight of metallic mercury, and is so heavy that a piece of lead-glass floats on it readily. Its Sp. Gr. is 3·07. It boils at 93°, or seven degrees centigrade below the boiling-point of water. Mercuric ethide has a Sp. Gr. of 2·46, and boils at 159° C.'

That the symptoms were due to the inhalation of this substance is rendered almost certain from their close similarity in the two cases, as well as from the fact, that symptoms of the same character, although much less in degree, were experienced by almost all those who were working in the laboratory at the time. No comment upon the cases is possible, but it may be remarked, that the condition of the brain after death in the fatal case corresponds with that usually found in acute mania, and that this has been mentioned as an occasional effect

of mercurial poisoning. Possibly, too, the taint of syphilis and previous epilepsy in the one case, and that of presumed tubercle in the other, may have had some influence on their progress.

The notes of both cases are condensed from those of the clinical clerks, Mr. Hollis and Mr. A. H. Brewer, by whom they were carefully recorded.

ART. IX.—*Cases in which large Arteries were tied during the year* 1864. By ALFRED WILLETT.

IN this Report, I have advisedly omitted operations upon vessels of less magnitude than the brachial, and all amputation ligatures. Excluding then all such, I have ten cases to record as occurring during 1864. It is the number of these cases coming under observation in one year that in great measure induces me to publish them, believing that the variety in the arteries operated upon, and the varying causes requiring the operations, will convey a fair impression of the practice of the Hospital in such cases.

I feel that no important point, whether bearing on the diagnosis, the operation, or the after progress of the case, should be omitted, in order that comparison may be instituted with similar cases in the practice of other institutions.

The cases are arranged in two groups, the first including those in which the operation was performed for disease of the vascular system, one only being for disease other than aneurism, the second comprising those in which the operation was necessitated to suppress hæmorrhage.

I.—*Ligature of the external iliac artery for aneurism of the femoral (common)—Diffuse inflammation and suppuration of the cellular tissue—Death on the eighth day.*—Under the care of Mr. WORMALD.

A male, æt. 33, a flabby and exceedingly corpulent man, but in other respects of a healthy constitution, was admitted on February 4th, with a large pulsating swelling occupying the upper and front aspects of the left thigh.

He was a sailor, and confessedly a hard liver. He stated that two years and a half ago he received a severe blow on the groin; six months later there was a fixed uncomfortable sensation in the part, and occasional shooting pains through the limb; he then

noticed a fulness about the groin. Pulsation had been detected for eighteen months. The swelling had steadily increased, and for six months he had been quite unable to work. He described the pain as having been lately most acute, cramp and numbness being the prevailing features. A globular tumour filled Scarpa's space, and extending beneath Poupart's ligament, passed beyond it into the pelvis. The left lower extremity was œdematous.

The tumour pulsated forcibly, and a loud 'bruit' synchronous with the heart-beat was readily distinguished. Compression of the external iliac artery arrested the pulsation, and so long as it was kept up, the tumour diminished gradually. Auscultation of the heart disclosed nothing abnormal.

On February 16th, the external iliac artery was tied, and in consequence of the encroachment of the aneurism upon that vessel, the ligature was applied at a point mid-distance between the internal iliac and Poupart's ligament. A curved incision fully six inches in length, parallel to the crest of the ilium and Poupart's ligament, at a distance of one inch from these structures, and commencing three inches above the spine of the ilium, was made through skin and subcutaneous tissue, here more than two inches in thickness. The aponeurosis of the external oblique being exposed was divided upon a director; the internal oblique and transversalis with the fascia beneath the latter, were then cut through. The peritoneum was raised by the hand from off the iliacus and psoas, and the artery was seen lying upon the inner border of the last-named muscle, and at a depth of seven inches from the surface. The sheath of the vessels having been opened, a ligature was passed around the artery and tied. There was no bleeding. The margins of the aponeurosis of the external oblique were brought together by wire sutures, the external wound was then closed in the usual manner, and upon being removed to bed he was placed on his right side.

On the second day, he had slept, after an opiate, several hours. Pulse 120, compressible; tongue furred; the wound looked quiet; the left leg, which shortly after the operation became quite cold, had regained its warmth; he complained of an aching pain in the wound.

The third day, he had slept fairly; expression anxious; pulse 130, irregular, and wiry; tongue more coated; skin dry and hot; respirations 36, short and catching; bowels confined; abdomen tympanitic; pressure about the wound was painful; temperature of the left foot ten degrees lower than that of the right. He suffered a good deal from cramp. He was ordered the subcutaneous injection of morphia.

On the fourth day, he had passed a better night; pulse 110,

still irregular but soft. The wound was discharging; he experienced less pain.

On the fifth day, an injection brought away a large motion. At 3 P.M. he was attacked with acute pain in the wound, and hiccough set in.

The sixth day, he had passed a very restless night; countenance much distressed; pulse 140, small and feeble; tongue getting dry, bowels purged. On opening the wound a large quantity of decomposing pus and blood flowed freely out.

On the seventh day, intense pain prevented him from sleeping; countenance haggard and shrunken; hiccough and vomiting constant; pulse 140, thready; skin cold.

On the eighth day, he died at 5 A.M.

Thirty hours after death an examination was made. Rigor-mortis was fairly developed. Subcutaneous areolar tissue everywhere loaded with fat. The edges of the wound had sloughed, otherwise the external appearances were natural. An incision was carried from the wound upwards and across the abdomen; on reflecting the external oblique, it and the deeper muscles were found already separated by broken-down tissue soaked in a fœtid semipurulent fluid, whilst in the sub-peritoneal tissue was a large cavity extending across the spine into the right lumbar region, containing decomposed blood and pus. The peritoneum was healthy, except a small patch of inflammation where it had been disturbed at the operation. The kidneys were large, fatty, and congested. The liver was loaded with bile, and fatty. Lungs congested hypostatically. There was interstitial deposit of fat throughout the muscular tissue of the heart; the valves were healthy, and the aorta free from atheroma.

The state of the parts about the ligature was satisfactory. Above and below it there was a firm clot. The aneurism was of the true fusiform variety. It involved the first three inches of the femoral, terminating nearly an inch below the origin of the profunda. The sac was formed of the outer tunics of the artery and the sheath of the vessels; it was filled partly with decolorised fibrine and partly with recent coagula; its greatest circumference was eleven and a quarter inches, and its diameter four and a half. The aneurism commenced and terminated very abruptly. The femoral vein was plugged, and the anterior crural nerve was spread out over the surface of the tumour.

II.—*Ligature of the femoral artery for pulsating tumours of the thigh (aneurism by anastomosis)—Secondary hæmorrhage on the sixth day—Death on the tenth day.*—Under the care of Mr. LAWRENCE.

A man cook, æt. 31, stout and thick-set, was admitted on April 5th, with two pulsating swellings in the right thigh. He had always enjoyed good health; habits very temperate. When overfatigued he had for several years felt pain above the knee, but he had never laid up until within the past two months, when a considerable swelling having formed which greatly impeded locomotion, he placed himself under medical care. Quite recently, a smaller swelling had been discovered close to the great trochanter of the same limb. He had not noticed that these swellings pulsated until his attention was drawn to the fact.

The lower and larger tumour was situated on the outer and front surface of the lower fourth of the femur, to which it closely adhered. It was of an irregular outline, pulsating feebly, and was lessened by pressure. There was no bruit audible. The upper swelling was much smaller, placed more deeply, and appeared to be intimately connected with the bone, immediately below the trochanter major. Pressure upon the femoral at Poupart's ligament arrested the pulsation in either tumour. There was no enlargement of the femoral glands.

Absolute confinement to bed was imposed upon him, continuous uniform pressure upon the tumours being at the same time employed by means of carefully-adjusted pads and bandages. This treatment was kept up for five weeks without perceptible change. On May the 14th, the femoral was tied one inch below Poupart's ligament. Pulsation ceased immediately in both tumours. The artery appeared quite healthy.

On the 2nd day, he had slept well. Limb fairly warm. He was rather dejected by the return of the pulsation in the upper swelling. On the 3rd day, had passed a restless night, and traumatic fever had fully set in. He complained of considerable pain in the calf of the leg. On the 5th day, feverishness had passed off, his general condition was quite satisfactory, but pulsation had returned in the lower tumour; the wound was healthy.

On the 6th day, at 4 P.M. there was a sudden gush of blood from the wound; it was at once checked by pressure on the vessel above. The wound was laid open and a rent seen in the artery. The ligature came away directly it was put upon the stretch, and the vessel parted; the upper end retracted, and

could not again be discovered. The bleeding on this side was arrested by passing a tenaculum deeply in the direction of the flow and tying everything that it included. The lower orifice was easily secured. A large branch supposed to be the profunda required ligature. A compress was put over the wound.

On the 7th day, he was much blanched and very faint. Pulse 160, small and feeble; skin hot and dry.

On the 8th day he was delirious all night and very restless, vomited constantly, and was extremely prostrate. At 3 P.M. the hæmorrhage returned, necessitating the removal of the compress. The wound was in a sloughing state; it was emptied of clots, and replugged.

On the 9th day he was delirious, vomiting incessantly, tossing about in bed, a cold clammy sweat upon the skin, and occasional outbursts of hæmorrhage. He was evidently moribund, and died at 2 A.M. on the 10th day.

An examination, restricted to the limb, was made fourteen hours after death. The wound had sloughed, so that the relations of the parts could not be readily recognised. An attempt to inject the limb was unsuccessful. Upon dissection, the profunda was seen to be given off half an inch from Poupart's ligament, beneath which the proximal portion of the femoral had retracted with its orifice partially patent.

The tumours, after removal, the blood having flowed out of them, had a flaccid shrivelled appearance, and were scarcely a tenth of the size they had been during life; they consisted of large venous channels, freely communicating. The artery that had principally supplied them was the external circumflex.

In the upper tumour, the periosteum and adjacent layer of condensed bone were implicated, the Haversian canals being visibly dilated.

III.—*Ligature of the left (superficial) femoral artery for popliteal aneurism.—Recovery.*—Under the care of Mr. WORMALD.

A male, æt. 32, slightly made, and of an excitable nervous temperament, was admitted on September 16th, with aneurism of the left popliteal artery of two months' duration. For a similar affection in the patient's right limb, Mr. Wormald had successfully tied the femoral two years previously.

He was a baker and of temperate habits. Since the last operation he had remained well, and quite able to do his full amount of work, until one month since, when he noticed stiffness in the

left knee, and inability fully to extend the leg. These, which had been the first symptoms noticed on the previous occasion, induced him to pay attention to them, and within a fortnight he detected a 'beating' in the ham.

The tumour was as large as a hen's egg, oval, and well defined. The usual physical signs of aneurism were present. His heart was healthy.

Beyond the scar of the wound in the right thigh, there was nothing to recall the past history of the case. The limb was well nourished; its temperature and sensation were natural.

Compression of the artery above was established by aid of a double tourniquet, but this and all other contrivances for the same object were defeated by his restlessness and excessive sensibility, although for an entire month a fair trial was given. He wished throughout to have the artery tied. At the end of the month his appetite had failed and his general health was unsatisfactory; he had suffered from an attack of jaundice, and had become irritable and anxious. After October the 14th, all restraint was removed, and he was allowed to be up.

On October 19th, a ligature was placed upon the femoral artery five inches below Poupart's ligament. The tissues generally were thickened and matted together, the edge of the sartorius muscle was exposed and had to be drawn aside; one small artery was wounded and secured.

On recovering from the chloroform he had a convulsion, but did not altogether lose his consciousness.

On the second day, he had obtained scarcely any sleep, he had several convulsive attacks, and had been frequently sick; tongue thickly coated; pulse hurried; respiration frequent; skin natural. He complained of headache and giddiness. On the third day, had slept pretty well; the convulsions were less frequent, but when they occurred he had two or three in rapid succession; chloroform sickness subsiding; traumatic fever fully established; face flushed; pulse 120, hard and full; skin hot, dry, and harsh; tongue still coated, bowels relieved after an enema. The temperature of the limb was normal. On the fourth day, much better; convulsions quite ceased, feverishness abating. There was an abundant sanious discharge from the wound. On the sixth day, still improving; no return of convulsions.

On the eleventh day, had a slight rigor, due to the formation of an abscess on the outer part of the thigh. Discharge continued abundant, and still tinged with blood. On the fifteenth, recurrence of the rigor; a red and painful spot was seen on the outer part of the thigh. Suppuration had become healthy,

much less abundant, and the wound was healing. On the twenty-third the ligature came away, and at the seventh week the wound had healed, and he was about the ward convalescent.

IV.—*Ligature of the (superficial) femoral artery for popliteal aneurism—Recovery.*—Under the care of Mr. COOTE.

An engineer, æt. 30, well nourished and healthy, of temperate habits, was admitted July 7th, for aneurism of the left popliteal artery of four months' duration. He first noticed a small swelling in the ham, which, he stated, had a 'beat' in it. Not 'knowing what it was' he paid no attention to it, and continued at his work to the date of his admission, but he had found it increase rapidly for the last ten days, and the leg had begun to swell, so that he could no longer walk.

The limb was slightly flexed and œdematous, the superficial veins distended. There was a large tumour occupying the popliteal space, prominent, and pulsating forcibly. The physical signs of aneurism were distinct. The coverings were very thin. The circumference of the left knee over the most prominent part of the tumour was eighteen inches, the right being fourteen and a half.

On July 9th, the femoral artery was tied five and a quarter inches from the crural arch in the usual manner, and pulsation ceased in the aneurism.

On the third day, he was very comfortable, and had slept well, he had not been sick, and no constitutional irritation had been manifested. On the twenty-seventh day the ligature came away. He had gone on uninterruptedly well; the tumour was consolidating. At the twelfth week, the wound was soundly healed, and he was discharged in perfect health, being able to walk with the aid of a stick. The tumour was firm and shrunken.

V.—*Ligature of the (superficial) femoral artery for popliteal aneurism—Death on the eleventh day.*—Under the care of Mr. COOTE.

A male, æt. 58, a feeble, shrunken, cachectic-looking man, was admitted on March 24th, with aneurism of the right popliteal artery, of one month's duration, rapidly increasing.

The outline of the tumour could be easily traced; it was globular, and apparently of the size of a small 'orange.' It felt as though only covered by the integument; the usual diagnostic signs of aneurism were present. There was a loud double murmur at the base of the heart, and such arteries as

could be felt were hard and unyielding. He had incontinence of urine with other symptoms of bladder disease. On March 26th, it being evident that the aneurism was increasing, and that the integument over it was becoming involved, a ligature was placed upon the femoral, at a point four and a half inches from Poupart's ligament. The artery appeared healthy, and upon tightening the ligature pulsation in the tumour ceased.

On the third day, the operation did not seem to have affected him in the least; there was no reaction. He slept a good deal, took his food well, and made no complaint of ache or pain. The limb was moderately warm, but the wound seemed inclined to slough. On the sixth day, the sac of the aneurism had become tense, and the integument had a dull blush over it, and with this there was some amount of sympathetic fever. The wound looked better, and suppuration was commencing.

On the ninth day, redness and tension had passed off, the tumour being soft and fluctuating; appetite had failed him, and he was daily getting weaker. On the eleventh day he died, having gradually sunk exhausted. After death the ligature was found loose in the wound.

At the post-mortem, the femoral artery and vein at the side of the wound had sloughed to the extent of an inch. The artery was well plugged both above and below the ligature. The sac of the aneurism was formed of condensed cellular tissue, and it communicated with the posterior aspect of the artery by a defined oval aperture. The contents of the sac were quite fluid, and the sac in places was very thin. There was atheromatous degeneration of the entire arterial system, large plates of almost bony consistence being scattered, especially, over the aorta. The viscera were all more or less fatty. The bladder was thickened and contracted, quite deprived of the epithelial lining. The prostate gland was converted into a large pouch.

VI.—*Ligature of the (superficial) femoral artery for popliteal aneurism—Primary union of the wound—Recovery.*—Under the care of Mr. SAVORY.

A founder, æt. 45, a powerful, healthy-looking man, was admitted on September 9th, with popliteal aneurism.

He was of intemperate habits, could give very little account of himself, but thought he had noticed something amiss with the left knee for about three weeks; but he paid no attention to it until, finding he was unable to work, he came to the Hospital. The tumour filled the ham, and was stretching the integuments,

the pulsation being very forcible; its exact boundaries were not very distinct.

September 11.—During the two days he had been under notice the tumour had considerably increased, and the skin was becoming involved. It was decided at once to tie the femoral. A ligature was placed three and a half inches below Poupart's ligament. The bleeding was trivial, and the wound was carefully closed, the limb surrounded with cotton wool, and bandaged.

On the second day, he had been very restless since the operation, and delirium tremens seemed impending. He was supplied with stimulants, and directed to have opium if required. On the third day he was quieter; there was only very slight feverish reaction. On the fourth day the wound had healed; his general condition was most favourable. On the sixteenth day the ligature came away; the tumour was consolidating rapidly. On the twentieth day he was up, stated he felt quite well, with the exception of some numbness of the foot.

At the seventh week the tumour was still shrinking. A small sore had formed on the foot, from his having held it too near the fire. At the tenth week he was discharged, the tumour having almost disappeared. There was still a small troublesome sore on the foot, and sensation was still very imperfect about its inner side.

VII.—*Ligature of the femoral artery twenty-three days after amputation of the thigh for secondary hæmorrhage—Recovery.*—Under the care of Mr. PAGET.

A clerk, æt. 28, a spare, sallow, unhealthy-looking man, was admitted on January 21st, with disease in the lower end of the femur,* for which, on January 23rd, the limb was removed by circular amputation. On the evening of the same day, it became necessary to reopen the stump for recurrent hæmorrhage, and to tie several small vessels. He was in a very precarious state for a week, after which he rallied, and was doing well. On February 5th, a small bleeding occurred, easily arrested by

* There was separation of the condyles of the femur from the shaft. The condyloid extremity was drawn upwards and inwards, being locked to some extent in the proximal portion, which projected externally. Thickened fibrous tissue surrounded these parts. The ends of the femur, thus separated, were expanded, thickened, and excavated, leaving a mere shell of bone surrounding a considerable cavity, its walls smooth and hard, coated with a brownish putty-like material. The duration of this disease was three and a half years, and the limb had been rendered useless since a fall on shipboard, by which, in all probability, the diseased bone had been fractured.

pressure; the wound at this time was closing in, and all the ligatures had separated. On February 9th, hæmorrhage again took place, to the extent of eight ounces; the blood flowed more freely, and was distinctly arterial. This bleeding was also arrested by pressure. The loss of this amount of blood threw him back; the granulations became flabby; he had perspirations, became anæmic, and lost his appetite. On February 15th, the hæmorrhage returned, issuing from the wound in a full stream. A tourniquet was placed upon the femoral, the stump was laid widely open, under chloroform, but all that could be seen was a stream of blood welling up through a mass of granulations; nothing like the mouth of a vessel could be discovered, and every attempt to secure the bleeding spot in a ligature failed. The bleeding was now so free that it was necessary to tie the femoral; the point selected was an inch and a quarter below Poupart's ligament. The bleeding was wholly arrested upon the completion of this operation.

On the second day, had passed a restless night; pulse 100, feeble; skin blanched, cool, and perspiring. Had vomited at times, and was very prostrate. On the fourth day, the sickness had almost stopped, skin warm, and the heat of the stump fairly retained. There was free suppuration at the upper wound, and there had been no return of the bleeding; he was taking nourishment and stimulants in good quantity. On the fifteenth day, the ligature came away. His daily progress was slow, though satisfactory, so that at the seventh week the wounds remained very inactive, and would not heal in the Hospital. He was discharged in the tenth week, and a month afterwards he was quite well.

VIII.—*Ligature of the axillary artery thirteen days after primary amputation of the arm for secondary hæmorrhage—Death on the same day.*—Under the care of Mr. COOTE.

A carman, æt. 40, a powerful, healthy-looking man, was admitted on August 8th, having sustained a compound and severely comminuted fracture of the lower half of the left humerus. The brachial artery had been ruptured, and the soft parts greatly crushed. The same morning he had been knocked down, and a cart-wheel had gone over his arm.

Primary amputation, by the modified circular operation, above the injured structures was performed three hours afterwards. The progress of the case was most satisfactory until August 18th. A small superficial slough had been thrown off, the wound was granulating, and all the ligatures had come

away, when a sudden gush of arterial hæmorrhage occurred, ceasing spontaneously. On the afternoon of August 19th the bleeding returned, but was at once stopped by the pressure of a finger. A graduated compress was placed in the stump over the spot whence the blood seemed to escape. He was now much blanched and exhausted. On August 21st there was considerable feverish reaction, and he had a slight rigor, which, disarranging the compress, a profuse flow of blood occurred, rendering him almost pulseless. Mr. Power, the house surgeon, in this emergency, proceeded to tie the axillary artery, where it lay upon the tendon of the latissimus dorsi muscle; by this means the bleeding was effectually checked. In spite of restorative measures, he sank and died eight hours after the operation. No examination of the body was permitted.

IX.—*Ligature of the carotid artery for hæmorrhage from gunshot wound of the cranium (suicidal)—Death in four hours.*—Under the care of Mr. HOLDEN.

A male, æt. 64, was admitted at 11 P.M. on October 14th, collapsed, insensible, and freely bleeding from a small wound, directly in front of the right ear, caused half an hour previously by the discharge of a pistol loaded with a bullet.

He had vomited blood, and there was ecchymosis of the left orbit. His pulse was small, low, and laboured; pupils contracted firmly. The little finger could be just passed into the wound, and it found the petrous bone broken into fragments, small portions of what appeared to be brain substance lying in the wound. The hæmorrhage was only restrained by compression of the common carotid.

At 12.30 A.M. on the 15th, Mr. Holden saw him; his condition was unaltered; a full stream of arterial blood issued directly pressure was relaxed. As the simplest plan of effectually controlling this hæmorrhage, a ligature was placed upon the common carotid artery, above the omo-hyoid muscle. 4.30 A.M. he died, never having rallied from the injury.

An examination was made eight hours after death.

Upon removing the calvarium, a starred fracture of the internal table of the right parietal bone was brought into view, one inch from the sagital suture, and a corresponding wound of the dura-mater, through which a communication existed with the external wound. After removing the dura-mater rents in the apex of either hemisphere were seen. The bullet had destroyed the petrous bone, cutting through the internal carotid artery, and leaving its upper surface, had entered the

right middle lobe of the cerebrum; passing through which it had struck and fractured the parietal bone; falling back through the same hole in the dura-mater, it had passed through the falx cerebri, and lodged in the middle lobe of the left hemisphere.

X.—*Ligature of the brachial artery for hæmorrhage from a punctured wound of the upper arm—Diffuse inflammation and suppuration of the cellular tissue—Recovery.*—Under the care of Mr. PAGET.

A male, æt. 17, a slight, delicate youth, of an extremely nervous disposition, was admitted on September 24th, with a small wound at the middle of the inner aspect of the left upper arm, from which a jet of arterial blood was issuing, and which had been caused by his falling upon a narrow-bladed chisel. He was pale and faint from the loss of blood: already the hand and forearm were much colder than those of the right side. The pulse at the left wrist was scarcely perceptible, whilst at the right, its beat, though feeble, was clear and distinct. On examining the wound the probe passed directly across the course of the brachial vessels. It was stated that at the time of the accident the blood spurted out for a considerable distance in a large stream. The wound was enlarged, and upon exposing the brachial artery a defined circular aperture was seen. A double thread was passed around, and the artery having been secured above and below the wound, was cut across between the ligatures. The wound was closed with metallic sutures.

On the third day, a smart attack of traumatic fever had set in; he was flushed, excited, and occasionally delirious; pulse 120; skin hot and harsh; tongue clean and red; great thirst; arm very painful and swollen; edges of the wound red and inflamed, and a thin ichorous discharge flowing from it. The sutures were all removed, the wound opened, and the whole arm poulticed. On the fifth day, the feverish state had increased, the arm was more swollen, and had assumed a bright red tinge; the wound was sloughing, with an abundant sero-sanguineous discharge. On the seventh day, the constitutional irritation was rather less. He had had a sudden and profuse attack of diarrhœa, which rendered him very prostrate, though he was still excited and delirious. The inflammation of the arm was less, but the integuments were extensively undermined. The wound had become more healthy, and a very free discharge of a better character was taking place.

On the tenth day, the ligatures came away. It had been found necessary to make counter and dependent openings. On the twentieth day, he was greatly improved, but he was still extremely weak. All swelling of the arm had disappeared, and the discharge was daily diminishing. By the fifth week, he was almost convalescent, the wound being nearly healed; he was regaining strength and flesh rapidly, and in the seventh week he was discharged—cured.

In the first case which I have narrated an unfavourable result was anticipated, in consequence mainly of the extreme obesity, extending to fatty degeneration, and intemperate habits of the patient.

In the second case the interest centered in the nature of the disease, and, upon the principle of exclusion, an almost unanimous opinion was arrived at; for taking into consideration the history, excepting the possibility of cancer, the circumstance of there being two tumours in the same limb of precisely similar features--their position, too, away from any main artery—pointed to their being examples of pulsating erectile structures, deeply seated around, or slightly involving, the bone, the so called aneurism by anastomosis. The operation was undertaken for the following reasons:—1st. The patient was quite incapacitated from following his occupation and almost from getting about. 2ndly. All simple treatment had failed. 3rdly. In spite of what had been done the disease was increasing. 4thly. No other proceeding (save amputation at the hip-joint, a far more hazardous operation) offered any prospect of success. Instances of similar cases having been successfully treated by the proceeding here adopted have been recorded from time to time.

The tumours, after removal, and emptied of their blood, were disappointingly insignificant. It was interesting to notice how periosteum and bone were involved in the upper of the two, as was in great measure anticipated.

The third, fourth, fifth, and sixth cases were instances of popliteal aneurism, and with the exception of the fifth each patient recovered after the Hunterian operation. Even in the fatal case death did not result from ligature of the artery, but from independent bladder disease. At the post-mortem, the femoral vein and artery were found to have sloughed for a full inch, a feature quite inexplicable, considering that the vein was scarcely, if at all, disturbed at the operation.

In this Hospital, cases of popliteal aneurism, suitable for the compression or other non-cutting plans of treatment, are

quite the exception, and I do not know of a single instance, among the few thus treated, in which the result has been satisfactory. I can call to mind, on the contrary, more than one where most untoward troubles have ensued. Of the majority that are at once submitted to the Hunterian operation for the form of aneurism now under consideration, recovery is the almost uniform result. The third case was for several days in a very critical condition, which, I believe, was solely due to his highly excitable state, occasioned by the strain and feeling of discomfort arising from the use of an apparatus for compressing his femoral.

The seventh and eighth cases present some features in common. Probably no more perplexing circumstance calling for immediate solution arises than that of secondary hæmorrhage (properly so called) after amputation. Mr. Guthrie upheld the dictum that a surgeon is not warranted in interfering unless bleeding is going on at the time he is called to the patient, but our eighth case is not a favourable instance of the result of following this recommendation, for it is just possible that had this man's axillary artery been tied after the second bleeding he might have stood a chance of recovering, whilst, as it was, being in a moribund state, from repeated losses of blood, all hope of success had wellnigh disappeared before the operation was undertaken. The seventh case stands out as a prominent and clear proof of the advisability of adopting effectual measures for stopping the flow of blood as quickly as possible. This case raises the question as to the relative advantages of opening the stump or of tying the main artery. It is quite certain that within the first few days, provided the hæmorrhage is not the result of unhealthy ulceration going on in the wound, the stump should be opened, and the bleeding vessel be there secured; but should sufficient time have elapsed to allow the wounds to be covered with granulations, or should the before-mentioned process be going on, then, without doubt, the main artery should be tied, that vessel after thigh amputations being the femoral above the origin of the profunda.

The tenth case shows the great jeopardy a patient, when a weak, delicate subject, may be placed in by an operation one is inclined to look upon as a trivial affair—a small clean cut, dividing the artery, which was soon after secured, the wound being carefully and accurately closed. With this one would have anticipated rapid progress towards recovery, but with the feeble constitution in question a most violent cellular inflammation followed, which really placed life in danger, and in a very short time reduced the patient to an extreme state of exhaustion.

ARTICLE X.—*The Minute Structure of the Human Kidney.* By REGINALD SOUTHEY, M.B. Oxon.

A PROPHET is not without honour except in his own country. In the clinical wards of La Charité, at Berlin, as in those of the Allgemeinen Krankenhause, at Vienna, Die Bright'sche Krankheit appeared on many a head board.

Pathologically speaking, a great deal more than we are wont to classify under the titles of anasarca and albuminuria was comprehended under this heading, while the something wrong about the kidneys was less obscurely hinted at than occurs under the nomenclature we have adopted.

By affixing the name of its first special describer to a disease whose symptoms they recognised, but only knew in part, the German professors of medicine exercised a sound discretion, and at the same time paid a graceful tribute of well-merited praise to our countryman's discoveries.

Albuminous urine and general œdema of the surface of the body are symptoms significant enough of grave disease, but since this need not necessarily originate from the kidneys, the requirements of a sound nosology are very ill complied with by thus extending the sense of these terms. We have further much to learn before appraising their exact meed of importance to those urinary sediments with which the microscope has latterly made us more familiar. There are persons, we know, still willing and ready to cast the horoscope of a man's life from an examination of his morning water, and this without caring to see their patient at all; but we believe the number of these skilful guessers to be on the decrease.

Blood and casts in the urine point plainly enough to functional derangement, but to distinguish a chronic from an acute disease by their presence and appearances alone, is the step in diagnosis which has, we fear, been often taken too hastily.

The term, Bright's disease, as used by Oppolzer, avoided all such error, for it was applied by him to include both a transitory and permanent kidney affection. But of this hereafter, in its due time and in its proper place; my present communication is to treat of the minute anatomy of the healthy human kidney. I propose following this hereafter by an account of its pathology, intending finally, which will bring my subject more properly within the limits of Hospital Reports, to recount, from clinical observation in the wards, what symptoms during life accompany those lesions which we most commonly observe after death.

Histological research, in this special department, during the past ten years, has certainly not been idle; the investigators have been many, and the attention paid to their labours, if we may judge from the discussions these have elicited from contemporary periodicals, has been great. In truth, these fresh contributions to our anatomical knowledge upset the beau ideal of a kidney which we imagined, and which our text-books assured us had been long since a very settled affair. As a natural consequence, the new anatomical creed led to the promulgation of revised physiological tenets, and since the 'point de départ' was somewhat minute, and the theories proposed to be based upon it very important, the reformed faith found, as it was pretty sure to find, as much opposition as support.

Happily for ourselves, we in England, a nation slow to move, are little likely to be biassed by the party strifes which so slight a difference in dogma as this has brought about in our cousins German.

Our physiological opinions are soundly and strictly conservative, and inasmuch as there probably exists no class of medical students more burdened by examinations than our own, it is doubtless better that we should be very cautious in accepting new ideas, and in inculcating their acceptance.

Leave it alone a little longer, and the truth will distil out of the ferment; such at least I take it must have been the conscience salve of our teachers when they touched at this particular anatomical port in the course of their annual physiological voyage round the body.

Unfortunately, it is impossible for us all to wait patiently until the anatomy of the urine tubes shall be emancipated from the limbo to which the discussions of the Göttingen, Berlin, and Viennese schools seem to have consigned it. As with our own Court of Chancery, a quite indefinite period must elapse before judgment is pronounced, and this because no person can say that he is prepared with all the evidence that can possibly be brought to bear upon the case, and no judge is willing to compromise himself by an adjudication so likely of subsequent reversal. It would be a foolish vanity upon my part if I undertook to settle this matter; for I sit upon no bench of authority, am trammelled by no traditions, and my dictum could carry no weight. The very liberty which I enjoy enables me to discuss freely what I think. This, therefore, and other vexed questions in the anatomy of the kidney, I shall consider in the present paper, trusting that the many months of hard schooling undergone by me in learning how best to investigate this organ may not have been spent in vain;

when I pass beyond what I have been able to see for myself, and make articles of my own belief, I shall take a review of what has been written, and weigh the evidence in a fair scale.

It is essential for me to lay down what I imagine to be the normal picture of these parts before proceeding to paint in the alterations effected by disease: it would be difficult for me to make myself intelligible hereafter if I did not do so now; for how can I attempt to show the manner in which special morbid patterns are worked into the web if I do not first unfold the simple fabric of its woof?

The kidney belongs to the order of compound tubular glands. The secreting agents of the urine are the urinary tubes; these, after the manner of all special gland structures in man and the higher animals, are so arranged as to present the largest possible secreting surface, orderly packed into the smallest available space. The plan upon which this is performed will be discussed a little later. Directing our attention in the first instance to the structure and contents of the tubes themselves, we learn that these possess a membrana propria, not quite so structureless as it appears, according to Beer, but consisting of the finest possible connective tissue, in which the intercellular substance is overwhelmingly developed, and the cellular elements individually very much retrograded. Henlé* describes a fine dotting which he could trace upon the inner surface of the wall, produced by fine circular fibres: he likens the texture to that of the innermost membrane of the hair follicle.

This membrane is on its outside brought into the very closest contact with the capillaries throughout its whole length, and is on its inside lined throughout with nucleated cells. These cells present us with very different appearances in different portions of the tubes, just as the part to which they belong has somewhat different functions to fulfil. Thus a large cylinder epithelium lines the large open tubes, but still leaves a lumen or bore patent in their interiors. The basal membrane of these straight open tubes is upon transverse section seen to be of lineal contour.

This large cylinder epithelium is, as it were, pared gradually down into a pavement epithelium, and comes to protrude less and less into the lumen of the tubes, as these become by dichotomisation smaller and more ribbon-like upon their course upwards towards the cortical portion. Soon after their first subdivisions they measure about the 1-400th of an inch in diameter, but they quickly reach a smaller size, the 1-600th, which is their more uniform average diameter.

* Anatomie zur Niere, Göttingen, 1862, p. 31.

The tortuous or curling tubes have a double contoured wall or membrana propria; they vary much in diameter, ranging between 1-250th and 1-600th of an inch. They, too, present us with an epithelium lining, but the individual cell territories of this are much less distinct, because, either from post-mortem or manipulatory disturbance, the interiors of the tubes are almost always seen completely filled up with granular contents. Upon treatment with acetic acid this yellow nebulous material is rendered transparent, and the whole interior of the tube can be observed to be most richly studded with nuclei; the cell limits have, however, vanished, leaving us no nearer distinguishing their arrangement than we were before.

It is a point much to be insisted upon, that the wall of the tortuous tubes is so much thicker than that of the straight ones, since in the description of the course and relations of these tubes to each other much moment is attached to it.

Kölliker* makes no such distinction. He likens the membrane of the tubes to the sarcolemma of muscle, and says they are lined with angular epithelium, and filled with round glandular cells, so as to show no lumen at all.

I have essayed many methods of isolating the tubes for observation; that which has uniformly given me the best results I believe I may detail without risk of being considered tedious. The process is not my own, but Ludwig's modification of that first detailed by Henlé—

I find it much the best plan for this purpose to make use of a kidney which has been hardened by some days' stay in strong alcohol, after having been well injected with Prussian blue from the artery. Portions of moderate size should be cut from this and cooked for from five to eight hours in a mixture of alcohol and hydrochloric acid.—Alcohol (90 per cent.), hydrochloric acid (S. G. 1·160), equal parts.

This is best effected by immersing the vessel containing this fluid in a water-bath, whose temperature should not be allowed to exceed 100° Fahrenheit.

After being thus parboiled the pieces of kidney are exceedingly friable, and the connective tissue elements are all dissolved away. They should next be gently shaken in distilled water, the sediment allowed to settle, and the supernatant fluid poured off. After three such washings, which must be carefully conducted, I am in the habit of neutralising further acidity with carbonate of soda solution, and once more washing with water. The texture can now be easily frayed out with a

* Handbuch der Gewebelehre, p. 522.

dissecting needle, and if it is desired to preserve any specimens these can be coloured by carmine solution and mounted.

The most difficult question, to my mind, in the kidney structure, is the nature of the connection between the uriniferous tube and the glomerulus or capillary tuft, and man is about the stubbornest animal in which to solve this difficulty.

J. Müller,* Valentin,† Bischoff,‡ Gerlach,§ Ludwig und Zawarykin,‖ and Henlé;¶ all these authorities are for the termination of the urinary tubules by encapsulating the capillary tuft.

Hyrtl** and Reichert†† are against such termination.

Kölliker‡‡ is for a layer of epithelium cells both inside the capsule and outside the tuft, that is, a double layer; so is Gerlach, Ludwig, Bidder, and Isaacs.

Moleschott§§ is for the Malpighian body being intercurrent, and not terminal.

Mavorstein‖‖ distinctly denies this, and says that he has never seen these bitubal capsules.

Bowman,¶¶ speaking of the frog's kidney, says that the epithelium in the capsule becomes remarkably thin, and that the vascular tuft hangs free in it.

I cannot but believe that the testimony of all observers must differ less upon this point if they would only tell us what arrangement they have been able to make out in that genus of kidney which they have investigated, and did not seek to establish one particular relationship of tuft to capsule which should be common to all, man included.

In the kidney of Triton cristatus, to which Moleschott and most observers have had recourse to form their ideal of a Malpighian body, Reichert, in his 'Vorschlag die Niere von Tritonen,' informs us that the vascular tuft is seen lying enwrapped in an ampulliform enlargement of the urinary tube, and this where it (the tube) is thickly covered with pigmentation spots.

But in Triton tæniatus, in the hindermost and compactest portion of the kidney, this tuft is not merely to be observed

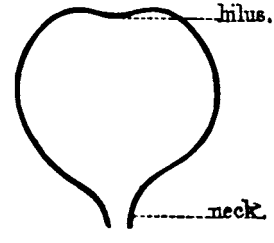
* De Glandul. Secernent Structurâ penit, Lipsiæ, 1831.
† Repertorium, 8 Bd. s. 92.
‡ Müller's Archives, 1843, S. 132.
§ Ibid. 1845, S. 378.
‖ 48 Bande der Sitzungsb. der Kaiser. Akad. d. Wissenschaften, Taf. i. fig. 7.
¶ Handbuch der Anatomie, Bd. ii. Lieferung. ii. S. 310.
** Oesterreich. Medicinisch. Jahrbuch, 1844, Bd. 48.
†† Müller's Archives, 1843, Jahresbericht, S. 120.
‡‡ Handbuch der Gewebelehre, Bd. ii. S. 522.
§§ Untersuchungen zur Naturlehre des Menschen und d. Thiere, Jahrg. 1861, Bd. viii. Heft. ii. S. 222 und. 224.
‖‖ In Henlé and Pfeiffer's Archives für Ration. Medicin, Jahrgang 1862. Bd. xv. S. 180.
¶¶ Philosophical Transactions for 1842, i. pp. 61, 63.

distinctly outside the ampulla, but in parts lying as it were against the neck of the bottle, where this adjoins the urinary tube, rather than against the bulb of its body. Hence it is not essential to a tubular gland secreting urine that a vascular tuft should be inside the urinary channel. Neither, says Reger,* (from whom I am quoting the substance of this) is it necessary that urinary tubules and their capsular dilatations should be lined with ciliated epithelium, as they are found to be in Triton tæniatus, when the ampullæ are intercurrent to two tubules, or bitubal because they happen to be the common channels of communication with the seminal ducts of these creatures.

From what I have been able to make out in the kidneys of men, oxen, and sheep, the Malpighian bodies are terminal and not intercurrent. The bitubal appearance is due, I believe, to a mistaking of the afferent vessel for a urine tube; it is an error only to be escaped by examining injected specimens, since after the hydrochloric acid treatment described above, by means of which the isolation of these bodies is rendered comparatively easy, the distinction of the artery from the urine tube must otherwise be very unsatisfactory.

I have found the kidney of the ox that most easy to manipulate with, the Malpighian bodies often measuring 1-150th of an inch in their longest diameter, and tortuous tubes the 1-200th in their transverse. This size enabled me, after a little practice, to move them about at will with a needle under an inch object-glass. As the urine tube approaches a Malpighian body, it is observed to diminish very suddenly to a neck from which it then gradually dilates, funnel-wise, into its capsular termination. I say termination advisedly, for in the human kidney, although I have been able to isolate and closely observe very many Malpighian bodies which present this figure, for the most part being broken off at the neck (fig. 1), and some few with a longer tubule attachment, I have seen none presenting a bipolar arrangement as if intercurrent to two tubules. I cannot, however, quite so distinctly affirm this to be an invariable rule in the kidney of the ox, having twice observed appearances in the Malpighian bodies of this animal which led me for a time to believe in the emergence of a urine tubule from them: the one urine tube approached it as in man, by

Fig. 1.



* Dr. R. Reger, Ueber die Malpighische Knäuel der Nieren u. ihre sogenannt. Capseln, Archiv. für Anatomie, &c. Leipzig, 1864, No. 5.

a neck, and from a distinctly tortuous origin; the other tube apparent, but, as I now believe, afferent artery, immediately almost upon leaving the capsule was bent short off at a right angle, and resembled in size and aspect a straight tube descending in a straight tube territory. Toynbee, in the plates to his paper on the intimate structure of the human kidney, communicated to the Medico-Chirurgical Society,* distinctly delineates the Malpighian body as intercurrent to two tubules. He makes the capsule of the Malpighian body a separate globular investment, enveloping both tubule and tuft, and he concludes from his injected specimens (injected from the ureter) that the urine tubule penetrates this capsule, twists into a coil within it, and then emerges.

There exists no problem in minute anatomy more difficult of solution than this of the relationship of the urine tube to the glomerulus or tuft. It is a point upon which I have held the most varied opinions myself, and one on which I dare not even now assert that my doxy is orthodoxy. The conflicting opinions which so many authorities entertain upon it are in themselves enough to stamp the subject with uncertainty; but I possess no single proof of, or room for, Mr. Toynbee's coil theory. My belief is that his injection found its way into the capillary system. In common justice let it be said against me, however, that I have not yet succeeded in reaching the Malpighian bodies from the ureter.

Now the afferent artery measures a little more than half the diameter of the urine tube when this is at its thinnest neck; and whether injected or not, the attachment of the artery to the Malpighian body is much closer and very much stronger than that of the annexing tubule. My explanation of this is, that the artery, upon approaching the terminally dilated tubule, which I may mention happens for the most part to be more flattened pear shape than spherical (the stalk end of the pear symbolising the tubule attachment), splits up into its component elements, its external connective sheath encapsulates the membrana propria of the tubule, its muscular coat incorporating itself with this. I was fortunate enough in one instance to have been able to trace the circular striation of this muscular coat, descending like a wall and penetrating into the interior of the Malpighian body.

I can discover no sufficient evidence in support of Bidder's theory. He introverts the expanded end of the tubule so as to encapsulate the tuft of capillaries, making the relation of the glomerulus to the urine tube similar to that of the head in the

* Vol. xxix. of their Transactions, p. 8, figs. 9, 11, 12, 13.

double nightcap. The only evidence in favour of this surmise being the correct one is, that it is by no means uncommon to find a kind of hilus at the point of arterial attachment.

In the stale or preserved kidney the Malpighian body is invariably observed filled by granular cells, having contents which, to all appearance, resemble those that fill the tortuous tubes; rendered transparent by acetic acid, it is seen to be most richly dotted with nuclei. Many describe a layer of flattened cells lining the capsule, and another agglomeration of glandular cells disposed between and upon the capillary coils in its interior. This indeed is the view, as I have previously stated, held by Dr. Isaacs, who is one of the latest authorities upon the structure of these bodies.*

I entertain no doubt myself of the existence of such glandular cells, since I regard the Malpighian body as the direct continuation of the urine tube; yet in the living kidney there can exist but small room for these cells in the interior of the capsule, seeing how completely this is filled by the capillary coils when these are properly injected. But I shall speak more precisely of the arrangement of the capillary coils inside the capsule a little later, when I come to treat of the blood-vessels.

Two Systems of Tubes (?)

The great and at present most debated question is, whether these two systems of tubes which I have cursorily described, the one closed and connected with the Malpighian bodies, the other open and terminating in the papillæ, are or are not continuous the one into the other. Before discussing this, it will be well to give some sketch of the general arrangement of both sets of tubes as we find them in both cortical and medullary portions.

The straight tubes in the medullary part of the kidney do not all open externally, but are, in largest proportion, made up of down-stretching loops, some shorter, some longer, which course even close to the papillæ, and then bend round to ascend again and enter the cortex. I possess many preparations showing this.

Any person who chooses to make a section transversely through a papilla of the kidney close to its termination, and who will reckon the gross diameters of the large openings, may satisfy himself that these fall very far short of what he must have expected, if all the canals, which can be seen by a cross section

* Transactions of New York Academy, vol. i. p. 440.

taken through the upper part of the medullary portion, had opened one into the other. The final aggregate calibres of the debouchements very inadequately represent the sum of channels observed in the upper section.*

Now why is this? The pyramid fattens or broadens as it extends up towards the cortex:—1st. Because the open tubes dichotomise by becoming individually smaller, but by occupying a greatly increased aggregate total space. 2ndly. Because after a short distance a down-looping closed system of tubes is included in it. 3rdly. Because the individual tubules of this closed system, just as they reach the cortical portion, swell in their own calibres themselves. 4thly. Because the arteriolæ rectæ add their tuft quota to the mass.

It is not difficult to make sections that will clearly demonstrate an order that prevails in the arrangement of both straight and tortuous tubes in the cortical substance; that is, if only care be taken to make the section where the columns lie most parallel to each other, drawing the double knife through both cortex and medulla in a line with the centre of a pyramid, axially from pelvis to periphery. Columns of straight tubes, in bundles of from five to nine square, can then be traced up almost to the capsule itself of the kidney. These sheaves of straight tubes are severally separated from each other by the tufts of vasa recta in the upper two-thirds of the medullary portion, and again intercepted by columns of tortuous tubes in the cortical portion proper; here, indeed, the plan of the thing may roughly, but not inaptly, be compared to a double series of wedges dovetailing into each other, of which the straight tubes have the broad end of the wedge below, that is, towards the pelvis of the kidney in the medullary zone; and the tortuous tubes their broad part above, that is, against the supra renal capsule in the cortical zone.

There is a very thin layer immediately beneath the renal capsule wholly composed of curling tubes, for the straight tubes do not quite touch the surface of the kidney in distinct bundles, but spread into flat arborescence like cedar trees.

Thus much, then, for a general outline map which will help us to understand each other better.

No person who has for himself investigated the minute histology of the kidney, can for a moment doubt but that Professor

* To do this best, a thick section should be made, including the papilla itself. Having rendered this transparent with glycerine, one is enabled to look up the tubes for a short space with an inch object-glass, and can make out the knarled trunk-like openings of these, and their columnar epithelium linings and first subdivisions.

Henlé has described what is actually the case in so far as the existence of two distinct kinds of tubes is concerned. But whether the open system below, the system of the straight tubes, his 'Pyramiden Fortsätze,' terminates in the closed network above, which he has described, and is not continuous by direct channel of communication with the capsular system (the system of the Malpighian bodies of the tortuous tubes with their down-looping prolongations), is to my mind not yet sufficiently proven.

It is by no means so easy as one might at first have deemed it, to inject the tubes from the ureter upwards, even with the very finest injection fluids, at least to inject so well as to satisfy oneself of the trustworthiness of the guiding line left in the winding maze. I have tried it with coloured gelatine that had answered my purpose in the very finest capillaries admirably, and with Prussian blue (Beale's solution), and with collodion, after the manner described by M. V. Cornil.*

Neither have I been more successful in my endeavours to burst an injection through the Malpighian bodies into the tubes; they offered more resistance than I had given them credit for, and I was only rewarded by some of my most beautiful specimens of capillary injections. It is not very creditable to oneself, after thus confessing inability to prosecute inquiry properly, to fall foul of the conclusions drawn by one who has proved himself not merely a master hand at this very work, but a master mind in all physiological research, patient and laborious in investigation, and like how few now, terse and lucid in the description of all that he has so well observed.

It is, however, incumbent upon us to be very exacting in our demands for proofs of this new theory, which upsets all our preconceived notions, and is at once so contrary to our experiences in the comparative anatomy of this organ, and to our expectations of what we imagine most likely to be the case in man. Where else are we to look for the analogy of a bipartite tubular gland? It is impossible for us to take the surmise of Professor Henlé, that the liver cells and the gall ducts present us in that organ with a double glandular system coalesced, and then to accept this hypothesis as evidence for such bipartism.

This is to build theory upon theory without sufficient basement

* Journal de l'Anatomie. Publié par M. C. Robin, 1865. No. i. I need only add, that the composition of collodion renders it especially unfit for injection purposes. Ether dissolves fat in England, and alcohol has a tendency to coagulate albumen, and render sections too opaque: it is, further, expensive, difficult to manage, and utterly untrustworthy if even successfully used, for it transudes all tissues, and with it you may go astray anywhere.

of facts, and to hope that the one will serve to bolster up the other. It is to argue at extensible probabilities merely.

Now the facts are hardly enough to justify the deductions which Professor Henlé has drawn from them. He himself allows the stress of argument to fall less upon the perfection of his injections than upon the respective differences of the two kinds of tubes. His injection he found always filled the large, the straight, the linear contoured, the flatter and more ribbon-like tubes, those which have open canals and clear epithelium linings, and which in their passage among the tortuous tubes proper, may be often distinguished by having little globular appendices, pinched off as it were from them; but never reached the glomeruli, or entered the tortuous tubes proper, the double contoured, the more cylindrical, those which are less pervious because full of granular contents, and hence bulged out at their several elbows or bends.

As he himself remarks very naïvely, this alone is no argument for a double system of canals, but rather the reverse.

But the injected tubes, he goes on to say, are much branched, are of very regular size, and terminate distinctly by inosculating with themselves, while the uninjected are not branched at all, vary much in their diameters, and widen to enclose the glomerulus. Against this he allows by his drawings the passage of the more granular-filled tubes into those lined with a clear pavement epithelium.*

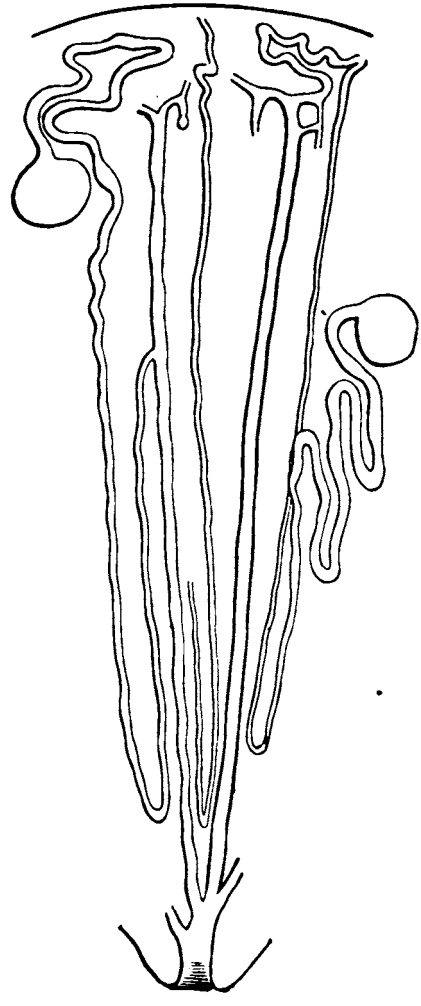
These fragments may belong, as he asserts they always do, to the down-looping prolongations of the tortuous tubes, which lie in the middle of the bundles of straight and open ones: but can we certify ourselves of this? They are not injected—true—but may not the position in which they lie prevent this; may not the large open tubes, swollen with injection mass, press these down-loopers so that, although they communicate with the open system from the top, and sides too, perhaps, no fluid can pass into them jammed as they are, closed valve-like by a thick fluid intruding against the natural course to which nature adapted them. The true state of affairs can well be that which Ludwig has described,† and which he illustrates by an ideal figure (fig. 2). Professor Ludwig, by using small injection pressure, and continuing this over a long period of time, did succeed in injecting the Malpighian bodies from the ureter; he does not make the straight tubes all terminate by immediately passing over into the tortuous tubes and so on to the Malpighian bodies,

* Vide op. cit. Taf. iii. fig. 30; and Taf. ii. fig. 13 c. Einzelne Fragmente von Röhrchen zur eine Hälfte breit und Körnig, zur andern schmal und klar.

† Op. cit. p. 3.

but having tracked the bifurcations of the large open excretory tubes close up to the kidney capsule, supposes them to wind about there amongst the tortuous tubes proper, and after enlarging in calibre for a short space, and interosculating much with each other, to narrow again, and return to the centres of the bundles of straight tubes, as Henlé's down-loopers, thence to rise up again with that increase of size and alteration of epithelium so clearly described by Henlé, and now to pass into the tortuous tube territories as tortuous tubes. Thus he presents us with a continuous but highly elaborate scheme of a direct passage from without into the Malpighian bodies, and one which experiences very various alterations in size.

Fig. 2.



There is thus much which an outsider who cannot form an opinion for himself must duly weigh before making up his mind upon this question.

Professor Ludwig sees all that Professor Henlé has described, and a little more; the closed network of Henlé becomes open into the down-slings of the latter, under more vigorous investigation. The injection fluid, under more skilful manipulation, reaches to some of the Malpighian bodies, those especially which lie high up in the cortex. Nor does Professor Ludwig merely inject from the ureter up into the

Malpighian bodies, but he meets us from above down, and from within out, in the most wonderful manner.

By passing a continuous current of warmed wax, dissolved in turpentine and coloured red (Orleans), through the artery and out at the vein, he makes the coloured wax transude at the capillary tufts, and so fill the entire system of urinary tubules; then, when the wax begins to pass out by the ureter, as well as by the vein, he ties the former, and now with warm size and water and Prussian blue, he sweeps the vascular system clear of its red wax, and fills it with blue, thus bringing it into marked contrast with the tubular system.

If my readers are pleased to confine this transudation of coloured wax to the glomeruli, and not to believe in the contingency of its filtering through the subsequent capillaries, as Professor Ludwig would have them, this proof will suffice for them, and they may rest satisfied of the existence of a continuous channel from the one system of tubes into the other. Gerlach, Toynbee, and the old observers are sufficiently confirmed. Can we still be doubtful? We think this question is one which the Professors of Physiology in our own Universities, whose ample endowments give them leisure for minute research, opportunity for employing costly apparatus, and great facilities for obtaining skilled assistants, might settle, if they would only expend a little of their spare labour upon it. We hope for the interests of science that our discussion of it may awaken their attention.

The Supply of Blood to the Kidneys.

Turning to the latest edition of Todd and Bowman's valuable work on Anatomy (and there is none so trustworthy that I know of in any language), I find the distribution of blood-vessels to the kidney still only very generally described there, the great mains are certainly laid down with wonted accuracy, but nothing beyond this is attempted. I will not waste time by describing the entry of the renal artery with its sheathing of areolar tissue, nor tell out its great divisions, but shall pass at once to the anastomotic arches, and just above them to their first branchings, where the perplexities really begin, and observers commence to differ. I must quote first from Todd and Bowman.*

'From these arches a multitude of branches are given off,

* Edition 1856, vol. iii. p. 324.

and, after ramifying through the cortical substance, at length end in a system of capillary vessels, which exist through the whole substance of the kidney and form a network upon the tubes; in the medullary portion forming oblong meshes parallel with the tubuli, and in the cortex, with few exceptions, becoming afferent vessels to the Malpighian bodies.'

Virchow* holds a different view; I will therefore summarise this from his communication.

'The artery (arteria renalis, as he still denominates the anastomotic arches) enters the upper part of the pyramid obliquely from the side, passing between the bundles of tubules as you might pass a pen between your fingers, some in front and some behind it; branches, vasa ascendentia, are then sent off from it upwards towards the Malpighian bodies, but directly after leaving the main trunk, these vasa ascendentia divide again to give off two or three tiers of little arches, which run almost parallel to each other, and all parallel to, but above the fornix magnus.

'The ascendentia give off the afferent vessels like falling rockets, whereas the tiers of little arches give off the descendentia, which break up into tufts, or what they are much more like, miniature horsetails, that run downwards, encompassing the medullary tubes under the denomination of vasa recta.'

Between two such branches of ascending and descending vessels, the so-called 'keil' of Virchow, 'conus' of Ferrein, or lobule, is contained. Thus, he says, we have two exactly corresponding parts in both cortex and medulla, in which the identical tubuli uriniferi and their tortuous prolongations are supplied with blood from the same branch source. He makes the capillarisation in the upper two-thirds of the cortex take place wholly from efferent vessels, and in the corresponding medullary portion wholly from the vasa recta, but between them he allows a neutral zone to exist in which both systems closely interosculate.

Arnold, Hyrtl, and Ludwig make the arteriolæ rectæ spring straight from the renal artery (that is, the fornix arteriosus).

Berres and Bowman make them originate from the efferent vessels. Kölliker is of much the same way of thinking; he makes all the capillarisations arise from the efferent of the glomeruli. Ludwig allows a small separate supply to the top of the cortical portion, and Gerlach, a few vessels to pass directly over into capillaries at the lower part, the 'innern,' of the cortical layer.

* Einige Bemerkungen über die Circulations-Verhältnisse in den Nieren, Virchow's Archives, 12 Bd.

Now, of my own views: the importance of deciding the actual origin of these vasa recta is very great, and I have spared no time or pains in my endeavour to investigate it. Hitherto, however, although I have most carefully injected the kidneys of oxen, sheep, and man, this, too, in various ways and with very complete success, and although some thousands of sections have been made just at that part where the tiers of little arches, described by Virchow as giving off the vasa recta, should have been forthcoming, these have entirely eluded my observation, so much so as to lead me to believe that, apart from pathological specimens, the vasa recta in healthy kidneys originate mainly from the capillarisations springing from the efferent vessels, and also partly, as Gerlach has laid down, from direct capillarisation of blood, whether from the fornix or the arteria ascendens, which has not passed through glomeruli, but that this source is very small, and very difficult to ratify, and certainly given off with no such regularity or constancy as Professor Virchow has illustrated it in his plates.

Now it is difficult to find out what main branch distributes these arteriolæ rectæ; first, because, as Professor Virchow has stated, it does not spring from its source upon the same level as that in which the main branches (individual hairs of the descending tufts) extend themselves: a very small portion of it only can therefore be comprehended in any section which includes these; and secondly, because the more perfect the injection is, the fuller the whole capillary meshwork becomes, and the greater is the complication of affairs—the perplexities are merely multiplied.

But, then, the basework upon which Virchow grounds his own belief is just the worst possible; his main evidence is a pathological specimen, an amyloid kidney, which does appear to me to be the weakest pedestal to support an anatomical argument upon. If this point is to have physiological value attached to it, a fundamental requirement must be that the sound healthy organ should, upon proper inquisition, present us with some evidence in its favour.

What Professor Virchow describes as the origin of these vasa recta is, in my belief, true only of diseased specimens. I possess one myself, in which a tubercle growth obstructs the vas ascendens to a lobule, the enlargement of the vasa recta belonging to this lobule, and their apparent origination from one main trunk, is now very distinct. But this is an exception, the rule is otherwise, which I will lay down as briefly as I can, consistently with its very great importance.

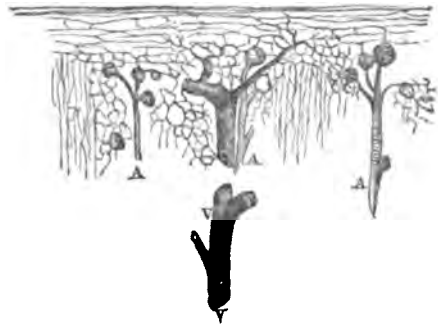
The fornices arteriosi divide the cortical from the medullary portions, they give off all, or almost all, their branches, as arteriæ ascendentes distribuentes glomerulorum, upwards, yet not thus with a mathematical precision, as Professor Virchow ably words it, and that for two reasons: since, in the first place, the ascendentes arise, divaricating from each other like the spokes of a wheel from axle to tire, and in the second do not all rise in the same plane, but slope obliquely outwards, like the skeleton bones of a fan. These vasa ascendentia are by some called lobular branches; they give off the vasa afferentia like falling rockets, turned back at acute angles to themselves, and thus exactly against the current of the blood stream; they are placed thus doubtless to break the shock and slacken the force of the blood's impact upon the glomeruli, for the stems by which the Malpighian bodies thus hang connected with the ascending arteries are very short. Close to the cortex the terminal tufts of the ascendentes carry their afferent arteries, and so their glomeruli, much more uprightly; they may be said to hold their heads up better like certain mannikins, the higher they stand in their little world, as not a few do in ours.

Let me for a moment refer my readers to what I said when treating of the orderly arrangement of the urine tubes: the bundles of tortuous and those of straight tubes which I represented as wedged between each other, or dovetailed after a fashion together, just as I might, for comparison's sake, introduce the fingers of one hand between those of the other. Now the arteriæ ascendentes and the afferent stems, with the glomeruli, which are given off from them, lie for the most part in the territories or pillars of the tortuous tubes.

Inside the Malpighian body the afferent vessels break up into the glomeruli or vascular tufts, and then take exit as the efferent vessels, which are very little larger than the surrounding meshwork of capillaries in which their individuality is quickly lost. This capillarisation is of a net or honeycomb description in the tortuous territories, and of a longer mesh in the territories of the straight tubes; while in the layer of tubes which lies immediately beneath the kidney capsule, it extends in closely flattened meshes running parallel to the surface of the kidney (fig. 3). But certainly throughout the cortex the blood invariably passes through the glomeruli before entering the capillaries; indeed, if we have not injected through these, the tissue remains free from colouring matters. The veins of the cortical portion may be described as beginning in the subcapsular meshwork; they are collected by short radicles into stems, which run closely clinging to the orderly

arrangement of the vasa ascendentia in the tortuous tube territories, and thus terminate in the large venous anastomotic arches.

Fig. 3.*



Now of the vasa recta: these, by the specimens before me, always commence in the meshworks of capillaries at the lower portion of the cortical half; their largest sources are from the straight meshes of the straight tube territories, which have thus passed through glomeruli; but they also receive a considerable supply from efferent vessels coming direct from the lowest tier of Malpighian bodies, which efferent vessels are, as Ludwig has correctly stated, larger than the efferent vessels in the upper cortical parts,† and this because the Malpighian bodies here are scantier in number, but individually larger in size (fig. 4).

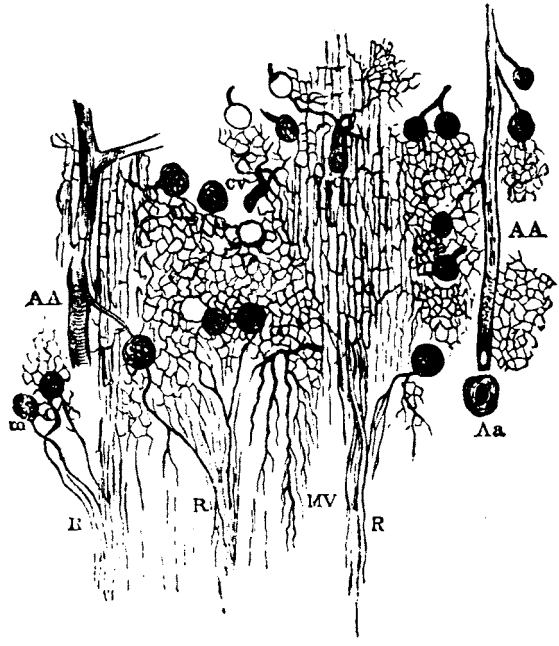
They also receive some few branches here and there which seem to spring from the vasa ascendentia stems, not having passed through glomeruli; they are a very small and a most irregular source, but still it is most important for us to recognise them, for if the establishment of such a direct blood channel be allowed existence at all, the complete accuracy of Professor Virchow's observation is virtually admitted, and those capillaries, which in a normal state of the kidney are scarcely ever traceable when the so-called amyloid thickening of arterial twigs has diminished the calibre of the afferent vessels almost to obliteration, gradually yield to the increased pressure of the blood thus forced through them by collateral fluxion, and become the means whereby the blood can pass over into the renal vein from the renal artery without entering the glomeruli at all, accomplishing its circuit by a short cut, and thus avoiding those

* Section close to renal capsule, cut parallel to the direction of the straight tubes, demonstrating the arrangement of capillaries in the upper cortical portion of the kidney. A, A, A, are terminal ascendant arteries; v, a cortical vein. The meshwork is shown parallel to surface of kidney, quite at the top of a fine network description in the tortuous tube columns, where the Malpighian bodies also lie, and of a straight long mesh in the straight tube territories.

† Ludwig's Bemerkungen über die Verenwurzeln der Rinde und dem Mark. p. 14. Zur Anatomie der Nieren.

channels in which the special gland depurative agency is properly exerted.

Fig. 4.*



It is a pretty theory, and one that must stand or fall upon its own merits, which I will not seek to advocate here. I have had a long and arduous search before I could establish this last, this far smallest, and in health most unimportant, source of the vasa recta; but I possess one section from a perfectly sound sheep's kidney which renders its existence to my mind no longer doubtful: but when Professor Virchow maintains the vasa recta to be derived from sources mainly apart from glomeruli, he is in error. I take his origination of them from tiers of little arches to be merely a pathological enlargement of pre-existing capillaries—the exception, not the rule.

All observers are agreed about the general appearance and

* Section cut parallel to the direction of the straight tubes, showing capillary arrangement in the intercortical and medullary region, Virchow's neutral zone, and origin of vasa recta. A A, longitudinal section of ascending arteries; C V, cortical veins; A a, transverse section of anastomotic arch; m, Malpighian bodies; R, vasa recta; M V, medullary veins.

distribution of the vasa recta; they are of remarkably equal size; they run, like brushes or horse-tails, parallel with the fascicles of tubules in the medullary portion, dividing these into bundles apart from each other, and separating them into so-called lobules, playing indeed with them just the part which their homologues, the vasa ascendentia, act by the cortical portion.

They measure from the 1-1600th to the 1-2000th of an inch in diameter; they extend through the upper half of the medullary district in their separate bundles, and finally gradually lose themselves in very long-meshed, large-sized capillaries.

The veins of the medullary portion commence, as Bowman has described, by a beautiful plexus upon the surface of the papillæ; they collect into trunks which run up just where the vasa recta run down, in the same divisions between the tubules; they are much less numerous than the vasa recta, and present about double their calibre; they are also much more wavy. I have injected them carefully, and they are very easy of injection; they terminate, too, like their fellows that descend from the cortex in the venous arches round the bases of the pyramids, and the venous arch mostly lies below the fornix arteriosus, and is considerably larger than it.

Thus much microscopically of the circulation; the macroscopic conclusions I can sum up in a moment.

Is a kidney arterially or venously congested? There are certain special parts of it to look to by which we can decide this.—Venous congestion is shown upon the outside of the kidney by an arborescent appearance of the subcapsular veins; these veins pass over into the capsule itself, and may be distinctly seen in it; while, upon section, the stems of the collecting veins in the tortuous tube territories in the cortical half, the long vascular lines running between the bundles of straight tubes in the medullary half, the undue prominence of the large veins, and greatly increased sanguineous injection of what Virchow terms the neutral zone, the intermedullary and cortical portion, each and all proclaim it.

Arterial congestion is shown upon the surface by punctiform dottings, in which no arborescence is perceptible; fine twigs of vessels cannot be traced out as before. Malpighian bodies and terminal ascendant arteries are seen as through a stratum of ground glass, dimly and indistinctly, and a species of ill-defined lobulation may be made out, which is badly termed lobulation, because merely due to the meshwork of capillaries round the tortuous tubes.

Upon section, arterial congestion of the cortical portion is

indicated by more manifest symptoms. The tortuous tube territories present much more vascular injection as contrasted with straight tube columns. The real lobulation is thus rendered much more distinct, both by the ascendant arteries above and by the tufts of vasa recta below; this in a healthy state of the kidney is perceived very much less, being masked by the needle-point red dottings of the innumerable Malpighian bodies which are much more generally to be seen through the then more semi-transparent structures.

The nerves of the kidney arise from the plexus renalis, which is composed of branches springing from the cœliac and aortic plexuses, and from a large ganglion covered by the supra-renal capsules, which receives large branches from the great splanchnic. The nerves surround the arteria renalis as this vessel enters the hilus, and branch with it in the kidney substance. They have been traced by Von Wittich, from whom I transcribe this,* into the cortical substance; they consist, for the most part, of grey ganglionic fibres, and only of a few double contoured tubes; their ultimate terminations are not known.

Those who still doubt about the existence of a stroma of connective tissue in the kidney, had better seek to assure themselves upon this point by examining the kidney of a young child, for it is here to be observed in much larger quantity than we ever find it in that of the adult. In the normal state a fibrillar texture is of course not recognisable in it, but the stellate corpuscles may be shown without any great difficulty in the membrana propria of the glomeruli.

This connective tissue is much richer in the medullary than in the cortical parts, and most so nearest to the emunctories of the urine tubes in the papillæ; it passes on and into the capsular sheath by the medium of the blood-vessels whose outer coat it invests.

The more intimate Relations of Tuft to Capsule.

I possess several preparations from the kidney of the ox which demonstrate how the capillary tuft is attached in its first branchings to the inner wall of the Malpighian capsule; its coils subsequently hang free, but the primary breakings up into divisions of the artery lie incorporate, as it were, in the wall of the capsule. The great stress which is laid upon this very point by Ludwig may be well known to many. The scheme of his deduction from it will be best shown if I copy his ideal drawing (fig. 5).

* Virchow's Archives, vol. x. p. 325.

The efferent vessel springs, as he describes it, from the centre of the globe of the glomerulus, where the capillaries hang loose and free; but the afferent vessel first breaks up into branches, which lie, as he says, close against the capsular wall, and which are, in my opinion, still further attached to it (fig. 6); and thus,

Fig. 5.

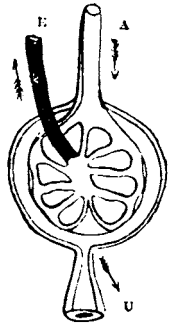
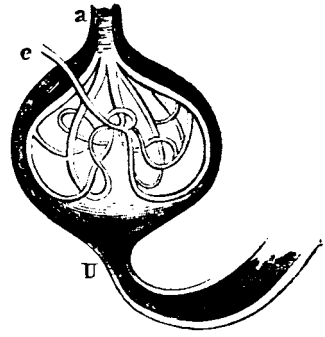


Fig. 6.*



as the pressure of the blood stream distends these, they tend to stretch open the capsule, and separate the loose capillary coils from each other, thus rendering the stream through into the efferent vessel so much the more easy.† The correctness of his view is, as he states, strongly confirmed by the circumstance that no injection from the veins can be made to enter the glomerulus; for since the efferent vessel debouches from the centre or loose end of the capillaries, these, since they hang slack, are driven against the capsule of the glomeruli by any pressure which does not draw them apart from each other, and thus the channel is closed to the reflux current.

Now if the tuft were not thus attached by its branchings to the capsular wall, so as to include the free capillary coils in the centre, out of which they cannot escape, the hernia or protrusion of a string of capillaries into the urinary tubule would be no uncommon occurrence, when we consider the constant and lifelong continued pressure to which the intra-glomerular capillaries are subjected, and the nature of the opening, funnel form, as I have described it, from the capsule into the tubule. Such an accident, however, I have never seen myself, nor read described by anybody else.

* a, Afferent artery, the first branchings of which are attached to the capsular wall; e, efferent vessel springing from loose coils; u, urine tube.

† Einige Neue Beziehung zwischen dem Bau und der Function der Niere. Ludwig, 48 Bd. der Sitzungsb. d. Kais. Akad. d. W. 1863.

Physiological Summary.

We have thus learnt that the kidney presents us with a gland structure of wonderful extent: the uriniferous secreting surface is about six times as large as the whole surface of the skin (according to Valentin), and is packed in man, after a marvellous order, into the minutest possible space.

It remains for us to explain the adaptation of the several parts towards the function of the whole. We suppose this tubular gland structure in man to commence at the Malpighian bodies, to terminate in the papillæ, and to be continuous by direct channel of communication throughout. We consider the tortuous or glandular tubes proper, as signified by their structure, contents, and intimate annexation with blood supply, to be that portion of the tubes in which the separation of the more solid constituents of the urine and its colouring matters takes place; but we regard the Malpighian bodies themselves neither as the especial seats of water filtration, as assumed by Bowman, nor as that of urea secretion, as Dr. Isaacs, of New York, has from his experiments surmised; but rather, as their position and structure appoint them, as blood regulators.

I am not comparative anatomist enough to speak from my own authority of what pattern obtains in the Invertebrata, but I am told that a glomerulus or tuft invariably appertains to the urinary organ in Fish, Reptiles, and Birds as in Mammalia: this is enough to assure me that the apparatus means more than water separation from the blood; neither need we force our imaginations to recognise in this first capillarisation a portal circulatory analogue. This may serve to impress our memories with the anatomical fact that all the blood passing through the kidney makes its 'premier début' on these little stages, but explains nothing of the 'rôle' played out upon them. No; there is something much more important effected at these flood-gates, which no engineer would have overlooked. Our explanations hitherto have been too depreciatory of Nature's handiwork; through blindness we have ignored perhaps the most beautiful example of constructive design in the Creator's mind, which is presented to us in man, His masterwork. Here is the sluice-gate which commands supply, the balance-wheel which regulates speed, the governor which prevents undue pressure; an escapement adapted to work for scores of years and not be worn out or get thrown out of gear. The afferent vessel is given off from the arteria distribuens. When the nuclei are coloured by carmine the double striation of this is very signifi-

cant. The colouration of the Malpighian body itself also is intense, because the muscular sheath of the artery is left upon the wall of the dilated tubule, and pinches round its neck of communication; but the efferent vessel is no more coloured than the capillaries in which its identity is shortly lost: this is nothing but a large capillary.

A point that is much lost sight of by physiologists is the solidity of the Malpighian body when shelled out of its connective tissue framework in the kidney. It is a circumstance of which we become fully aware when we have teased this out of a portion of kidney macerated in hydrochloric acid and alcohol mixture. We then learn how closely the capillary coils fill all the capsular cavity. There is no room here during life for glandular structure, although gland elements may perhaps be pushed up into it after death, separated by post-mortem changes from the communicating tubule.

When the afferent artery wall is relaxed, the wall of the capsule participates in the act of dilatation. The capillaries are stretched open, and the blood is flushed quickly through by 'vis a tergo' and 'a fronte.' If the urinary water transude here at all it must be in small quantity, for the conditions are not those most favourable to transudation, and can only serve further to dilate the capsule and expedite the blood's passage. The act of dilatation itself, however, is one which we feel much more inclined to attribute to the elastic external sheath of the Malpighian body, that investment by which it is linked and fastened into the kidney stroma proper. This coat it is which preserves its shape and size whatsoever rough treatment of brushing and shaking in water we may subject a thin section to, and which may be so distinctly seen when the Malpighian body itself has been shelled out from it.

Again, when the muscular wall contracts the calibre of the afferent artery, the capsule, muscular too in its elements as we have premised, contracts upon the capillary tuft, makes the blood ooze slowly through its canals, and lends the strength of its own wall to resist, to support, and to diffuse the pressure.

Throughout the cortical portion the closest and finest possible meshwork of capillaries surrounds both tortuous and straight tubes, but in the medullary region the vasa recta bundles, in which, as above described, the lower half of the capillarisations from the efferent vessels terminate, are coarse and relatively much larger. It is easy to see the explanation of this.

The blood which has been delayed in its passage through a multiplicity of minute channels, and has been already closely searched for urinary constituents, is now collected into broader

and much more direct canals, and is directed to flow side by side with the emulgent urine tubes; the object now is to render the current more swift, to present the most perfect conditions for the exosmosis of watery fluid. These are the swift passages of blood against a thin-walled (single contoured) open urinary tube, which is lined with clear epithelium, and permeated by a fluid of higher specific gravity than itself, now that it (the blood) has been thinned of its urinary solids.

Apart from all pathological evidence, the arguments are as strong as possible for the transudation of mere water occurring here from the medullary portion.

But it will be urged against me, What mean the closed downloopers of Henlé, and wherefore do they dip down among the water drains? Ask, why do the roots of trees tend towards the water wells if not for water? These are the thirsty spongioles which pick up the water to flush down the drains which had otherwise been choked up with solid urinary excreta.

The pathological confirmation of the correctness of these views is briefly this—That in the small contracted kidney where the cortical or glandular part proper has been reduced to quite a minimum, large quantities of water of very low specific gravity are often daily passed. The uric acid and lime deposits so commonly found in new-born infants' kidneys have their seat in the open-mouthed tubes in the medullary region. Now these occur where the circulation in the kidney has suffered in common with that of the rest of the body from insufficient oxydation of the blood, and only when but little urinary water has transuded.

But the sling-looped straight tubules were shown by Hyrtl to be the favourite seat of gall-coloured cylinders, of fibrinous casts, and, as Henlé* states, of the white infarcta, whether salt deposits or fat, found in old people. This is no longer surprising when we remember that these downloopers are prolongations of the tortuous tubes, that they are not water flushed from the glomeruli downwards, but that they dip down to suck up water, and lie side by side with blood-vessels.†

There remain only a few physiological points which I must call further attention to. These are the large size of the renal artery, the absence of valves in the renal veins, the existence of muscular fibre cells in their walls, the facility of injecting up to the glomeruli, but not through them, from the veins, the great rapidity of the renal circulation during the periods of

* Op. cit. p. 13.

† Their intercapillary position renders them liable to fibrinous infiltration, while as intermediate channels between the tortuous and open-mouthed excretory tubes their occasional clogging up with glandular débris is noway remarkable.

glandular activity, which are, as Brown-Séquard has shown, not constant, and the then red colour of the blood in the renal veins.

But enough. Anatomy by itself is uphill work both for writer and reader. My endeavour has not been to advocate opinions of my own, but rather calmly to review the labours of others. My desire was to be a sound critic, and to this end I have honestly striven and assiduously schooled myself.

The 'brevis esse' and 'obscurus fieri' fear has been ever before me, rendering my descriptions intelligible, I trust; but at the expense, perhaps, of their being considered tedious.

To those who may have followed me through all my probabilities, my thanks are sincerely due, and my hope is that they may have found something to repay them for the favour of their forbearance.

Article XI.—*Remarks on the Operation of Excision of the Knee-Joint.* By Holmes Coote.

THAT long bones increase in length by addition to their extremities, especially their distal extremities, was the general result of the experiments of the late Mr. Stanley, who introduced needle-points at measured distances into different parts of the bones of young animals a certain number of days before they were killed. After death he measured, in each case, the distances between the needle-points, and between each of them and the ends of the bone. He also found that when any part of the walls of a bone in a young animal is thoroughly hardened by ossification it ceases to increase in length.*

When bone has become solidified it does not admit of expansion by interstitial growth; but complete solidification is attained only when a bone has acquired its normal or permitted length. Thus in a healthy subject the increase in length and in circumference proceed pari passu until the full development has been attained.

In animals (e.g. Crocodilians, Chelonians) to whom no limit of growth has been assigned, the different typical pieces of the skeleton preserve their individuality; increase in size takes place by the addition of osseous matter to the exterior and circumference.

Not so, however, in the Mammalia. It has, indeed, been proved by repeated observations, that increase in diameter is

* Catalogue, St. Bartholomew's Hospital Museum, vol. ii. ser. vi. No. 47.

attended by continual deposition and ossification of a layer of blastema beneath the periosteum, just as increase in length is caused by growth and ossification of the layer of cartilage between the epiphysis and the shaft. But growth involves the whole thickness of the shaft, as has been shown by the experiment with the metallic ring, which, put round the circumference of a growing bone, is found after a time in the medullary cavity. When a bone is once formed there is no further deposition under the periosteum, nor any growth of cartilage beneath the epiphysis; but interstitial absorption goes on within the medullary cavity until, as in old subjects, the cancellous tissue is removed, and a more or less thin case of bone, containing fatty matter, is left. No better illustration of interstitial growth can be selected than that of the compound bone named the lower jaw. The early fusion of all the pieces, except the alveolar, renders increase of length impossible except by the deposition of cartilage and its ossification under the articular piece. The rest of the bone enlarges by general interstitial increase. In all the shorter bones, such as the metatarsal and metacarpal bones, there are well-formed epiphyses as in the longer bones.

The separation of the epiphysis from the shaft may take place in consequence of considerable violence; nevertheless it is comparatively rare. In the Museum of the Hospital* there is a specimen from a boy, aged 16, showing the shaft of the femur separated from its lower epiphysis; the injury was produced by a rope entangled round the leg. Amputation was performed three weeks after the injury. The same event may occur from disease, as, for instance, in pyæmia.

But in a healthy-growing bone the connection between the epiphysis and the shaft is sufficiently firm to resist common injuries.

The growth of bone, thus pervading its entire structure, though often more active in one part than another, is in direct dependence on the exercise of nerve force. The interruption or disturbance of this force affects not only the interstitial deposit of nutritive material, but also arrests development.

No such change, so decided and striking, is produced by disease however long continued: in the former the tissues become at once flabby and soft; the minute structure of muscles shows the lowest form of fatty degeneration; the bone ceases to grow equally with the opposite, its form becomes ill-defined, and the prominences slight and rounded.

* Series iii. No. 91.

In cases of long-continued disease the muscles may, it is true, become soft, and the circumference of the limb will be less than natural; but this form of atrophy admits of repair. Exercise will restore the warmth and roundness of the limb. Moreover, the bones in this case attain the same length as with the sound member. The following cases illustrate some of these points:—

Measurement of limbs in which nerve power is impaired.

A female, æt. 9, Talipes equino-valgus paralyticus (severe) of the right foot, proceeding from the consequences of a fit at the age of two years.

Length.

Right lower extremity	25⅝ inches
Left lower extremity	29 „
Right thigh	12¾ „
Left thigh	15 „
Right leg	13 „
Left leg	14 „

Circumference.

Right thigh	13½ „
Left thigh	15 „
Right leg	11 „
Left leg	9 „

A female, æt. 7¾, Talipes equinus paralyticus, in a very slight form (rectangular) of the right leg; the history obscure; early symptoms slight.

Length.

Right thigh } Left thigh }	equal.
Right leg	11 inches
Left leg	11½ „

From a skeleton in the Museum of St. Bartholomew's Hospital, an adult, the subject of Talipes equinus paralyticus of the right foot.

Length.

Right femur	15½ inches
Left femur	17 „
Right tibia	12½ „
Left tibia	14 „

Circumference.

Right femur	3 „
Left femur	4 „

Measurement of cases affected by disease, but no loss of nerve power.

A female, æt. 12, disease of the left knee-joint; seven years' duration.

Length.

Right lower extremity	27½ inches
Left lower extremity	27½ „

Circumference.

Right leg	10¾ „
Left leg	10¼ „

A male, æt. 4, disease of the right ankle-joint; six months' duration; from a cab running over it.

Length.

Right lower extremity	19 inches
Left lower extremity	19 „

Circumference.

Right thigh	10 „
Left thigh	10 „
Right leg	7¾ „
Left leg	8½ „

A female, æt. 13, disease of the right knee-joint; of two years' duration.

Length.

Right lower extremity	29½ inches
Left lower extremity	29½ „

Circumference—nearly equal.

A male, æt. 13, disease of the left knee-joint, from a violent twist in machinery; of seven months' duration. Since the accident he has scarcely once put the foot to the ground. The knee is extremely tender; the leg is straight, but the foot and lower extremity are everted.

Length.

Right lower extremity	29½ inches
Left lower extremity	29½ „

Circumference.

Right thigh	13½ „
Left thigh	12 „
Right leg	10 „
Leftleg	9¼ „

This limb underwent the operation of excision of the knee, May 6, 1865. The articular cartilage and the cavity of the joint were found in an apparently healthy state; but the cancellous tissue of the head of the tibia was dark-coloured, congested, and friable. It was in that soddened state described by the late Mr. Stanley, who on more than one occasion endeavoured, without success, to extirpate the affected tissue without

removing the limb. This state of the bone prevents the patient bearing on the limb, the pain on pressure being excessive. In course of time the parts may, by constant rest, regain their normal condition; but more frequently one of two morbid changes is observed. Either a sequestrum forms, by necrosis and detachment from the surrounding tissues, or the soddened cancellous tissue becomes dead without separation. In these cases the operation for the removal of the dead bone is at all times uncertain and hazardous. The removal of the sequestrum may be the means of effecting a cure; but more commonly the extensive manipulation required, in the operation on the head of the tibia, leads ultimately to changes involving the adjacent joint, under which circumstances amputation is necessary.

An interesting case, illustrating the effect of disturbance of nerve power on the nutrition of bone, occurred lately in Bethlehem Hospital. The patient is the subject of progressive general paralysis, but is still a stout, florid-complexioned man, apparently in the enjoyment of good health. The tissues, however, are flabby; fatty degeneration is doubtless going on, and the bones have become brittle. Within the last eighteen months he has twice sustained fracture from trifling accidents; on the first occasion, by suddenly and sharply falling to the ground, he broke the bones of the forearm; on the second, by twisting the foot and falling, he broke the bones of the leg. Union has taken place on both occasions without difficulty and in the usual time.

On another occasion I saw a child, the subject of infantile paralysis, two days after the seizure. The right lower extremity was paralysed. Atrophy seemed in progress at once, for I detected on my first visit a difference, which a few weeks made apparent to all, in the measurement of the circumference of the limb.

In making an inquiry into the causes of this disturbance of nerve power, we enumerate (*a*), paralytic seizures of various kinds dependent on changes in the cerebro-spinal axis. Whether or no such changes consist in molecular disintegration of the nerve cells of the grey matter, is yet a matter for investigation. (*b*) Injury to the grey matter by the effusion of blood, attended with breaking up of the nerve substance. (*c*) Arrests of the flow of blood to the brain, as by ligature of the common carotid artery, or embolism of some of the cerebral vessels.

But direct violence may lessen the nerve power and arrest nutrition. We all know how cold and feeble a limb remains after a serious accident; how the deltoid muscles wither

after a heavy fall on the shoulder; how an arm becomes atrophied when a bullet has passed through the limb. May we not attribute these occurrences to the nerve shock sustained by the patient who is the subject of such injury? And what greater injury can a limb sustain and yet retain its vitality, than the extirpation of such a joint as that of the knee.

To what do these observations tend? To this fact—that the operation of excision is, as a rule, unsuited for young growing persons, in whom joint-disease is certainly not a fatal affection. 'White swelling,' as understood in England, does not generally require operation. It means chronic synovitis, on whatever cause this synovial inflammation may depend. The Report from St. Bartholomew's Hospital of 1864 gives 86 cases of synovitis; of these 79 were discharged cured; 2 were discharged relieved; 4 were discharged unrelieved. The per-centage of deaths to the number of cases was only 1·16.

The number of cases of the more serious form of diseased joints, i.e. affections commencing in the bones and extending thence to adjacent structures, amounted during the same period to 74. Of these 54 were discharged cured; 7 discharged unrelieved; 2 discharged for other than medical reasons; 11 died. The per-centage of deaths being 14·86 to the number of patients from this disease.

The age of the patient exerts a great influence on the chance of recovery. During the year 1864 the death of one female, between 15 and 25, the subject of synovitis, is recorded from pyæmia. The death of another female, between 10 and 15, the subject of 'disease of a joint,' is recorded, from tuberculosis.

During this year 37 males and 40 females were admitted suffering from synovitis. Of these 43 were under 25 years of age; 7 remained from the preceding year, making a total of 50 cases. Of these 50 cases, 47 were discharged as cured, leaving 3 under treatment. Thirty-seven males and 29 females were admitted during the same period labouring under 'disease of joints,' making a total of 66; 37 were under 25 years of age, but this number was increased by 7 remaining from the preceding year, making a total of 44. Of these 36 were discharged as cured, leaving 8 cases under treatment.

We are therefore justified in affirming that affections of joints, especially in the young, are for the most part curable, and do not require so serious an operation as either excision or amputation.

On the present occasion I offer no remarks on the subject of amputation. It may be sufficient to say that in the class of cases now under consideration, the operation is year by year

decreasing in frequency. But as regards resection or excision of joints, I must record my protest against the general propriety of the proceeding as a method of treatment. The arrest of development in the limb is a circumstance now amply confirmed, and I know of no method by which it can be averted.

Dr. Hodges, of Boston, has collected from all sources 119 cases of resection of the elbow. Of these 57 were performed on patients under 25 years, the youngest being 3½ (!) He has likewise tabulated 200 cases of resection of the knee; and of these 140 were under 25 years, the youngest being 3 (!)

Does it not make a strong demand on our belief to infer that the operation was in all these cases necessary?

One of the most striking instances of a shortened limb after excision of the knee-joint, is that recorded by Mr. Pemberton, of Birmingham, who removed three and a quarter inches. Six years later it was 'shrunk, blighted, and shortened nine inches.' Mr. Henry Smith operated on a boy 6 years old, the shortening being two and a quarter inches. Five years and a half afterwards the shortening amounted to five inches.

M. Ollier* claims to have shown that the two epiphyses do not effect the same proportion of the growth of long bones, and that those which achieve the most do not correspond in the two extremities. He arrives at the conclusion that, in the upper extremity, for the arm and forearm, the epiphyses furthest from the articulation of the elbow grow the most; whilst, in the inferior extremity, for the bones of the thigh and leg, the epiphyses nearest the knee increase to the greatest extent. Hence that resections of the upper extremity performed on the young yield a better result than those on the lower extremity.

But I maintain that too great importance is attached to the exclusive influence of the epiphysis upon the growth; and that in whatever region of the body the operation of resection is performed, the great dangers consist primarily in the nerve shock to the patient, and secondarily, in the consequences of extensively opening the cancellous tissue of the bone, and in the prolonged period of convalescence. In all cases the limb is withered, small, and weak; in many instances it is useless, or nearly so. When performed on the young, growth only adds to the consequent deformity; when performed on the adult, the attendant dangers are immeasurably increased.

The performance by me of this operation on two patients within a period of fourteen days from one another, imposes, after the foregoing remarks, the duty of explaining the reasons which induced me to follow that particular course.

* Journal de Physiologie de B. Séquard, vol. i. No. 13, p. 87.

In both instances the patients, it is true, were young; but apparently healthy; and the severe symptoms, which called forth the necessity of an operation, were due to accident. Although young, and therefore free, in all probability, from internal organic disease, they were tall and had not much to acquire in height; consequently, the difference of length in the limbs would be permanently limited to the immediate effects of the operation. There would not be many years of growth to add to the deformity. The patients were country-bred, and of florid aspect. Bearing in mind that there are two structures only in joints which are ever the seat of primary inflammation; namely, the synovial membrane and the cancellous tissue of the articular epiphysis, I inferred that in these two cases, in which the symptoms of synovitis were absent, the disease was limited to a portion of bone which admitted of removal. Although the articular cartilage would most probably be found loosened and partially detached, yet this fact would not influence the steps to be taken. The experiments of Richet have shown that in animals wounds and injuries of articular cartilage readily heal when the bone is healthy; and perhaps the same would take place occasionally in man.

The morbid conditions of bone affecting a neighbouring joint consist in (*a*), superficial ulceration with detachment of the cartilage; (*b*), general infiltration and soddening of the cancellous tissue; (*c*), suppuration, circumscribed and diffused; (*d*), necrosis. (*e*), Tubercle; sometimes deposited in the cancellous tissue, but also to the shaft.

The bones of the lower extremity receive the whole weight of the body, and are particularly exposed to the effects of shocks and other injuries.

I now proceed to brief narrations of the facts of the two cases.

I.—A female, æt. 15, was admitted under my care in 1863, suffering from chronic disease of the left knee. Under proper treatment, she so far recovered that she returned to the country, and was able to pursue a light occupation. On April 1, 1865, she was re-admitted, suffering great pain. She said that she had given the foot a sudden wrench, which set up active disease in the knee, and she came back to the Hospital almost worn out with pain After a trial of the usual remedies, the knee-joint was excised, April 18, in the usual manner, the patella being removed. The limb was supported in the proper tin splint; the wound was closed by the metallic suture. Examination of the morbid parts showed extensive inflammation of the cancellous tissue of the bone, with superficial ulceration and shedding of the cartilage.

No very unfavourable symptom supervened; but convalescence has been prolonged, and at the present date, August 20, she is just able to leave her bed. The result is satisfactory.

II.—A male, æt. 13, employed in machinery, gave the left knee a violent twist. The persistent symptoms which followed the injury were extreme pain and inability to bear on the limb. He made one attempt to resume his occupation, but was forced to desist, all the symptoms being much aggravated by exercise. He was admitted into the Hospital April 13, 1865, and was ordered good diet. The limb was to be kept in a state of complete rest.

No improvement supervened. The appetite began to fail, and the night's rest was broken. At his own and his parents' request, an operation was suggested, and the joint was excised by me, May 6. The interior of the articular cavity was apparently normal; but the cartilage covering the head of the tibia was loosened, and the subjacent cancellous tissue was dark-coloured and soddened. The whole joint, including the patella, was extirpated in the usual way. A back splint was applied, and the after-treatment conducted as in the other case. One suppuration formed over the head of the tibia, but, with that exception, there has been no unfavourable symptom; and at the present date, August 21, the boy is convalescent; and he will soon be able to leave his bed.

The operation of resection of the knee has been performed ten times in St. Bartholomew's Hospital since August 1863, as shown by the following list of cases (see next page).

Of these ten cases two died, being a mortality of one in five. Amputation was performed once, and an unsatisfactory condition of the limb existed in several of the recoveries. Now all these patients were particularly favourable subjects for operation, the eldest being only 20 years of age, the youngest was 9; they were 'selected cases,' and, consequently, present this operation under its most favourable aspect.

The result of my own experience in the treatment of knee-joint-disease, especially in the young, is adverse to the operation of resection. I feel more confidence in the treatment by long continued rest, and the application of those principles comprehended by the term orthopœdic surgery. And this opinion seems in consonance with the feeling of the upper classes, among the children of whom I have not yet heard of one instance of the performance of 'resection.'

When disease is so far advanced as imminently to threaten life, amputation is the preferable operation. To this rule the exceptions are, I believe, very few.

No.	Ward	Surgeon	Sex	Age	Date of Operation	Date of Discharge	Result to Life	Condition of Limb
1	Sitwell	Mr. Paget	F	16	Dec. 17, 1862	Aug. 2, 1863	Recovered	Firm union. Walks well, without perceptible limp.
2	Sitwell	Mr. Paget	F	17	Jan. 24, 1863	July 15, 1863	Recovered	Firm union. Reported by the 'sister' to walk well.
3	Darker	Mr. Callender	M	11	July 8, 1863	March 14, 1864	Recovered	Failure of union. Amputation of thigh, Jan. 9, 1864.
4	Darker	Mr. Paget	M	18	July 23, 1864	Aug. 18, 1864	Died	Extensive necrosis of the bones; pyæmia.
5	Henry	Mr. Savory	M	11	Sept. 7, 1864	May 11, 1865	Recovered	Firm union. Walks fairly, without any support.
6	Sitwell	Mr. Paget	F	20	Nov. 25, 1864	Jan. 19, 1865	Died	Failure of union. Exhaustion from suppuration. Thigh amputated, Jan. 17.
7	Pitcairn	Mr. Smith	M	9	Jan. 11, 1865		Recovered	Convalescent. Is about the ward.
8	Lucas	Mr. Coote	F	17	April 18, 1865	Aug. 30, 1865	Recovered	Result, doubtful.
9	Pitcairn	Mr. Coote	M	13	May 6, 1865	Aug. 30, 1865	Recovered	Progressing favourably.
10	Kenton	Mr. Paget	M	15	May 15, 1865	Aug. 30, 1865	Recovered	Progressing favourably.

ARTICLE XII.—*Report of a Case of Ichthyosis; with Congenital Malformation of the Aorta.* By WILLIAM CHURCH, M.B. Oxon.

BY the kindness of Dr. Martin, I was enabled to take a note of the following case during life, and I subsequently had an opportunity of verifying my notes and gaining additional information at a post-mortem investigation.

Mary Ann M——, æt. 15, but who seemed at least two or three years younger, a small delicate-looking girl, was under Dr. Martin's care as an out-patient during the autumn of 1863, and spring of 1864.

The affection of the skin was confined to the left half of the body, scarcely crossing the middle line at any point. The disease presented two quite distinct characters, being in some situations papilliform, in others squamous. The skin on the left side of the trunk was everywhere of a darker hue than that on the right, a well-defined line being visible down the centre of the thorax and abdomen.

A large patch covered the left side of the forehead and nose, the affected skin being slightly papillary in character; a patch similar in appearance spread over the greater part of the cheek and chin on the same side, and extended from the face to the tip of the ear.

The whole of the left side of the neck was occupied by the disease, which here assumed a warty character, some of the papilliform outgrowths being pedunculated. The diseased portions of skin stopped abruptly both before and behind, at the middle line of the neck.

The scapular region was almost entirely occupied by a large patch of steel grey colour, very slightly elevated above the surrounding skin, and consisting of small polygonal scales. The skin, so altered, felt quite smooth and soft to the touch, could be easily pinched up between the fingers, and nowhere exhibited traces of the cracks and fissures usually described as present. The greater portion of the left half of the chest was affected in a similar manner, the areola of the nipple being the seat of long conical papillæ of a browner colour than the surrounding squamous portions. At the border of the axilla, and in the axilla itself, the papillæ were longer and darker than in any other part of the body. Smaller patches, similar in every respect to that on the chest, existed on the subscapular and lumbar regions, a very small one at the commencement of the anal fissure, and another larger one on the buttock.

Nowhere, not even in the neck or axilla, where the papilliform masses were largest, was the integument stiff or rigid, while the non-elevated squamous portions were quite remarkable for their softness.

The hair, nails, scalp, skin of the arms and hands, legs and feet, presented a perfectly natural appearance, as also did the skin of the abdomen and groin, which was, however, of a rather darker hue than that of the corresponding portions on the right side.

A similar change had taken place in the mucous membrane of the mouth, whilst that of the eyes, nose, and vagina was unaffected. The whole of the mucous membrane covering the inside of the left cheek, the left half of the soft palate and tongue,* was the seat of papilliform outgrowths, which closely resembled those on the neck and in the axilla, but contained no pigment, and were of a dull yellowish white colour.

In the upper jaw the two incisors and the canine tooth were normal, perhaps a little smaller than those on the right side. The two premolars were very small and much decayed, whilst no molars could be detected, and the gum was hollowed out into a broad and deep furrow, thickly studded with hard papillæ of a considerable length. The teeth in the lower jaw were quite natural in appearance, and all present with the exception of the last molar.

On the evening of the 17th of July 1864 she went to bed in her usual health. Early in the morning of the 18th, a sister, who occupied the same bed, was disturbed by her making a 'peculiar noise,' and, on looking at her, found that she was 'black in the face, and apparently gasping for breath.' The sister ran down stairs to fetch her mother, and when they returned she was dead.

Permission to examine the body was with some difficulty obtained, and no examination of the head was permitted.

The viscera, with the exception of the heart, were all nearly natural, a few cretified masses were found in the bronchial glands, and a small similar mass in the apex of the right lung.

When the sternum was removed, the left lung was seen pushed to the side by the greatly hypertrophied heart.† No valvular disease was present, the foramen ovale was widely open, and the valvular fold in connection with it did not appear

* For a somewhat similar state of tongue, see a case reported by Mr. Hulke, Med.-Chir. Trans. vol. v. No. 1.

† The heart weighs, after being nearly a year in spirit, 15½ ounces. It is but slightly dilated, and the muscular tissue under the microscope appears quite free from any fatty degeneration.

sufficiently large to close the whole orifice. Nothing unusual was noticed about the arch of the aorta or the origin of the large vessels, but immediately below the left subclavian the aorta suddenly narrowed.

The aorta, at its origin from the ventricle, measured two and a half inches, whilst the descending portion measured only one inch in circumference.

No satisfactory evidence of the immediate cause of death was obtained. In the forty cases of aortic contraction and obliteration collected by Dr. Peacock,* sudden death occurred but seldom, and was attributable in four cases to rupture either of the heart or aorta. In two cases Dr. Peacock is of opinion that death took place from syncope, although one of the two is reported as a case of apoplexy.

The chief points of interest in the foregoing case appear to be—

First. The evidence afforded by it of a correlation of growth existing between the derma and the teeth.†

Secondly. The proof that some cases, at all events, of ichthyosis spuria, or sauriderma, are due to an alteration and hypertrophy of the papillæ of the corium and their epithelium, and not to desiccated and altered sebaceous substance, as stated by Mr. Erasmus Wilson.‡

Thirdly. The limitation of the disease to the left side of the body.

Lastly. The absence of any cyanosis, or marked cardiac symptoms notwithstanding the patency of the foramen ovale and the malformation of the aorta.§

In this case, as is so general in all cases of congenital blemish, there was a history of a fright having occurred to the mother during pregnancy. In this instance but little weight can be attached to her story, as she gave a very confused account of the circumstances, and did not remember at what period of her pregnancy the fright occurred.

* Med.-Chir. Rev. vol. xxv. 1860.

† I am unable to find any recorded case of ichthyosis in which a similar condition of the teeth has been observed.

‡ Diseases of the Skin, p. 629.

§ In none of the cases collected by Dr. Peacock is mention made of the state of the foramen ovale.

Article XIII.—*On Tumours containing Fluid Blood.*

By W. Morrant Baker.

TUMOURS containing fluid blood may be conveniently divided into two classes — 1. Those containing blood which coagulates on exposure. 2. Those in which the blood is variously altered, and not spontaneously coagulable.

It is of the second class, chiefly, that I propose to treat in this paper.

The following is a good example of one species of the class to which I refer.

In April 1863, a healthy-looking man, about 35 years old, was admitted into St. Bartholomew's Hospital, under Mr. Paget's care, with two partly distinct swellings; one on the outer side of the right ilium, and the other in the loin.

The larger swelling, obtusely oval, measured about nine by from four to about six inches, and, by its long diameter, reached from the anterior superior spine of the ilium nearly to the sacro-iliac synchondrosis; its upper border being almost exactly limited by the crest of the bone. The smaller swelling, nearly half-globular, was seated in the lower part and right side of the lumbar region, immediately above the sacro-iliac synchondrosis. It measured about three inches in diameter. The characters of both swellings, excepting the difference in size and shape, were exactly alike. Both were tensely elastic—evidently from the presence of fluid—immovable, and well circumscribed; they communicated freely with each other, the passage of communication presenting the appearance of an oblong swelling between them, of rather less transverse diameter than that of the smaller one. The skin over them was quite unaltered, and no pain was caused even by firm pressure. On coughing, a kind of impulse was communicated to the smaller of the two swellings, but such an impulse as might be communicated to any, even a superficial, swelling connected with the abdominal wall, and not such an expansive or heaving impulse as is characteristic of 'filling' from within. The muscles, when put in action, could be felt contracting superficially to the tumour, but no pain was caused by movements of any kind, and no pain or tenderness was complained of when pressure was made on any part either of the spine, sacrum, or hip; and no unnatural projection could be felt in either of these bones. The leg could be freely bent and extended, and the patient could walk well and firmly without pain or difficulty.

The history of this case was, that two years before his

admission into the Hospital, the wheel of a waggon passed over the outer side of the hips and flank, and he was laid up in consequence for a month or six weeks. After this time he returned to his work, but it was not until a short time afterwards that he discovered the presence of the swellings. They rapidly attained a considerable size, and then did not very much increase during the long interval that elapsed before his being taken into the Hospital. He continued to work, as an agricultural labourer, until within the few days preceding his admission, without any impairment of his general health, or any other trouble from the swellings than arose from their size. He had no rigors, or other constitutional symptoms indicating the presence of pus.

A short time after his admission into the Hospital, the larger swelling was punctured with a small trocar, and about twelve ounces of dark liquid blood were drawn off. The tumour was not completely emptied, but after the tapping, it was found to be limited by a very thick and firm boundary-wall, formed, probably, either by effused lymph or coagulated blood.

It is not necessary to give here a full report of the case;* it may suffice to say that, after repeated tappings and partial refillings, consolidation, with signs of inflammation of the tumours, took place, and the patient left the Hospital, nearly well, about two months after his admission.

On careful examination, the characters of the bloody fluid were found to differ remarkably from those of blood which had simply not coagulated. The specific gravity of the fluid drawn off at different times varied from 1024 to 1019.

It was of a dim blackish red colour, and somewhat turbid, but not putrid; on standing, it deposited a grumous sediment, but without any sign of coagulation. The microscope showed the presence of abundant blood-cells, variously altered, and of apparently various ages, from quite recent ones to some so old and shrivelled as to be scarcely recognisable. One of the most notable peculiarities was in the abundance of cells, which at first sight looked almost like those of recent blood; but on comparing them with recent characteristic disc-shaped ones, which could be seen floating side by side with them, the differences between the two were found to be very marked. The altered and, I presume, older cells, were of about half or one-third of the diameter of the recent; they were more globular, they had a more defined and firmer, but equally regular

* A good account of it, by Mr. Griffin, may be found in the Med. Times and Gaz. August 8, 1863.

outline; and, on altering the focus, their centres became brightly-shining instead of nebulous, as in a healthy recent cell.

The outline of many others of the corpuscles was uneven and jagged, and they had become also variously altered in shape and size.

It will be unnecessary to quote many cases of this kind. Except the unusually large size and long duration of the blood-swellings, the preceding may be taken as a fairly typical specimen of cases which are not very infrequent, and the history of which, in respect to cause and progress, closely resembles it.

Instead, I may refer to another variety of these cases, in which the fluid blood is contained in a cyst. Some very good examples of this kind are in the Museum of St. Bartholomew's Hospital. One of them was removed by Mr. Lloyd from a man's thigh. 'It lay in the course of the saphenous vein; but neither that nor any other considerable vein, was divided in the operation, or could be traced into the cyst. This cyst was of spherical form, about an inch and a half in diameter, closed on all sides; its walls were tough, and polished on their inner surface; it was full of dark fluid blood, and its venous character was manifested by two valves, like those of veins, placed on its inner surface. On one of these a soft lobed mass, like an intracystic growth, is seated.'*

Many hæmatoceles may be included in this class of blood-swellings. Their history and progress are often very similar, and the appearance of the fluid blood which is let out, almost or quite identical. Thus, in a specimen of fluid from a case of hæmatocele under the care of Mr. Paget, the following appearances were shown. To the naked eye the fluid appeared dark brownish red, and, on standing, it deposited a layer of apparently recent but uncoagulated blood of a brighter colour; it looked, too, like the fluid from the tumours lately referred to, not uniform and homogeneous, but dim and almost dusty or muddy, as it were, from suspension in it of fine particles, probably of disintegrated fibrine and blood-corpuscles. On microscopic examination, I found—1. Red blood-cells, with their usual characters not more altered than any recent cells might be after soaking for many hours in serum. Some floated singly, some in little groups, the latter appearance being, chiefly, in the layer before referred to as having settled at the bottom, and which seemed to be composed of recent blood, the

* Surg. Pathol. Paget. Ed. 1863, p. 409.

coagulation of which, in mass, had been prevented, probably, (at least in part) by its diffusion in a large quantity of fluid. 2. A large quantity of blood-cells, such as I have described as existing in the case of blood-tumour in the loin, of smaller size, and more globular than recent unchanged corpuscles. 3. Fine molecular matter, either in the form of minute granules or floating in thin masses and films, and consisting, probably, of disintegrated fibrine.

The history of this case was, that six weeks before the evacuation (by tapping) of the fluid just described, the patient was tapped for a simple hydrocele, and the surgeon noticed at the time some slight extravasation of blood into the cellular tissue of the scrotum. It is probable, therefore, that a wounded blood-vessel continued to bleed into the tunica vaginalis after the healing of the puncture.

The cause of the fluidity of the blood in cases such as those which have just been related is, I believe, commonly supposed to lie in the well-known fact, that coagulation of the blood is always retarded when it is contained in its proper vessels, or when extravasated among living tissues. And no distinction is, commonly, made between those cases in which the blood coagulates on exposure, and those in which it does not.

Hewson says,* 'After a blow or contusion, the blood now and then bursts from the vessels into the cellular membrane, sometimes forming an ecchymosis, and sometimes a tumour, and it is a question with some, whether such blood coagulates or not; but that it coagulates in most of these cases, is proved by opening such tumours. Yet it has likewise been observed, that now and then these tumours have been attended with a fluctuation, and that, after some time, their contents have been absorbed, and it has also been found that, upon opening some of them, even several weeks after the accident, the blood was fluid. In such cases the blood had probably undergone a change similar to what was observed to take place in some of the preceding experiments, that is the lymph had been deprived of its property of coagulating, in passing from the blood-vessels into the tumour—a circumstance, which, how remarkable soever it may appear, agrees with what we have above observed of the lymph whose properties seemed to vary with the state of the blood-vessels.'

John Hunter remarks, 'There are partial influences likewise which destroy the power of coagulation, as a blow on a part

* Works, ed. by Mr. Gulliver, Syd. Soc. 1846, p. 70.

producing a considerable extravasation. This forms an ecchymosis in which we shall often find the blood not in the least coagulated.'

Many other authors might be quoted, and many differences of opinion concerning the cause of the fluidity of the blood in these cases; but whatever the cause—whether destruction of the fibrine's power of coagulating, or the subtle influence of the living parts by which it is surrounded, or any other cause—it has been always supposed, so far as I am aware, that no coagulation takes place.

I venture to think that the usual explanations of the fluidity of the blood in these tumours, are unsatisfactory, and that they become more so as the facts of the case are more thoroughly examined. Before noticing in detail, however, the reasons which have led to this conclusion, it will be best, perhaps, to see under what other circumstances than those attendant on extravasations within the living body, fluid and uncoagulable blood can be obtained.

If anyone will take the trouble to collect some liquid blood in a bottle, corking it so as to prevent evaporation, and will watch it from day to day, he will see a somewhat curious, and to many, probably, an unexpected series of changes. Of course there happen, first, the usual coagulation of the fibrine and entanglement of the blood-corpuscles, with the gradual assumption, by the clot, of the shape of the containing vessel, and the separation of clear, straw-coloured serum. Then, even without any shaking of the bottle, and after an interval of a day or two, the serum commonly begins to be slightly stained with the colouring matter of the blood, and to assume a pinkish tinge. The colour deepens day by day, and the serum, without losing its transparency, becomes gradually of a deep claret colour. Soon after this, the bright tint is, by slow degrees, exchanged for a duller one, and the fluid begins to be turbid and to lose its transparency. The colour, too, besides being duller, is darker and richer, and now is found to stain deeply the sides of the vessel in which the blood is contained. At this time the clot seems but little altered. It has become, perhaps, somewhat softer, but the change is not well marked, and it can be taken out from the surrounding serum and handled freely without danger of breaking it. After a longer or shorter interval, however, it softens, and is at length easily broken down under pressure by the fingers. But even without pressure it breaks down at last, and all trace of clot, as such, is lost by its diffusion and solution in the surrounding serum. At this period of the decomposition, about the fifth or sixth month, the blood has

again become perfectly fluid, rich dark purplish-red, thick, turbid, opaque, deeply staining, and of about the specific gravity of ordinary blood. The liquidity of the fibrine does not depend on the solvent action of the serum by which it is surrounded. In one of the experiments, the serum which had been squeezed out from the clot in the ordinary process of its contraction was poured off, and the clot was left in the bottle and corked as before. After a short time, dark-red fluid was exuded, the clot became smaller and smaller, and, at last, it completely broke down, until, in the dark-red liquid blood which resulted, no trace of solid clot remained.

The microscopic appearances are such as might be anticipated. At first the cells are altered chiefly in their becoming more filmy and colourless as if washed out, some of them also more globular and much smaller, and many jagged and irregular. They gradually alter more and more, become more shrivelled and irregular, and at length break down into clots and granules of various sizes; some of them resisting decomposition for a much longer time than others, and remaining, even after a considerable interval, comparatively unaltered. Between these and those which are quite broken up, there are of course others in all stages of alteration and decomposition. Together with these changes in the corpuscles, corresponding changes proceed in the fibrine, which loses its fibrillated characters, gradually breaks down, and, becoming more clotted and granular, mixes its débris with those of the cells.

I have related these changes which occur in blood which is allowed to decompose out of the body, not because I wish it to be inferred that such alterations are exactly those which happen in the fluid blood contained in the tumours under consideration, but rather to show that a liquid, identical in appearance with dark, uncoagulated blood, can be obtained by simply allowing blood-cells to break up and diffuse their colouring matter in serum. The fluid obtained in this manner is, indeed, very much more like ordinary blood, both in naked-eye appearance and specific gravity, than that which is commonly let out of tumours such as I have described: it is less like it than such fluid, in being putrid, and in its blood-cells and fibrine being much more broken up and variously altered, and in its containing no recent cells.

The theory which appears to me to agree best with the facts of the case, may be thus briefly stated—

1. That, although the coagulation of blood extravasated in the cellular tissue, or in cysts or hæmatocœles, is probably de-

layed, yet it does occur after a longer or shorter interval, more or less completely.

2. That, in many of these cases, the whole of the blood does not escape at once or within a short time, but that the hæmorrhage continues for a considerable period, although the loss of blood is only small—too small to cause wide-spread extravasation or bursting—too great to allow the disintegration and absorption of that which has already escaped to proceed at a quicker rate than does the effusion of fresh blood.

3. That the fluid obtained from these tumours is, in many cases at least, not simply uncoagulated blood, but a mixture of serum (derived probably, not only from extravasated blood, but secreted also by surrounding parts) with blood-cells, diffused colouring matter of cells, and disintegrated fibrine.

4. That, besides the constant but small effusion of blood, there is a constant absorption, although not sufficient to keep pace, or to do more than keep pace, with the effusion.

I. *Although the coagulation of blood extravasated in the cellular tissue, or in cysts or hæmatoceles, is probably delayed, yet it does occur after a longer or shorter interval.*

That blood, at rest, even when in contact with living tissues, almost always coagulates in a period measured at the outside by a few hours, is rendered certain both by clinical experience and by the results of experiment. Hewson found that blood confined between ligatures in a living vein (than which no other situation can be conceived better adapted for the retention of its fluidity) in general continued fluid for ten minutes; but 'after being at rest for three hours and a quarter, above two-thirds of it,' only, 'were still fluid.'*

Mr. Gulliver also experimented on the coagulation of blood confined in the jugular veins of living dogs. The blood was examined in different cases at various intervals after its confinement, and the retardation of the clotting under such circumstances was well shown. But, 'after eighteen hours, in two trials the blood was about half coagulated, and in a third, completely so. At the end of twenty-four hours, coagulation was complete in four trials, but incomplete in one.'†

These are but examples of numerous experiments to the same effect, which might be quoted from the works of va-

* Op. cit. p. 16. † Ibid. p. 23.

rious writers. All attempts to prevent the coagulation of the blood, confined under such circumstances, have proved quite futile.

Corresponding results from clinical experience are equally numerous. In all cases in which blood extravasations are examined soon after their occurrence, coagulation, more or less perfect, is found to have taken place. I wish to lay some stress upon their being examined soon after the blood has escaped, for, the longer their existence, the more time has there been for the occurrence of those changes, which have been before enumerated as sufficient for the production of a fluid like uncoagulated blood, and for other changes, still more deceptive, which will be described hereafter. It is quite true that the coagulation may be delayed for many hours, and that, even when coagula are present, there may be found liquid blood, also, which clots on exposure. In all such cases, however, I believe that the weight of evidence will be in favour of such coagulable blood being comparatively recent, and of the hæmorrhage having continued up to a period not more than a few hours, at the outside, before the examination.

The best test, however, of the truth of the theory which has been here advanced, consists, of course, in the examination of the interior of these tumours containing fluid blood. I have had no opportunity of doing this in the case of the first kind of blood-extravasation which has been described; the three or four cases which have come under my own observation having been cured by simple tapping. The only direct evidence from these, therefore, has been drawn from examination of the external characters of the tumours, and from the naked-eye and microscopic appearances of the fluid contents.

1. The hard boundary-wall which becomes so evident, in many of these cases, after (sometimes before) the tenseness of the tumour has been lessened by tapping, may be explained, either by supposing the presence of coagulated fibrine in the interior,* or of effused lymph on the exterior, as around an abscess. It is probable that both of these causes are frequently in existence, but that masses of coagulated fibrine are sometimes found in tumours containing fluid blood is proved by the record of a case by Mr. Stanley, in which the tumour was laid open. The case is, indeed, not similar to those which have been here described, in respect to the cause and nature of the disease, but it resembles them exactly as regards the appear-

* See Med.-Chir. Trans. 1845, p. 76.

ances of the fluid contents, and is a good instance of one variety of the tumours now being considered.

The case is quoted by Dr. Burrows.* 'W. J. æt. 20, had had swelling about the head of the fibula from his earliest recollection. About five months previous to his admission into St. Bartholomew's Hospital, in December 1819, he had several severe cramps in the muscles of the calf of the affected limb. Constant uneasiness remained after these cramps, and in about a fortnight he observed two lumps at the inner and upper part of the shin. These lumps disappeared on compression, and reappeared on pressure being made on the calf of the leg. Tumefaction and uneasiness of the limb gradually increased for four months. At this period he was admitted into the Hospital. Ten days after admission the foot became œdematous, and the leg exceedingly painful. The skin was reddish purple at points, much distended, and elastic on pressure.

'Great doubts were entertained concerning the nature of the disease; some thought the swelling to consist of fungoid matter, others that it was formed by blood effused from a ruptured artery. After consultation, it was determined to amputate the limb.

'Dissection of the limb.—Upon making an incision in the middle of the calf, through the skin, the gastrocnemius and soleus muscles, about a quart of a bloody fluid, or rather blood itself, resembling menstrual blood, escaped from a cavity. The lower part of the swelling was formed by a single cavity between the soleus and deep-seated muscles; the upper part was formed by an intermixture of solid matter, with cells of different sizes, containing blood. This solid matter in some situations evidently consisted of nothing more than fibrine of the blood; the greater part of it, however, was of a dense homogeneous structure, of a whitish colour, and certainly in appearance more resembling a newly-formed organised structure than mere fibrine. On clearing this away, towards the upper part of the fibula it was found gradually increasing in density, and having numerous osseous spiculæ in it. The fibula being sawn through its middle, it was seen that an osseous growth had taken place from the whole external surface of the bone. To the external surface of the osseous growth the soft white homogeneous matter before mentioned was everywhere adherent, and numerous spiculæ of bone were found in it. The space between the tibia and fibula was occupied by the morbid mass; the coats of the anterior tibial artery, just at its passage to the

* Lond. Med. Gaz. 1835, p. 716.

front of the leg, were destroyed; the opening in the artery communicated freely with the morbid mass, as was ascertained by passing a probe through it. The dissection of the limb showed that the solid part of the tumour was diseased growth of bony matter around the upper part of the fibula.'

Dr. Burrows remarks on this case, 'If we regard the foregoing case in connection with the facts related in these lectures, of the remarkable changes observed to take place in the substance of coagula, either in the heart and blood-vessels, or effused from them, I think we can hardly refrain from concluding that this morbid mass was modified coagulum. At the time of the occurrence great doubts were entertained upon its nature and its origin. Mr. Abernethy declined expressing any positive opinion, while Mr. Welbank, who was then house surgeon to the Hospital, was convinced that this mass was the fibrinous part of the blood greatly modified. Mr. Stanley, to whom I am indebted for the notes of this case, is now also of the same opinion as Mr. Welbank, although at the time he did not entirely come to the conclusion that this mass was blood effused from the wounded artery. The coagulated blood appears at all times to have a great tendency to promote the formation of a cyst around it, and the development of cells within it. In this respect the morbid mass entirely corresponded with the phenomena observed in masses of coagulated blood in other parts of the living body.'

So far as this case goes, the evidence given by it is complete. Had the tumour been simply tapped, 'a quart of a bloody fluid, or rather blood itself, resembling menstrual blood,' would have escaped, and had the nature of the disease admitted of cure in this manner, the case would have been recorded simply as that of a tumour in which, for four months, the blood had remained uncoagulated. As it happened, however, the interior of the tumour was laid open, and a large quantity of coagulated fibrine was discovered.

It should not be forgotten, moreover, that in a large number of the cases in which it has been said that blood remained fluid for weeks or months after its extravasation, the tumour containing it has been simply punctured, and not laid freely open as in the present case; and, although this is but negative proof of the imperfection of the evidence by which the usual theory is supported, it ought not, I think, to be disregarded.

The opening which, in this instance, existed in the anterior tibial artery, will be again referred to.

Cases which somewhat resemble the preceding are described

by Mr. Hodgson.* In these, however, the flow of blood appeared to proceed from the smaller vessels, and not from either of the principal arteries of the limb.

Reference may be made to the usual appearances of the inside of hæmatoceles, and of that of some blood-containing cysts, as well as to the microscopic characters of the fluid contents of these tumours, for corroboration of the opinion that in many, at least, of these cases, more or less of the blood coagulates.

2. The microscopic appearances of the fluid blood evacuated from these tumours furnish evidence of its having coagulated.

A woman, æt. 46, was admitted April 12, 1865, into President Ward, St. Bartholomew's Hospital, under Mr. Holmes Coote, on account of a swelling in the abdominal walls.

The history given was that, ten days previously, she had received a severe blow in the abdomen from the sharp corner of a chain, that the swelling appeared at the injured spot almost immediately, and that it very rapidly reached the size which it presented at the time of her admission into the Hospital. The following note of the condition of the case at this period was kindly given to me by Mr. Willett:—'The swelling was tense and elastic, prominent and fluctuating, of the size of a large orange, but somewhat oval, and with a margin of firmer consistence. It was situated in front of and above the spine of the ilium, and external to the rectus muscle, and was seated in the abdominal parietes.

'April 28th.—It was punctured with a very fine trocar, and four ounces of fluid blood were drawn off. A circular, hard, and defined ridge remained.

'April 29th.—The swelling had in part refilled.'

After this time the swelling continued, with but little change, for several days; it then gradually subsided, and she left the Hospital, with only a small lump yet left, about the middle of May.

The appearances of the fluid blood were, to the naked eye, almost exactly like those which have been described as belonging to the contents of the tumour described at p. 202; as they were also to those of the hæmatocele fluid (p. 205). The sediment in this case, however, formed a thicker layer than that from the hæmatocele. Under the microscope, besides blood-cells, which had undergone various degrees of alteration, there appeared a considerable quantity of molecular and oily

* Treatise on the Diseases of Arteries and Veins, 1815, p. 449.

matter, and besides, thin and small films and masses of apparently broken-up fibrine. The specific gravity was only 1·031.

Even if it be allowed, however, that the blood, in these tumours, coagulated, it is not probable that its change to a fluid state again is a simple breaking-down, as in the case of the blood experimented on outside the body. The chief arguments against such a supposition may be drawn not only from some of the characters of the fluid contents to be described hereafter, but also from the records of the changes which have been actually observed in blood, coagulated in the living body, but remaining unabsorbed for a considerable time.

Dr. Burrows records the case of a man who was admitted into St. Bartholomew's Hospital in October 1834, under the care of Dr. Latham, on account of headache, giddiness, and so forth. He gradually became insensible and comatose, and died, a few days after his admission. At a post-mortem examination:—'Upon cutting through the dura-mater a quantity of grumous blood escaped from the sac of the arachnoid. It was then found that this blood, with a quantity of coagulum, had been confined between two layers of false membrane. One of these layers was so intimately connected with the dura-mater as to lead to the suspicion that the other layer of membrane was the arachnoid detached from the dura-mater: this proved not to be the case. The false membrane covering the coagulum, and in contact with the arachnoid covering the convolutions, was smooth and nowhere adherent. The sac formed by this membrane was bounded anteriorly by the coronal suture, posteriorly and inferiorly by the lateral sinus. The source of the blood could not be discovered; there was no apparent rupture of the middle meningeal artery, nor of the sinuses. It was not obvious how this sac, containing the blood and coagula, was formed, and how the blood was prevented from diffusing itself over the cerebrum. The false membranes were certainly not the product of inflammation of the arachnoid, but had the appearance of having been separated from the effused blood itself.'*

Mr. Prescott Hewett has also described minutely the changes which have been observed in blood extravasated in the sac of the arachnoid.† The fibrine, in such cases, often appears to undergo a kind of organization, forming a distinct membrane or cyst wall, as it were, which contains the remainder of the blood, more or less altered. In describing these changes, he says,

* Lond. Med. Gaz, 1835, p. 715. † Med.-Chir. Trans. 1845.

'When thick, this membrane is oftentimes divisible into distinct layers, of which the external ones are of a light colour, whilst the internal ones possess more or less of the colour of the blood:' and in describing a preparation belonging to Mr. Cæsar Hawkins, he says, 'On the right side of the falx, the false membrane' (formed of blood-fibrine) 'is composed of three distinct layers, the two external ones being pellucid and of a white colour, the central one being about two lines in thickness, opaque, and of a mottled colour, yellow in some parts, and of a brownish-red in others.' In another case, in which the blood had been extravasated probably for about six weeks, two remarkable collections of blood were found connected with the parietal layer of the arachnoid, and the appearance was as if the latter had been dissected off the dura-mater, and had formed a covering for the extravasated blood. This appearance, however, was deceptive, and the blood was found really enveloped in a smooth serous-like covering of false membrane, composed of its own fibrine. The membrane on one side of the falx cerebri was yellowish-brown, on the other light yellow. 'The cavity of the right cyst contained bloody fluid and coagulated blood amounting in all to about ℥iv.: the coagula presented various colours; some were dark, some of a rusty, and others of a yellow ochre colour; the cavity of the left cyst was not more than a quarter of that of the right, and its coagula were much more solid. Both cysts were perfectly smooth in their internal surfaces, except at a few points where some fibrinous coagula were adhering to them.' After describing the organization of these fibrinous cyst-walls, the author proceeds, 'Thus organized, these cysts possess all the physiological characters of an original serous membrane; they secrete, they absorb; they have been found filled with clots of fibrine and blood-tinged serum; sometimes they contain serum alone, of various colours, and oftentimes, in the cavity of the same cyst, are found coagula of blood of various hues, some recently effused, and others of long standing.'

As another illustration of the changes which have been observed in effused blood, the following case may be quoted from the same author. 'In July 1844, a man was admitted into St. George's Hospital, under Mr. Cutler, for a severe injury of the chest, with laceration of the lung, after which he lived five days. In the cavities of both pleuræ were large quantities of bloody fluid; on the pleuræ costales were several large clots of dark-coloured blood fixed to this situation by a transparent whitish membrane, perfectly smooth on its free surface, and presenting the appearance of the pleura having been extensively

stripped off, with the blood situated behind it; but the clots and their membranes were easily removed, and the pleura was found still firmly adhering to the subjacent tissues. In some points the false membrane formed a complete cyst, containing the thinner part of the blood, which was easily removed unbroken from its situation.'*

In another instance, of a similar kind, in which the patient lived eleven days after the accident, 'The cavity of the left pleura, completely filled with bloody fluid, of a deep colour, was subdivided into two compartments by a portion of coloured fibrine, presenting a honeycombed appearance, which passed from the ribs to the lung; the lower compartment was itself subdivided into several lodges, by other layers of coloured fibrine intersecting each other. Large portions of loosely coagulated blood were found in all these cavities; some of these clots were of a rusty colour, others approached nearer to the natural colour of the blood. The lung was compressed against the spine, and the whole surface of the pleural sac was coated by a false membrane, about two lines in thickness, formed by coagulated fibrine. The fibrine which lined the pleura pulmonalis was, towards its free surface, loosely coagulated, but towards the lung it was dense, firm, and of a yellowish colour. That which lined the greater part of the pleura pulmonalis and pleura diaphragmatica, presented, on its inner surface, a smooth and polished appearance, and in colour exactly resembled the yellowish fibrine found in the clots of the heart of this patient.'

'A large rent, from which the hæmorrhage had proceeded, was found in the substance of the lung.'†

I have quoted these cases (I might have quoted many more) at some length, because, before adopting the theory that the blood coagulates as usual in the tumours under consideration, and that subsequently it breaks down again to a greater or less extent, it is necessary to see how far actual observation of the changes of coagulated blood in the living body confirm or weaken such a supposition. And it will probably be allowed that in some respects, even by themselves, these cases tend somewhat to strengthen it. For while there is evidently a tendency, on the one hand, to organization of the coagulated fibrine where it is intimately connected with living textures, there is, on the other, a disposition to breaking down in the centre of the clot, where changes seem to occur somewhat like

* Med.-Chir. Trans. 1845, p. 70.

† Med.-Chir. Trans. 1845, p. 71. See also the same article for a record of changes observed in blood effused in some other parts of the body.

those which have been described as taking place in blood coagulating, and afterwards liquefying, out of the body. The differences, however, are very marked, the chief being that, in the living body, besides the prevention of putrefaction, there is more or less absorption of the clot, especially of its colouring matter and more liquid parts, and hence the thicker, more grumous, and paler blood that is found in the centre of these effusions. It is, therefore, as before mentioned, unlikely that the fluidity of the blood in liquid-blood tumours is due solely to a mere breaking down of coagulum; and it will be necessary to find other reasons for supposing that the blood in them does coagulate.

Before leaving these cases, however, I would direct attention to the partial explanation, which seems to be afforded by them, of the slowness of the rate at which, very frequently, effused blood is absorbed. I cannot help thinking that it happens not only on account of the organization of the fibrine, but also from the influence, or rather want of influence, of the false membrane, so formed, on the broken-down blood contained within it. Dr. Burrows, in speaking of these membranes, says, 'They circumscribe the foreign body, and limit the extent of its irritation; they confine the coagulum to one situation, and prevent it from becoming a source of irritation at some future time. They likewise probably present a surface admirably adapted to act by absorption upon the foreign body, and carry it out of the part suffering from its presence.' I venture, however, to differ, very diffidently, from Dr. Burrows, as regards the last function assigned to these membranes. On referring to accounts of long-standing extravasations, it will be found that, while the part of the blood which is in contact with living tissues affords indications of rapid absorption, at least of all except the fibrine which is undergoing organization, there is less and less evidence of the same process as we approach the centre of the clot. And, a long time after the exterior layers have become membranous and almost colourless, and adherent to neighbouring parts, the interior is but little absorbed, and consists simply of dark, half-liquid, broken-down blood. It would seem, indeed, as if, for a long time, the false membrane is only organized sufficiently for the maintenance of its own existence, and for resisting its own absorption, and has, at first, but little influence over the blood which it surrounds.

The pseudo-cyst-wall formation, so well shown in the cases recently quoted, probably takes place to a greater or less extent in many of the tumours under consideration.

Proof of this occurrence is with difficulty attainable in such

cases as that which was first related (p. 202), on account of the rarity with which such traumatic extravasations in the cellular tissue require more than tapping and other simple means of cure. In some of the other varieties of fluid-blood tumours, however, the formation of this cyst-wall-like investment of fibrine can be shown very well.

In the Museum of St. Bartholomew's Hospital is a specimen of hæmatocele of the spermatic cord, and it is described in the catalogue* as 'a large cyst in the spermatic cord, which contained blood. The cyst is situated just above the testicle, and the tissues round it are thickened, indurated, and consolidated. Part of the tunica vaginalis has been removed: the opposite surfaces were completely adherent.' On careful examination of this specimen, a very definite layer of light fawn-coloured fibrine can be seen closely laid down on the inner surface of the proper cyst-wall, and, in the section, clearly distinguishable from it. The internal surface of the fibrine is in some parts smooth, in others slightly rugous and pitted, but its nature is evident, although its presence might be easily overlooked, if attention were not specially directed to it.

The same appearance is present also in the cyst (removed by Mr. Lloyd) which has been previously referred to as containing fluid blood.† Here, as in the last case, a thin layer of fawn-coloured fibrine can be easily seen on the interior of the cyst-wall, and its appearance under the microscope corresponds with that which is presented to the naked eye.

II. *In many of these cases, those of the greatest duration especially, the whole of the blood does not escape within a short time, but the hæmorrhage continues for a considerable period, although the loss of blood is only small—too small to cause wide-spread extravasation, or bursting—too great to allow the disintegration and absorption of that which has already escaped to proceed at a quicker rate than does the effusion of fresh blood.*

If it were possible to suppose that blood, after escaping from the vessels and coagulating, could remain unaffected by the living tissues by which it is surrounded, much of the difficulty would be removed, and one might reasonably enough explain its fluidity at the end of a considerable interval, simply by supposing it to have broken down to a fluid state again as in the experiments described at p. 205. But in no case, I ven-

* Series xxviii. 11. † Catalogue, St. Barth. Hosp. Museum, Appendix 10.

ture to think, are we justified in supposing that blood, whether fluid or clotted, or even when surrounded by a false membrane of fibrine, can remain confined in the living body for any very long time with such few traces of absorption of colouring matter, as are present in the blood evacuated from these tumours. The cases which have been quoted from the papers by Dr. Burrows and Mr. Prescott Hewett are evidently insufficient, by themselves, to explain the characters of the fluid blood contained in the tumours under consideration. They show, and many other cases, in which effused blood has remained unabsorbed in the living body for a considerable time, might be found to show more plainly still, how greatly altered blood becomes by residence among living tissues. But without regard to what may be inferred from these instances, how can we suppose such a highly organized and changeable structure, if I may use the expression, as blood, remaining in contact with living parts for weeks, months, or sometimes even years, and yet with its characters so slightly altered, that, on its being let out, it is commonly thought to be only blood which has not coagulated? The difficulty is equally great, whether the blood be supposed, after its extravasation, to remain fluid or to coagulate. Indeed, any theory that supposes the blood contained in these tumours to be, all of it, poured out at or about the same time, has this very considerable difficulty to be disposed of. Microscopic examination of the contents of these tumours rather increases this difficulty, for besides abundant traces of broken-down fibrine and old cells, there are in many cases, as that related at p. 201, numerous blood corpuscles which in every respect resemble quite recent ones, and it is scarcely conceivable that they can remain soaking in serum for months or, as in the case referred to, for years, and yet be at the end of this time unaltered.

The most rational explanation of these facts seems to be, that the blood is not so poured out—at least that it is not so in cases of very long standing, but that the hæmorrhage, of course not great, is frequent or continuous. And that this is the true explanation is made more probable, not only because it affords another reason for the long continuance of many of these tumours, but also because these cases then fill up a gap in the series of blood-extravasations which appears to be at present unoccupied. For while there are, on the one hand, the varieties of blood-effusions, as bruises, in which the blood is cleared away by absorption within a reasonable time, and, on the other, those in which, on account of injury to some large vessel, the extravasation is so large and wide-spread as to require

immediate surgical interference, where are we to look, unless to the swellings which are now being considered, for instances (which surely must sometimes occur) of hæmorrhage too large for one method of cure, too small to demand the other?

For confirmation of what might have been fairly expected on theoretical grounds, reference may be made to Mr. Stanley's case, previously quoted. Here, an opening in the anterior tibial artery was discovered, and although it is only in the more severe cases that a lesion of an artery of this size is likely to be found, the great likeness between such a case and those which are more frequent and less serious, is very suggestive. This case, too, seems to form a link, as it were, between hæmorrhages which require immediate surgical interference, and those which require only such treatment as tapping, or pressure, for their cure.

Another reason for thinking that there is a tendency, in some at least of these cases, to long-continued hæmorrhage, may be drawn from the history of the partial refillings after tapping, which occurred so repeatedly in the case before recorded (p. 201), although, as will be shown hereafter, the fluid that exuded was not blood only. The characters of many of the blood-cells, however, and their tendency to cohere in rouleaux,* seem to indicate that at least a part of them had escaped from the vessels very recently.

How long soever, too, the blood remained to a great extent unabsorbed after its escape from the vessels, surely some diminution in the size of the swelling produced by it should occur, were there for disposal only the original quantity of blood lost at the time of the accident. That the blood should remain fluid, is, according to the usual theory, sufficiently remarkable, but that at the same time the surrounding parts should cease to absorb is, if possible, more remarkable still.

The manner of increase, by continuous hæmorrhage, of many hæmatoceles, taken in connection with their likeness to the other varieties of these blood-swellings, increases the probability of the truth of the explanation which has been just given.

III. *The fluid is not simply uncoagulated blood, but a mixture of serum (derived probably not only from extravasated blood, but secreted also by surrounding parts) with blood-cells, diffused colouring matter, and disintegrated fibrine.*

That the fluid of blood-tumours is not always blood, simply

* Med. Times and Gaz. Aug. 8, 1863.

uncoagulated, is very evident on examination. In the two cases of blood-extravasation in the cellular tissue which have been recorded at pp. 201, 211, the specific gravity of the blood-like fluid differed widely from that of blood. In the first case it varied from 1·024 to 1·019.* In the second (taken by means of the specific gravity bottle) it was 1·031. These are the only two cases in which I have had an opportunity of taking the specific gravity of the fluid contents of these blood-extravasations, and I have been unable to find the record of any others. So far as they go, however, these two observations show very plainly that the fluid is not simply uncoagulated blood, but a fluid, the specific gravity of which corresponds much more nearly with that of the serum. And as regards the last case, no other explanation seems needed beyond that which has been included in the preceding part of the argument; that is to say, the higher specific gravity than that of serum may be explained by some of the experiments to which reference has been there made. In one of them some pig's blood was collected and allowed to coagulate in the ordinary manner. The specific gravity of the serum that exuded was taken five days afterwards. It was 1·026. The clot was sliced and again placed in the serum, and allowed to soak for about a month, some oil-skin being placed over the mouth of the containing glass jar to hinder evaporation. At the end of this time, when the serum had become deeply blood-stained, and had begun to assume the appearance of uncoagulated blood, its specific gravity was found to have risen to 1·036. About a month after this time it was 1·040, and again, three months afterwards, when the clot had to a great extent broken up and become diffused in the surrounding liquid, it was 1·053. These results were obtained with an ordinary urinometer.

It is evident, therefore, that on the supposition that blood coagulates after its extravasation, and afterwards partly breaks down, there is no difficulty in accounting for the higher specific gravity, than that of serum, of the fluid obtained from liquid-blood tumours. There is more difficulty, indeed, in accounting for the specific gravity of the fluid obtained from the first case which was described as being less than that of ordinary serum, than for that of the fluid from the second being above it; and it seems, at first sight, as if there were a contradiction between the two cases, and that if the explanation just given of the one case were true, it could not be so of the other.

* Med. Times and Gaz. Aug. 8, 1863. The specific gravity was in this case taken only with the urinometer, and was perhaps, therefore, rather higher than is here given—no allowance having been made for sediment.

I think, however, that some other circumstances in these cases suggest a reasonable explanation of the differences between the specific gravities of the two fluids, the explanation being necessarily subject to correction by more numerous observations.

On referring to the account of both these cases (pp. 201, 211), it will be seen that, after tapping, partial refilling of the tumours rapidly occurred; in one case to be followed by gradual re-absorption and disappearance of the swelling; in the other, to require repeated tappings before final consolidation took place. In the last instance, although, as before mentioned, many of the blood-cells were evidently quite recent, yet the specific gravity of the fluid did not rise, as it should have done, if all the re-filling were due to the effusion of fresh blood. On the contrary, the specific gravity of the fluid drawn off by the later tappings was less than that by the earlier.

The only means of explaining these results seem to be by considering that in such cases there is really a kind of cyst-cavity, somewhat like that described by Dr. Burrows and Mr. Prescott Hewett, into which, as into a serous one, fluid is exuded; and thus, that the specific gravity of the fluid contents varies according to the proportion which this fluid bears to that of the blood mingled with it, whether this be recent, or diffused in it in the form of broken-down coagulum. The specific gravity of the fluid simply exuding in this manner is probably low, resembling in this respect the fluid of ordinary cysts, or that which is poured out in dropsy, rather than the serum of the blood.

The colour of the so-called fluid blood is probably due, partly to the presence of the red cells, partly to their colouring matter only, which has been washed out by the serum and diffused. That the latter cause has, in some instances at least, more share in the production of the colour than the cells themselves, was shown very well in the case of Mr. Coote's patient. Under the microscope the number of corpuscles seen in the fluid was evidently far too small to account for its dark-red hue, and the tint could be seen, indeed, plainly in those parts of the 'field' where no cells were floating.

The microscope, as has been before mentioned, shows the presence, also, of small films and masses of disintegrated fibrine, which are probably derived partly from blood which has coagulated and afterwards been disintegrated, partly from that which has clotted imperfectly from the first, on account of the dilution to which it has been subjected.

From the appearance of the fibrine laid down on the walls of cavities which have long contained blood, it seems likely

that, in many of these cases, the fibrine coagulates, bit by bit, as the blood is effused, on the boundary-wall of the cavity, and only to a small extent entangles the blood-cells—a kind of coagulation, the same in kind with that which occurs, much more regularly, in aneurismal sacs.

The character of the fibrine, however, found on the walls of these blood-containing cavities, is not the only circumstance that makes it probable that the kind of coagulation just mentioned takes place. It seems as if there were, generally, a great tendency on the part of the fibrine of blood effused in the living body to separate and attach itself to the wall of the cavity into which it escapes, and that dilution does not prevent this from taking place. Andral records the following case: 'In the body of a woman who died from ascites, I found reddish serum effused in the abdomen, and on both sides of the thoracic cavity. The two pleuræ were covered by a large number of little rounded bodies, of different sizes. Several were only simple blood-clots attached to the serous membrane; others resembled blood-clots of much older date. Among the latter some were still red, others were of a pale rose tint, and others of a dead white. They adhered very closely to the serous membrane, and were held in position, some by simple cellular tissue, and some by a truly vascular bond of connection. Four or five of these little bodies were filled with a milky fluid. Similar masses were found scattered over various parts of the peritoneum.'*

Mr. P. Hewett records the case of a man who died a few days after having been tapped for dropsy, depending on cirrhosis of the liver. 'The serum which was in the cavity of the peritoneum was deeply tinged with blood. Coagula of blood were found in various parts of the abdomen; several of them were situated on the anterior abdominal parietes, in the neighbourhood of the wound made by the trocar in the linea alba. These coagula, of a dark fawn colour, were covered over, and maintained in their situation by a fine transparent membrane, perfectly continuous with the parietal peritoneum, and presenting all the characters of a true serous tissue. At first it appeared as if the blood were situated between the fascia transversalis and peritoneum, but this appearance was easily destroyed by the removal of the coagula and their false membranes, and the peritoneum was then found only slightly roughened by the contact of the blood. There were no traces of inflammation about the peritoneum.'†

* Précis d'Anatomie Pathol. 1829, vol. ii. p. 692.
† Med.-Chir. Trans. 1845, p. 69.

This manner of coagulation, the more or less complete separation of the fibrine from the red-blood corpuscles, seems also to offer an additional and, I think, important explanation of the fluidity of the contents of these blood-tumours. For if the fibrine be separated in this manner, it will leave the blood-cells free to float out in the serum, and thus make with it a blood-like but not spontaneously coagulable fluid. And this supposition is still further strengthened by the results of experiment; for it will be found that on whipping blood, immediately after it has been drawn, so as to get rid of the fibrine, the liquid (made up of serum and blood-cells) which is left, very closely resembles the fluid evacuated from these tumours, and by simple dilution with water may be rendered undistinguishable from it.

IV. *Besides the constant but small effusion of blood, there is a constant absorption, although not sufficient to keep pace, or to do more than keep pace, with the effusion.*

But little need be said regarding this last part of the argument, because it has been to a great extent, although negatively, as it were, considered previously. The impossibility of supposing that blood can remain unaffected by the absorbing action of the parts among which it is extravasated has been before dwelt on, and need not be here repeated. The fact, however, of the theory which has been here advanced not requiring for its support the supposition of any such suspension of the usual laws which require the removal, or attempts at removal, of blood extravasated among living tissues, will be allowed, probably, to be an additional point in its favour.

It will be unnecessary to adduce evidence of absorption occurring in these cases of fluid-blood tumours, as the burden of proof evidently lies with the supporters of any theory (even, on other grounds, equally probable) which supposes its non-occurrence.

The remarks which have been here made concerning fluid-blood tumours have been intended for application chiefly to those the contents of which did not coagulate on exposure; and I believe that, among cases of long standing, such will be found to be by far the most numerous. It is probable, too, that many cases in which the fluid blood, when let out, is found to have the appearance of ordinary and fresh blood, and to coagulate in a short time after its exposure, are really either very recent cases, or, at least, there is reason to believe that the hæmorrhage has continued up to the time at which the swelling is tapped.

Besides these, however, there are others, to which (to judge

from the recorded description) neither of these explanations seems to be applicable. I cannot but think, however, that such cases (if they really exist) will be found to be exceedingly rare, if the following circumstances be taken into account and carefully weighed in all instances of tumours which contain spontaneously coagulating blood.

1. The possibility of the blood having recently escaped from the vessels.

2. The possibility (in cases in which the blood-containing tumour is laid open) of the clot being formed by the blood which escapes from the edges of the incision, and not by the older fluid, with which it has become accidentally mingled.

3. The chance (in cases of admixture of old with recent blood) of the clot being formed by the indirect, and as yet only partly explained action of blood-cells, in causing coagulation of serous fluids. (That the conditions fit for this occurrence often exist in these cases, may be gathered from part of the preceding description of them.)

4. The kind of coagulation should be observed; that is to say, it should be noted whether an ordinary fibrinous clot is formed, or whether there occurs simply a separation of blood-cells and disintegrated fibrine, by subsidence, such as happened in all the cases which have been here recorded, even in the fluid the specific gravity of which was least like that of blood.

In the preceding paper I have endeavoured to describe what I cannot but believe to be a more probable explanation of a very puzzling series of cases than that which is commonly adopted; but I do not wish it to be inferred that the evidence on which it rests is supposed to be complete. It is true, indeed, that so far as it goes, the evidence is conclusive, but there are so many circumstances which can only be observed when attention has been specially directed to them, that the case must still be considered on trial. Should the remarks which have been here made draw attention to these cases, and, so, increase the number of facts from which a conclusion concerning them may be drawn, the setting forth of a theory of their cause and nature, even if it be proved hereafter to be erroneous, will not have been fruitless.

ARTICLE XIV.—*Observations upon some points in the Anatomy of the Supra-Renal Capsules.* By DYCE DUCKWORTH, M.D. Edin.

I.—*The naked eye appearances of the supra-renal capsules, as modified by age and other, apparently normal, circumstances.*

THE supra-renal capsules are small before puberty, and increase in size with the other organs of the body. I desire to direct particular attention to this fact, for there can be no doubt that it has not hitherto been sufficiently recognised. It is true that these bodies are large about the second month of fœtal life, and again become smaller towards the close of that condition; it is no less true, however, that they go on growing again up to the adult period.

It appears that their large size in the embryo is almost peculiar to the human subject, and I am not acquainted with any animal in which the same plan of development is followed. I have made a number of observations to determine this point, and have examined the fœtuses of various animals at different periods of intra-uterine life. The following generalisations express the results of my research.

During the earlier months of fœtal life, the capsules preponderate greatly in size over the kidneys; this relative preponderance diminishes towards the close of that condition, but even then the capsules are large as compared with the renal organs.

In the sheep the preponderance is very marked in early fœtal life; after the second or third month the capsules do not exceed the kidneys in size; at this period they cease to be relatively large, and at full time they bear but a very small proportion to those organs. Thus, though they agree with the human capsules in the point of their early fœtal preponderance, they differ very markedly from them in the ratio of their subsequent development.

In the fœtuses of the rabbit, pig, musk-deer, and elk, which I have examined, no preponderance in size over the kidneys was observable.

Professor Allen Thomson, of Glasgow, has informed me that, according to his observations, the supra-renal capsules do not present that preponderance in any other mammalian animal which they exhibit in man.

In the fœtal capsules several deep grooves are generally to be seen on their anterior aspect; the most superior one becomes

the hilus. This hilus in some instances seems to divide the organ into two lobes.

Before puberty the capsules are small, firm, and sometimes translucent. I believe that they contain a minimum amount of fatty matter at this period. In the adult they are larger, rather less firm, and never, in health, translucent; the amount of fatty matter is increased. In advanced age they remain of the same size; certainly no appreciable difference is recognisable in this respect; they become somewhat softer, and not unfrequently friable, from the presence of a large quantity of fatty matter.

I believe the foregoing account to be generally applicable, and it embodies the result of my examination in several hundred cases. The colour of the capsules varies according to age, and the change is probably due to the amount of adventitious fat in their texture, or to excess of oily granules in the cortical substance. I am led to state this from having observed that the cortex in the capsules of the ox and sheep is of a dark-brown or madder-brown tint, and the tissues are free from an abundance of oily granules, while in the rabbit and human subject they exist in large amount, and the cortex is of a yellow, or rather a buff, tint.

The capsules are believed by some to be of larger size in swarthy than in white races. This I believe to be but an assumption, and I can find no facts to bear out such an opinion. I have by me the notes of three dissections of the supra-renal capsules in the bodies of a negro, a negress, and a Lascar, the two latter furnished to me by my friend Mr. Turner, of Edinburgh, and the first made by myself. In none of these was the size particularly worthy of note. M. Martineau* likewise quotes two dissections by Cruveilhier of the capsules in negroes, and his observations correspond with those just referred to.

II.—*The appearances presented on section of the supra-renal capsules.*

If the statements of various authorities on this subject be compared, I think they will be found to disagree more or less, and thus present perplexing and incongruous information to the student. There are unquestionably various difficulties in the way of rendering an exact account of the appearances. In the first place, as we have seen, the supra-renal capsules are found to vary in their texture and colour at different periods of life.

* De la Maladie d'Addison, par M. Martineau, p. 7. Paris, 1864.

Again, the appearances are very different according as the organs are congested or anæmic. For a long period anatomists have described the existence of a cortical and medullary portion. The ordinary characters of each of these have been, until recently, but indistinctly defined. Kölliker* and Harley† have given the best descriptions of this part of their anatomy, and I can confirm their observations.

On section of a human supra-renal capsule, two distinct substances are exposed to view; the external layer or cortex, and the internal contents or medulla (Plate III. fig. 1). The cortex is moderately firm, and bears some degree of handling, while the medulla, or central portion, is for the most part soft and delicate. The cortex is of a yellowish or buff colour in the greater part of its extent, more especially, however, in its outer two-thirds. It is striated from without inwards towards the medulla, and has a somewhat fibrous appearance. The inner third is of a brown or reddish-brown colour. It is of the same consistence throughout, rather friable, and disposed to tear in the direction of the striations; its texture varies according to the condition of its intimate tissues. It forms by far the largest portion of the capsules in man, and most animals. The calf is an exception to this; in this animal the medulla exceeds, or at least equals, the amount of cortical substance. In the capsules of man, the calf, and in some others, the cortex may be stripped or peeled off from the medulla with ease.

The medullary or internal portion of the human capsules varies more in its aspect than does the cortex; indeed, the cortical appearances may be considered almost constant. The fact that the medulla is the site of a large venous plexus, more or less filled with blood, explains the reason of its varying aspect. Thus, if the veins be congested, the medulla will be found of a dark reddish-brown colour; if free from such congestion, or if examined in an anæmic subject, it is of a pale grey or pearly hue.

Many anatomists have described a cavity as existing instead of a medullary portion. I have frequently met with cavities there. In the dissecting rooms I used always to find them, and thus I was led to the belief that they were decidedly of post-mortem origin. It is, however, not very uncommon to meet with this condition in examining ordinary bodies in the dead-house, and at no long period after death.

While I am conscious of having sometimes produced a cavity

* Manual of Human Microscopic Anatomy, by Kölliker.

† Histology of the Supra-Renal Capsules, by Dr. George Harley. Lancet. June 1858.

by reason of careless manipulation in removing the capsule from the body, and thus breaking up the medullary matter, I am equally certain that in some cases actual cavities have existed in these organs during life, for they have been found distended with diffluent and pultaceous matter.

We must regard the presence of cavities, then, as an abnormality, and the following are perhaps amongst the causes of their production:—1st. The presence of a large quantity of blood in the venules of the medulla, and the disintegration of the textures in consequence of its decomposition. 2ndly. Rough manipulation in removing the capsules while thus congested. 3rdly. Such morbid processes in the medulla as lead to its disorganisation; the cortical walls in these instances sometimes apparently taking on a secretory action and leading to the formation of the abundant diffluent contents.

The appearance of these cavities varies somewhat; thus there is at times but little found in their interior, and their walls are soft and velvety, and generally of a dark-brown colour. I believe this chocolate-like hue of the walls to be due to the projecting portion of the inner third or pigmentary layer of the cortex which is thus exposed to the cavity. I do not refer to the morbid condition of abscess of the capsules, when of course ordinary pus is to be met with on making a section of them.

In the centre of the medulla lie several venous sinuses; they are three or four in number, and some are of comparatively large size. The largest one is found in the transverse diameter of the organ, and is seen on its way to form the supra-renal vein. Numerous smaller venules open in the sinuses, so that when the latter are slit up they present quite a cribriform appearance. Owing to the delicacy of the walls of these venules, there is a great tendency for them to rupture into one another, and thus produce a cavity; and I am inclined to believe that this is sometimes a commencing cause of that condition. In injecting capsules I have always observed that the site of rupture, when it occurs, is in one of the medullary venous sinuses which communicates with another, and thus forms a cavity which is found full of extravasated injection.

In the healthy condition the medulla is so soft that it can be rubbed down between the fingers.

We may form a good conception of the relation of the cortex to the medulla in human supra-renal capsules, if we regard the former as a continuous fold with special involutions around the central medullary mass. The cortex may be unfolded and peeled off from the medulla, and laid out almost flat.

In the thinnest portions of the capsules, at the margins espe-

cially, there is no medullary matter, and the cortex is at these points merely folded upon itself, so that the two pigmentary layers are opposed to one another. They may be easily separated. I possess numerous microscopical preparations which demonstrate this arrangement.

III.—*Nature of the expressed juice of the cortex of the supra-renal capsules.*

An examination of the cortical juice under a high magnifying power leads to more exact knowledge of the structure whence it is taken. If we scrape the cortex with a clean scalpel, and submit the juice thus obtained to a magnifying power of from three hundred to four hundred and fifty diameters linear, we observe a variety of bodies floating about in the fluid material. The objects vary somewhat in different animals, and are likewise found to be different according to the age of the individual from which the capsules are taken. The most striking bodies are myriads of bright yellow refracting molecules and granules; the former are seen in motion. I have observed that these molecules and granules vary in number in different animals. They are most plentiful in the human organs and those of the rabbit, less so in the case of the sheep, and least abundant in the ox. (Plate IV. fig. 1.)

They are of a lemon-yellow colour, and are surrounded by a dark rim. A number of oil-globules are also seen, some of large size; they refract light strongly, and are surrounded with a dark rim.

Next in order to be observed are certain pale cells, oval for the most part, though sometimes appearing round or even polygonal. The cell wall is well defined, and one or two nuclei are seen within. The nuclei are yellowish in colour, and vary somewhat in size. They much resemble lymph corpuscles in their general aspect. They are seen to lie both isolated and in linear groups, attracting to their walls the surrounding granular matter.

Other smaller cells are seen, pale, and containing granular matter without any nuclei. The position of the adhering cells is worthy of attention; groups of them are seen bound together, apparently, by granular matter. Ecker considers these to be nuclei, and H. Frey, in his elaborate article* on the capsules, gives a drawing (after Ecker) illustrating his views.

* Todd's Cyclopædia of Anatomy.—Art. 'Supra-Renal Capsules' (translated by Dr. Brinton).

Ecker seems to hold and urge the molecular theory of cell formation throughout his statements, and supposes that the granular mass surrounding these nuclei is being developed into a cell wall. With all deference to such an authority, I must beg to differ from this view, for I have never been able to find a perfect cell of this kind. Not only have I never seen such cells as Ecker supposes to exist in the expressed juice, but not in the most favourable fresh or prepared sections of the cortex have I ever seen such cells *in situ*, while I have always found an abundance of the bodies which he considers to be nuclei, and which I am disposed to regard as true cells.

IV.—*Arrangement and nature of the cortical columns.*

A well-prepared section of the cortex shows that the columnar masses do not invariably course from without inwards. At the external and internal borders round or oval vesicles occur, filled with the same contents as the most elongated columns. The arrangement of the matrix explains this peculiar arrangement. I have never observed any kind of communication between the columns or so-called vesicles, though in this matter I am at variance with some writers. I believe that the loculi contain their own proper elements intact; further, that the contents are similar in all, and that the columns in all parts of the cortex are essentially similar in structure. They may be regarded, therefore, as variously-formed closed sacculi lying in the fibrous stroma. Under a high power, the loculi are seen to be filled with a number of nucleated and granular cells, and with all the elements already described as occurring in the cortical juice. (Plate III. fig. 2.) By pressure upon the section, the contents of the spaces may be squeezed out; the cells are then seen scattered over the field in linear masses, adhering together, also isolated and amidst granular matter. The cells when seen in a fresh specimen *in situ* seem to be disposed in a somewhat tesselated manner; they occur in single and double rows, and have thus, perhaps from compression, a distinctly polygonal outline.

A section across the loculi is instructive (Plate III. fig. 3); it proves their non-tubular character, and shows that they are closely occupied spaces, thus differing much from a similar section across a renal tube. Each loculus is lined by a so-called basement membrane. I have frequently satisfied myself of this. Specimens are sometimes seen in which the cells have been swept out of the loculi which have been left occupied by membrane. This mem-

brane resists for a long time the action of a strong solution of caustic soda, and this is held to be characteristic of membrana propria.

The pigment met with in the inner layer of the cortex is of a yellowish or sienna-brown hue. It is deposited in a molecular and granular form around the cells in some cases, and within them in others. When the cells are much loaded with this pigment, they lose the power of absorbing the ammoniacal solution of carmine; those that are less charged with it take up a little of the colouring matter.

V.—*Structure of the accessory supra-renal capsules.*

These are not unfrequently met with. They are generally attached to the organ by the investing cellular tissue, and are seen as small, round, or oval bodies, varying in size from a lentil to a pea. They are usually of the colour of the cortex, or perhaps paler. I think I have observed that the most common site for them is in or near the basal fissure, and on the anterior aspect.

Their microscopic structure is precisely that of the cortex of the large organ; there is no medullary portion within. The loculi seem to be most cylindrically serial and parallel in the centre of the mass, while they are smaller and more scattered at the peripheral portion.

VI.—*The relation between the cortical and medullary portions of the supra-renal capsules.*

In a section of a healthy capsule, there is apparent to the naked eye a well-marked limit between the cortex and medulla. We find that the matrix is prolonged from the cortical loculi into the medulla, its fibres are accompanied by bundles of nerves, and the intercolumnar blood-vessels, after having formed the most dense portion of their anastomoses, pass on, singly for the most part, to form the medullary venous plexus. The cortical columns and smaller loculi are seen to terminate abruptly, and their ends abut boldly against the more delicate medullary tissue. Thus the fibrous matrix limits the boundaries of the two portions, and while on one side we have the projecting cortical masses, on the other we have the contents of the medullary fibrous meshes. The fibrous matrix connects as well as limits the two portions, and the vascular and nervous elements, common to both, are directly continuous from the one to the other.

VII.—*Nature of the expressed juice of the medulla.*

It is almost impossible to discover any difference between the respective expressed juices from the cortex and the medulla. The only noteworthy point is perhaps the fact that there are fewer of the bright refracting granules. A number of pale nucleated and granular cells are seen, also some large oval pale cell-like masses, containing many bright refracting dark-rimmed granules. Aggregated granules, devoid of investing membrane, are also manifest. (Plate IV. fig. 2.)

In the juice of the medulla in the sheep I have met with an abundance of oval or round granular cells, with one or two nuclei, and in some cases nucleoli were present. On adding dilute acetic acid, the cells cleared up, and their contents were rendered more distinct.

I have never succeeded in finding such cells as are referred to by Kölliker;* viz. cells of an angular form, with processes passing off from their sides.

VIII.—*The medullary matrix and its contents.*

A rich network of fibro-areolar tissue constitutes the stroma in this part of the organ. It is traceable directly from the walls of the cortical loculi, and is not disposed in the formal manner as seen in the cortex.

In the medulla of most capsules, the fibres are seen to radiate from masses more or less stellate in shape (Plate IV. fig. 3); they then generally pass off in semicircles to form meshes of a somewhat round rather than angular form. In the carmine-stained specimens it is seen that the interior of these stellate masses contains granular matter which has imbibed the pigment. The granules are likewise apparent in fresh specimens. I have sometimes seen what appear to be cells, with nuclei in the midst of the masses. I am inclined to the belief that these bodies have been taken for other than they really are. They present much the appearance of stellate or multipolar nerve ganglia; but that they are not so is proved, I think, by the fact that nerve branches are seen to ramify and course beside them without receiving from or transmitting to them any fibres of communication.

The medullary cells lie in close relation to the fibres of the matrix, and it is difficult to brush or remove them from it.

* Kölliker, op. cit. p. 423.

They fill up the spaces, and, as seen in a section, are disposed in a somewhat tesselated manner, accompanied by the granules already described. There is thus no definite arrangement of the contents, and there are no determinable aggregations of cells or of medullary matter as in the cortical substance. Moreover, there is no evidence of a limiting or basement membrane, and in this respect the medulla differs materially from the cortex. The venules are seen to pass through numerous loops of areolar tissue, and the nerve bundles course amongst the fibres of the matrix and the contents of the meshes, though they do not appear to bear any definite relation to them.

Hence we must conceive the contents as lying free within the meshes, and in direct connection with the vascular and nervous arrangements of this portion of the organ.

Plate III.

Figure 1.—Human Supra-renal Capsule.—Appearances presented by Sections made Vertically.—Medulla rather pale (anæmic).

Figure 2.—Human Supra-renal Capsule.—Thin Section of Cortex (prepared with Chromic Acid and Carmine).—The Structure of the Columns is shown, Collections of Cells invested by Membrana Propria.—Cortical Matrix.

A. Isolated contents of a Loculus, much resembling an Epithelial Tube cast from a Kidney affected with Bright's Disease. (350 and 450 diam.)

Figure 3.—Human Supra-renal Capsule.—Section made at a right angle to direction of Cortical Columns, showing their Form and Structure, with the disposition of the Matrix. (450 diam.)

Plate IV.

Figure 1.—Juice of Cortex of Supra-renal Capsule of Rabbit.

A. Bright yellow refracting Granules and Molecular Particles.
B. Large bright oily Globules with dark rims.—Smaller Granules adhering to larger Globules.
C. Blood Corpuscles.
D. Pale round or oval Cells, oftentimes seen in Linear series, Nuclear and Nucleolar contents. (450 diam.)

Figure 2.—Juice of Medullary portion of Supra-renal Capsule of Rabbit.—Its striking similarity to that of the Cortex is obvious in the existence of bright refracting Granules, variously sized Globules, and pale Nucleated and Nucleolated Cells.—Aggregations of small refracting Granules with an apparent investing Membranous Wall. (450 diam.)

Figure 3.—Stellate bodies from Medullary Matrix of Supra-renal Capsule of Sheep. (350 diam.)

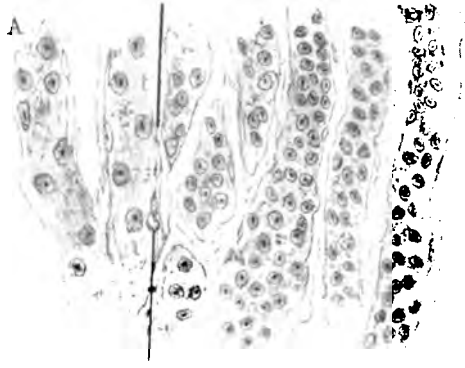


Fig. 2.

Fig. 1.

Fig. 3.

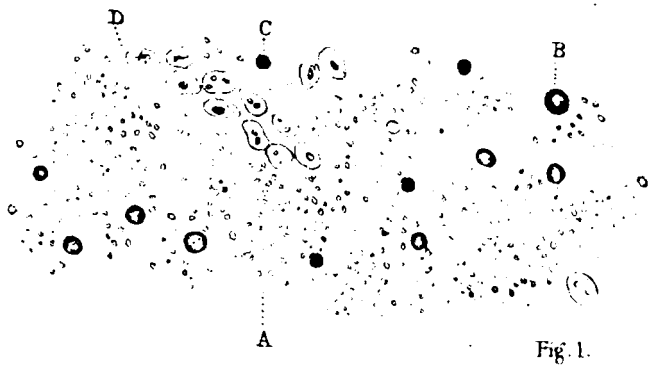


Fig. 1.

Fig. 3.

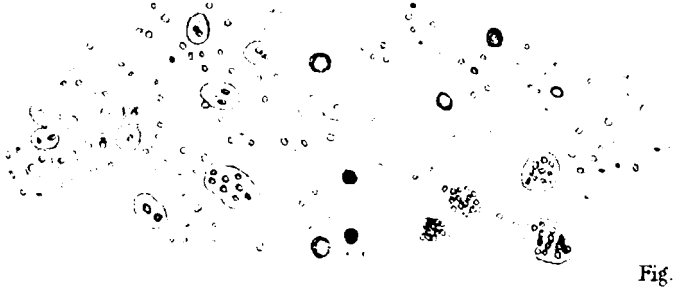


Fig. 2.

Article XV.—*Cases recently under Treatment.* By Thomas Wormald.

I.—*Rupture of urethra from contusion of the perineum, followed by retention of urine—Puncture of bladder by the rectum.*

On May 8th 1863, a boy, æt. 14, whilst endeavouring to walk along a pole, fell astride it on to the perineum. Bleeding from the urethra at once commenced. He went home and slept as well as usual. The next day he had retention of urine, and was brought to the Hospital.

Mr. Vernon, the house surgeon, introduced a catheter, but did not succeed in reaching the bladder; some blood and urine which had collected in the perineum escaped, giving him temporary relief.

When seen by Mr. Wormald, on the morning of May 10th, there was considerable swelling of the perineum and scrotum, with dusky mottling of the integument. The bladder was considerably distended. He was immediately placed upon the operating table, in the position for lithotomy, and an incision was made along the raphe of the perineum, through tissues infiltrated with blood and urine. Having removed a quantity of decomposing coagula, possessing a strong ammoniacal odour, Mr. Wormald introduced his finger into the wound, and found the triangular ligament detached completely from the left ramus of the pubes, and the tissues so bruised and matted together that it was impossible to recognise the further relations of the parts. The bladder was emptied by tapping from the rectum, and the canula was fixed in the bladder by silver sutures passed through the skin of the nates.

At the end of a week, the urine having become turbid and ammoniacal, the canula was removed. A gum-elastic catheter was passed along the urethra to the wound in the perineum. The patient was then requested to make an effort to void urine. During the time a little water was escaping from the wound, the catheter was passed onwards into the bladder.

Catheters were worn for a fortnight, when the wound in the perineum had healed, and on the thirty-second day he was discharged, with the integrity of the urethra restored.

II.—*Rupture of the urethra from severe contusion, causing retention of urine—Puncture of the bladder by the rectum—Repeated attacks of secondary hæmorrhage from operation wound in the perineum.**

On April 5th 1865, a boy, æt. 15, fell with one leg through

* Reported by Mr. J. A. Bloxam, House Surgeon.

a trap-door, striking the perineum violently against the edge. Admitted shortly afterwards, he was found to be very faint, complaining of great pain, and there was severe bruising, with swelling between the anus and the scrotum.

Cold was applied to the perineum.

On April 6th he was found to have passed a very restless night. No urine had been voided, but blood had come from the urethra. The perineum was black, very tender, and tense; the scrotum swollen and ecchymosed; the bladder slightly distended. Mr. Wormald saw him at mid-day, and attempted to introduce a catheter, which, after passing about four inches, came to a stop. As continued efforts only increased the bleeding, the attempt was discontinued. Chloroform having been administered, an incision in the mesial line of the perineum was made, and a quantity of coagulated blood was removed, exposing the catheter which had passed through the ruptured urethra, the distal extremity of which could not be discovered. The distended bladder was tapped from the rectum, and twenty-four ounces of clear urine drawn off, the canula being secured as in the former case. There was considerable bleeding from the wound in the perineum; it presently ceased, leaving him, however, very faint for several hours.

April 7th.—He had slept well; reaction had set in; he was free from pain. Urine flowed entirely through the canula.

April 11th.—He had been going on well till this date, when a smart hæmorrhage took place from the wound in the perineum, giving much trouble. It was only arrested by plugging and compression.

April 15th.—As the urine passed into the rectum, by the side of the canula, a larger tube was substituted. In changing the instruments no great difficulty was experienced, a small catheter being left in the track as a guide.

At 3 p.m. on April 16th, after one or two threatenings, a profuse flow of blood took place. A complete examination of the wound was made, and a deep track on the left side of the perineum laid open. Some clots, both old and recent, having been removed, a considerable vessel was secured; but as oozing of blood continued, the wound was again plugged.

April 25th.—There had been no return of bleeding for some days; indeed, he was very prostrate from the loss of blood. The canula had been removed, in consequence of the escape of urine by the side of it.

May 7th.—All the urine was passed through the rectum. Mr. Wormald now succeeded in passing a catheter from the end of the penis into the bladder, and directed it to be kept in.

May 23rd.—The catheter was retained for a week. On its removal, all the urine flowed through the wound in the perineum.

July 20th.—The wound in the perineum was reduced to the condition of a fistulous track, through which a few drops of urine escaped when urine was passed; it was now voided in a stream from the urethra. There was considerable cartilaginous thickening about the cicatrix. A No. 4 silver catheter was passed twice a week into his bladder.

This patient remains under treatment.

III.—*Lodgment of a piece of reed-cane in the forearm for twelve weeks without discovery—Extraction.*

A young man, in springing over a ditch in a marsh, fell, and received a penetrating wound of the palm of the right hand from a broken reed. He drew out a portion at the time, when he became faint from loss of blood, and with difficulty reached home. Inflammation supervening, he went to a hospital in London, and was under treatment for several weeks. An abscess formed above the wrist, which was opened. The original wound then closed; the hand was useless, being quite stiff, and very painful.

On April 5th 1865, being twelve weeks after the accident, he was admitted into St. Bartholomew's Hospital. The scar of the wound in the palm was still visible. The lower half of the front of the forearm was swollen, and the wound in it was still discharging. The hand was in the extended position, as it had always been since the accident, and the wrist-joint was immovable. On introducing a probe, a hard cylindrical body, lying deeply beneath the tendons, was felt. A cautious dissection brought into view, between the tendon of the flexor longus pollicis and the radius, a yellowish-looking substance, which, when extracted, was found to be a portion of a hollow reed, the size of a common tobacco-pipe, and measuring five and a half inches in length.

It seemed evident that at the time of the accident the reed must have passed under the annular ligament, and broken off just below it.

No local or constitutional disturbance followed the operation, and the patient left the Hospital, almost well, within a week.

The power of flexing the wrist-joint was regained immediately the reed had been removed.

IV.—*Tetanus following a scalp-wound, with injury to the cranium—Removal of loose piece of bone—Recovery.**

A bricklayer, æt. 31, was admitted into Colston Ward, on December 7th 1863, with tetanus. Six weeks previously he fell from a scaffold, and sustained, besides severe contusions, a wound on the left side of the forehead. He was treated as an out-patient. The symptoms of tetanus were of fourteen days' duration, and had very gradually increased in severity.

He had well-marked risus sardonicus, with drooping of the left eyebrow, almost complete closure of the mouth, and so much contraction and rigidity of the spinal muscles as to produce persistent opisthotonos. He swallowed with great difficulty; his bowels were constipated; urine scanty; pulse 120, full and strong; skin harsh; respiration generally easy, but impeded at times by attacks of spasm. His nights had been very restless, and he complained of cramp in his legs and back.

The wound was still discharging; it was pale, and without much action; at the bottom of it a loose fragment of bone was discovered.

On December 8th Mr. Wormald removed the piece of bone; adhering to it were several hairs. Up to the twenty-fourth day of the disease the intensity of his symptoms increased, varying only from day to day as to the locality most affected by spasm. Sometimes the thorax would be mostly complained of, at others the neck and jaws, or the back or legs. During this time his bowels were very costive. To procure rest and ease he required large quantities of sedatives. After December 16th he gradually improved, and was convalescent on January 7th 1864.

The plan of treatment devised and carried out consisted in—

1. Free purgation, and in endeavouring to obtain healthy secretions. The agents employed were calomel, in large doses, jalap, croton oil, senna mixture, turpentine enemata, and chlorate of potash.

2. Ensuring sleep, or at least freedom from pain, by morphia injected beneath the skin, administered as often, and in as large quantities, as were necessary for that purpose; thus, doses of two grains were commonly injected, and usually in the regions of the trunks of the nerves supplying the muscles most affected by spasm. On three successive days the total quantities thus administered were severally thirteen grains, thirteen grains, and twelve grains. In ten days eighty grains were used, and in twenty-three days one hundred and three grains were consumed.

* Reported by Mr. R. S. Stone, House Surgeon.

3. As the disease was on the wane, the administration, with great benefit, of large doses of quinine.

4. Taking all possible means to keep the patient in absolute quietude. In addition to a darkened, secluded part of the ward, his ears were filled with cotton wool, with the object of preventing external noises from exciting the spasms.

Article XVI.—*Cases from the Wards.* By Robert Martin, M.D. Cantab.

THE seven months of the present year during which I have had the care of in-patients at St. Bartholomew's Hospital have, happily, not been marked by the occurrence of any such outbreak of epidemic disease as would call for especial remark. The long-protracted winter, memorable rather because of its duration, and because of its piercing winds, than by reason of its absolute lowness of temperature, carried with it, indeed, in its train, a fatal host of lung-diseases. But these can hardly be included in the category implied by the term epidemic, as usually employed.

Strictly speaking, however, and having regard to the true etymology of the term—an etymology which requires only that a disease shall fall upon many at one time to be included in the epidemic class—bronchitis and pneumonia may fairly be considered to have found places in the category; for they were very prevalent. Pure, uncomplicated instances of each disease undoubtedly presented themselves—they appeared at least in forms which the imperfections of our observation lead us to style uncomplicated—but these were very few when compared with the too great frequency of their occurrence as accompaniments of other disorders.

Patients, who though suffering from one or other of the various forms of kidney-degeneration, had managed, in spite of a slight œdema and an increasing dyspnœa, to continue at their work so long as the weather was mild and their skin's action fairly good, felt the balance turned against them by the cold. So also was it with those suffering from old phthisis, or old heart-disease; to whom came bronchitis, or pneumonia, or the two combined. And very many of these gained admission to the Hospital; some to find relief—these were the younger of them—and some to serve only as cases for diagnosis and prognosis, and as illustrations of the futility of all treatment!

In the cases of fever admitted to my wards, and these were numerous, both typhus and typhoid, pneumonia was an almost constant complication. It occurred, generally, very early in the progress of the primary disease; and in two cases put an end to the patient's life before the expiration of ten days, dating from the supposed time of commencement of the fever. In the remaining cases, however, the complication of pneumonia, although prolonging the usual period of exaltation of the patient's temperature and pulse, and retarding proportionately his convalescence, was not productive of any more serious consequences.

Rheumatism, in its acute form, furnished its usual large contribution of subjects for treatment; and the number of these was fully as large during the hot months of the past hot summer, as during the biting weather of the early spring. A modification of the blistering process, advocated by Dr. Davies, was put in practice in some of these rheumatic cases; and, certainly, with the immediate result of producing most marked relief to pain. So certain were its effects in this direction indeed, that patients who had once experienced its use would ask eagerly, again and again, for its repetition. My observations upon the subject, however, at present, have been neither so extensive, nor so perfectly and accurately made, as to warrant me in giving any decided expression of opinion as to the real and ultimate efficacy of this plan of treatment.

The usual sprinkling of cases of scarlet fever, and the more frequent cases of acute renal dropsy consequent on that affection, have been admitted; and the same may be said of most other forms of ordinary disease.

Of the curiosities so often found in all metropolitan hospitals, the pathological puzzles and the diagnostic dilemmas of the medical wards especially, there have been many. And I have ventured to tell the story of a few of these, which were, most of them, cases of long standing at the time of their admission to the Hospital. They have been selected, not, certainly, because of the good practice observable in their treatment—for all, save one, were affected with mortal diseases, and in my account of another I lay myself open perhaps to the imputation of malapraxis—but, chiefly, because of the interest they excited during life by the obscurity of their symptoms, and after death by the revelation of the true meaning of these at the hands of Dr. Andrew.

To that gentleman I am especially bound to acknowledge my obligations in the preparation of this Report of 'Cases from the Wards;' for it is to his able hand and accurate eye that I owe

the demonstration of all the appearances set down in the accounts here given of the post-mortem examinations, and to his clear interpretation of their pathological import much of the knowledge I have gained from their inspection. And hardly less am I indebted to my clinical clerks,* without whose watchfulness and quick observation I might easily have overlooked many a new symptom as it arose, and without whose notes I should certainly have lost all written record of it.

Medullary cancer of the brain and spinal cord and their membranes.

M. A. Baldwin, a pallid, but tolerably well-nourished, child of 6 years of age, was admitted to Mary (ward) on the 11th of May. The patient when first seen was lying quietly upon her side, with the eyes half-closed, and breathing tranquilly. Her skin was of the natural temperature; pulse about 80, but somewhat irregular both in force and frequency; the abdomen was retracted and apparently tender to the touch—apparently tender only, because it soon became evident, upon closer examination, that this seeming tenderness was but an indication of an exaggerated sensitiveness, which was common to the whole surface. Upon being roused from her listless tranquillity, which was done without any difficulty, she exhibited considerable peevishness and impatience of examination, crying out whenever, and wherever, she was touched; and relapsing at once, when let alone, into the easy position and listless condition from which she had been roused. When asked to put out her tongue, which was covered with a white creamy fur, she did so easily and in a straight line, although not immediately; and when pressed to tell where she was in pain, complained continually of her 'back.' Upon examining her eyes carefully, and in a full light, they were found to present no very unusual appearance. They were somewhat suffused perhaps (the pupils a little dilated) and somewhat dull, looking out, as it were, with a puzzled look: but the pupils contracted under the stimulus of the light—a stimulus which was borne without creating any distress—and, certainly, there was no amaurotic blindness.

Such were the appearances, and such the assemblage of symptoms, observed at the first examination of the patient. Was it possible from this first examination to come honestly to any positive conclusion, either as to the exact seat of mischief,

* Messrs. Adams, Arnold, Bateman, Orton, Richards, Robinson, and Rundle.

or as to the exact nature of the disease? Surely not; although there were undoubtedly, in the group of symptoms enumerated, indications sufficient to warrant a strong conviction that the brain and perhaps some part of the spinal cord were affected.

The history of the case, which was fortunately furnished to us by the child's grandmother (a very intelligent woman), went far to corroborate this conviction; inasmuch as it furnished us with a cause adequate to the effects we saw before us, and to the effects of which we heard as having been produced earlier in the progress of the case.

About four months prior to admission, we were told, the child was attacked with scarlatina. She got well through it, being kept carefully in bed for some ten days, and confined to the house for about a month longer—this latter restriction being imposed not because of any imperfect convalescence, but as a precautionary measure only. On the first occasion of her going out, about ten weeks before admission to the Hospital, she was 'running fast round a corner, struck her forehead against a board, and was knocked backwards on to the pavement, where she was picked up completely stunned, and brought home insensible, remaining in this condition for an hour.' This happened at dusk. In the early morning she began to vomit; and this sickness, with diarrhœa superadded, continued during the next day; the forehead being at the same time much swollen, and both eyes blackened from the blow. About a week later, she first complained of her back; and when asked to point out the seat of pain would place her hand sometimes on the loins, and sometimes on the neck. Sickness after taking food now became the most frequent and prominent symptom, until ten days before admission, when, for the first time, she was attacked with a violent convulsive seizure. 'Her hands clenched; the upper part of her worked about; her eyes rolled; she was apparently unconscious, but screaming loudly.' This first fit would seem to have lasted for about an hour; and was followed, a week later, by a second which lasted for about half an hour, 'a sort of stupor remaining for about the same time after the convulsions had ceased.' In this second fit the 'legs were comparatively quiet, the arms and upper part of the body being most affected; and from the time of the first attack she has become heavy and drowsy, not seeming to know people as well as formerly, and the sickness has been getting worse.'

Interpreting the symptoms presented to us with the help of this history of their rise and progress, it seemed now not only certain that we had to do with some affection of the brain and

spinal cord, with their investing membranes, but further, that this affection was probably of an inflammatory kind; symptoms of that inflammation having set in contemporaneously with the reaction following upon the recovery from severe concussion.

Accordingly the opinion was hazarded, somewhat doubtingly, that as the result of a violent concussion of the brain substance, and of possible damage done to the upper part of the cervical spine, inflammation of the brain and of the membranes at its base had been set up, the mischief involving also the upper part of the cord.

The opinion was so 'doubtingly' expressed, because it seemed that the symptoms were hardly sufficiently pronounced to warrant a more positive conclusion. The accident had happened, be it remembered, some ten weeks before admission—a very long time for the production only of such evidence of oppression as we had before us in the symptoms, on the supposition of these being due to ordinary encephalitis, with meningitis, of such duration. From such a cause, operating for so long a time, it might have been fairly expected that we should have met with such results as either convulsion more frequent and pronounced, or paralysis however partial. We might have expected a more decided deadening of all the faculties; some dulness or perversion of the sense of sight or of hearing; some marked dilatation or sluggishness of pupils. But none of these were there; and on the contrary, the patient saw, heard, understood, and moved—although, it is true, with evident and painful effort.

Moreover, there were other explanations of the symptoms which were not altogether indefensible.

The patient, five weeks and a half before the accident, had suffered from scarlet fever; and although there was no history of any discharge from the ear, or other special symptoms indicative of mischief in the petrous portion of either temporal bone, still, it would have been by no means an unreasonable suggestion to say that some such mischief had been latent, and was roused into activity by the shock; or again that from some fresh damage done to the orbit, the inflammation had been directly set up. These probabilities therefore had, so far as was possible, to be excluded.

Again, because of this same attack of scarlet fever, it was not certain, by any means, until the opportunity offered of examining the urine, that the whole train of symptoms was not produced by retention of urea as the result of kidney mischief. And, further, mistrusting, or at any rate criticising very jealously, the history furnished to us (as is especially necessary

in Hospital practice, however intelligent our informant may appear to be) the possibility of the case being one of intercurrent continued fever, had also to be considered. Finally we had to exclude, so far as we might be able, the existence of tubercular disease of the brain and membranes, which, after all perhaps was, next to ordinary inflammatory disease, the most obviously probable solution of the difficulty.

Accepting then all these as possible explanations of the case; differentiating between them; and, above all, observing the good sound rule of not wandering too far afield in search of a cause when one good and sufficient is ready to the hand, the diagnosis which first suggested itself was ultimately determined on as being the most probable.

Anticipating now by some fourteen days (for the sake of a better appreciation of the progress of the case) the death, and examination after death, of the patient, let us see what was the real condition of things; and how far we were right or wrong in our guess at the truth. We were right in our conclusions as to the seat of the disease; but no one of all those who saw the patient had hinted even at its real nature. It was medullary cancer affecting the membranes of the cord and brain; commencing probably in the arachnoid, invading in parts the cerebral substance, and of this latter notably the left optic thalamus which was occupied almost wholly by a large cancerous mass.

The progress of the case was marked by all the alternations usually met with in cases of cerebral disease. At times the patient would seem so much herself, so ready to take food, the pulse would diminish so much in frequency, and the skin be so natural, as to lead one to hope that after all we might have a case of fever before us; and then would come a rapid pulse, a restless night, disturbed at intervals with that painful plaintive cry, telling so truly, to an accustomed ear, of mischief in the brain only too likely to prove fatal.

And there were many of these remissions and exacerbations—especially of pain; as indeed we may perhaps understand when we consider to what an extent the membranes of both cord and brain were affected, and how comparatively small a portion of the brain substance was rendered useless. It will have been seen that on her admission the pain was referred only to the back; and this was true for the whole duration of life; no mention ever being made of the head. With the help of opium, the use of which was often rendered absolutely necessary by the intensity of her sufferings and restlessness, the patient was lulled frequently into a comparatively easy condition, and occa-

sionally into an apparently sound sleep, from which she would wake refreshed, tranquil, and ready to take some food.

Meanwhile however her powers of resistance were gradually and surely diminishing; and after three convulsive attacks on the evening of the 24th (fourteen days after admission) followed by a night of restlessness and almost incessant screaming, she died on the evening of the 25th—never having shown from beginning to end of her illness the slightest evidence of paralysis.

Post-mortem examination. — Body emaciated. Abdomen retracted and of pale green tint from decomposition. Thumbs flexed upon the palms. Rigor mortis well marked.

Head.—The bones of the skull were normal. The dura-mater was slightly adherent along the vertex and the convolutions greatly flattened.

On the antero-lateral aspect of the left hemisphere, in connection with a large vein, was seen a firm yellowish-white tumour, about the size of a pea; and on the right hemisphere, partly on its under surface, a mass of similar consistence and colour; but occupying the surface of the brain for a space of 1—1½ inch square. The vessels in the pia-mater appeared to pass beneath it. Its thickness varied from one-fifth to one-twelfth of an inch, or less. On careful examination a few smaller and thinner masses of similar character were found scattered here and there on the surface of the brain. At the base, on the left side, springing from the inner surface of the dura-mater at the bottom of the middle fossa, was a tumour the size of a hazel-nut, which could not be separated, without cutting, from the middle lobe. The external aspect of the dura-mater was natural. To the naked eye the tumour presented the characters of medullary carcinoma. At this point only was the sac of the cerebral arachnoid obliterated.

The surface of the pons and of the medulla was occupied by a morbid growth similar in all respects to that described above. On section the firm masses seen on the exterior of the brain were found to have invaded to a greater or less degree its substance.

The ventricles were of large size; filled, but not distended, by clear fluid. Their walls, especially in the posterior horns, were soft, but not granular. The right posterior horn appeared to communicate with a cavity having ragged pulpy walls, which, however, were neither vascular nor discoloured.

The central portions of the brain, especially the septum lucidum and pillars of the fornix, were remarkably soft.

The velum interpositum was thickened and infiltrated by material similar to that on the surface of the brain, but the free

edges of the choroid plexus were apparently natural. The substance of the left optic thalamus was occupied by a medullary tumour.

Spine.—The vertebræ were healthy. In the upper cervical region was found a little recently extravasated blood, and about the usual amount of spinal fluid.

On opening the theca, which appeared somewhat dense, there appeared here and there (principally in the dorsal region) adhesions. The surface of the spinal cord was studded, and here and there for a considerable extent completely covered, with a material infiltrating the arachnoid and similar to that found in the cerebral membranes. This was most abundant in the dorsal region, and on the posterior surface, where the outline of the cord was nodular apparently from coalescence of separate growths. The morbid appearances were not found in the cauda equina, and only in a slight degree in the cervical region. They did not extend along the roots of the nerves.

Under the microscope the appearances presented by portions taken from the substance of the brain and from the membranes of the brain and cord were all but identical. The morbid material from all these situations was found to consist of cells of somewhat faint outline, varying much in size, the majority about the size of white blood-cells, and in shape being oval, pyriform, or caudate. Their contents were finely granular, and some but not all were nucleated. They were unaffected by dilute acetic acid. The mesenteric glands were slighly enlarged, but no morbid deposit was detected in them. All the other parts of the body were healthy.

Dr. Bacon, of the Cambridgeshire County Lunatic Asylum, who has recently published a pamphlet on primary cancer of the brain, gives the following statistics as the result of his search through the 'Post-mortem Records' of our metropolitan hospitals for cases of this nature, occurring during the last ten years.

He found, in all, only twenty-one; of which fourteen occurred among males and seven among females.

Of these twenty-one, males and females, sixteen, or nearly four-fifths were under the age of 40—so far negativing Cruveilhier's dictum as to primary cancer of the brain being the 'appanage of advanced life.' Nay more; of Dr. Bacon's twenty-one cases five were under 12 years; two between 12 and 20; four between 20 and 30; five between 30 and 40; the remaining five being distributed thus: one between 40 and 50, three between 50 and 60, and one at 62.

The number recorded may be taken probably as accurate; for although it is not unlikely that a few, which in the earlier years of the decade were described as cancer would now be classed with tubercular and syphilitic growths, still, these may be fairly set against those of which all record has been lost, for want of compulsory post-mortem examinations.

Dr. H. Bennett in his 'Cancerous and Cancroid Growths' writes—'During the last five years, my opportunities as pathologist to the Royal Infirmary, where I have examined annually between three hundred and four hundred bodies, have not been inconsiderable; and yet I have still to meet with a case of cancer of the brain.'

Rokitansky says that 'cancer occurring in the choroid plexus is one of the rarest ever met with' (it was free in the case before us, although the velum interpositum was affected); and further, 'that exclusively of several cases of circumscribed callous induration of the white columns, as to the cancerous nature of which I am still in doubt, I have met with but one case of cancer of the cord. It was a solitary nodule of medullary cancer.'

Ollivier mentions several cases of diffused cancerous growths as well as of the so-called colloid cancer; but whether these were primary or secondary is not determined.

Dr. Sutherland writes—'It is rare to find tumours in the substance of the brain in cases of insanity'—and if rare to find tumours, still more rare to find cancerous tumours—'in two hundred cases I met with only four.' The French statistics it may be briefly stated correspond entirely with those given by Dr. Bacon. With regard to the absence of any paralysis in the case above narrated, it may be worth while to quote Calmeil's experience; who found three-eighths of those affected with organic disease of the encephalon free from paralysis; and of the five-eighths who were paralysed he found one-half hemiplegic. Further, Esquirol and Durand Fardel relate five cases in which cancerous growths were found occupying the anterior extremity of each hemisphere, while the lower limbs only were paralysed. Finally, and as a point of interest in reference to the case above given, it may be stated that so far as could be learned from a careful cross-examination of the patient's grandmother on the female side, who spoke with a confident and intelligent knowledge of the family history, no case of recognised cancerous disease had ever occurred on either side.

Renal dropsy consequent on scarlatina; Convulsions, sudden blindness, recovery; Typhus fever, recovery.

John Alsford, a poorly-nourished boy of 11 years of age, was admitted to Radcliffe (ward) on the 25th of January.

When first seen he was lying on his back, breathing thirty-two times in the minute, with his face puffed, his pupils dilated and responding but sluggishly to the stimulus of light. His skin was harsh and dry, but not desquamating; his pulse 72, small and irregular; tongue moist, covered with a thin fur on the dorsum, and red at the tip and edges. His appetite was reported to be good; his bowels regular. The abdomen was full but tympanitic, giving no evidence of containing fluid, and his extremities were not swollen.

By occupation he was assistant to a chairmaker, and worked usually in a very cold and draughty room. About a month previous to admission he was supposed to have had an attack of 'gastric fever,' in the progress of which, as was learned from a close cross-examination, sickness and sore throat were two prominent symptoms. At the end of about nine days he was so far recovered as to be enabled to resume work; but two or three days later he found that his face was beginning to swell. In spite of this warning, however, he continued his occupation until the day before his admission to the Hospital; when growing feebleness, and the supervention of pains, referred chiefly to his neck and shoulders, compelled him to give in.

Such being his condition, and such the history of his attack, it seemed most probable that the so-called 'gastric fever' had been really scarlet fever; and that his symptoms were due to consequent kidney mischief. Being able to pass urine off-hand, it was found upon examination to be slightly 'smoky,' of low specific gravity (1015), and to contain a small quantity of albumen. The diagnosis could hardly be any longer a matter of doubt; and the board was accordingly headed 'Renal dropsy consequent on scarlatina,' and the patient was ordered a warm bath, a gentle purge, and a moderately nutritive unstimulating diet.

For the first few days subsequent to admission, under the influence of occasional warm or vapour baths, a diaphoretic saline, and occasional doses of the compound jalap powder, his condition remained very little altered; the only notable and unsatisfactory symptoms about him being a persistently slow and irregular pulse, and a continued scantiness and smokiness of

urine. On the 2nd of February however, one week after his admission, having slept soundly up to four o'clock in the morning, he awoke in a state of great alarm, and by his cries attracted the notice of the nurse. Upon coming to his bedside she found him violently convulsed—'the convulsions being confined to the right arm and right side of the neck'—quite conscious, and after a time, when the convulsions had ceased, he vomited. At 10.30, six hours later, he was again similarly convulsed; and again he vomited. When seen by the clinical clerk, soon afterwards, he complained of pain felt principally on the left side of the head; his pupils were dilated, and he was found to be completely blind. His pulse was not to be felt at the wrist; and he had passed fæces and urine under him in the bed, although not unconsciously.

There could be but little doubt, with such an assemblage of symptoms, that a sudden serous effusion had been poured out, either at the base of the brain, or, more probably, in its ventricles, the boy's perfect consciousness during the attack militating against the notion of the effects observed being due to uræmic poisoning, only, without effusion. Accordingly, and in spite of the feebleness of his pulse, he was ordered a brisk purgative. Later in the day, at 3.30 p.m., and before the purgative medicine had acted, he had another attack of convulsions, and again at midnight. After this last attack his bowels were freely opened, and he slept. Again his bowels were opened in the morning—this time not in the bed—and at the visiting hour, early in the afternoon, although still unable to see, and with his pupils still insensible to the light of a candle held immediately before them, his pulse had returned at the wrist. For the first time since his admission his legs and arms were now found to be œdematous, and his urine, which could again be collected, was more decidedly sooty and more highly albuminous.

Up to this time, dating from the accession of urgent symptoms, he had taken no food. But inasmuch as it seemed desirable to keep up a gentle action of the bowels, it seemed also incumbent upon us at the same time to endeavour to give a little food and stimulant. Accordingly, a teaspoonful of brandy with a little milk was ordered to be given, at intervals of two hours if the stomach would retain it, and a mild purgative at night. The food was well borne, the purgative was taken at eight o'clock P.M., and the patient slept soundly until four o'clock A.M., when his bowels were freely opened, and again he slept. The next day, or rather a few hours later on the same day at the time of the visit, he expressed himself as feeling much

better. He had experienced no return of the convulsions; and although still unable to distinguish objects, he was now aware of the light of a candle held close before his eyes. The pain before complained of in his head was relieved, and his pupils, though still dilated, answered to the stimulus of light. But his legs and arms were now more swollen. Again a purgative was ventured upon for the following morning, and apparently with the best effect; for after one action of the bowels, and a sound sleep, the quantity of urine increased; it was less smoky, and less albuminous; and on the following day his vision was again quite perfect, his head quite free from pain. His appetite being now much improved, and his stomach having lost its irritability, his diet was correspondingly increased; and from this time—although not without interruption, from the appearance, at one time, of a good deal of unaltered blood with fresh casts in the urine—he continued slowly to improve, until, on the 12th of April, his urine was reported to be quite free from albumen, and his general condition to be most favourable.

But his dangers and trials were not yet at an end. Two cases of typhus fever being at this time admitted to the ward, an urgent message was sent to the mother of the child pressing upon her the propriety of removing him from the risk of infection. The caution however was not attended to—it may have been that it was not received—and a few days later a succession of rigors, following quickly the one upon the other, announced the realisation of our fears, and the onset of an attack of typhus.

For a patient of such antecedents; for one who had so recently suffered such a shock as is implied by the occurrence of the train of symptoms above narrated, the supervention of a depressing attack of fever might surely well be looked upon as not unlikely to prove, at its outset even, a fatal blow; and still more likely did it seem that, even if his powers were sufficient to withstand successfully the earlier stages of the disease, fresh kidney complications must almost inevitably set in, and jeopardise his life once more.

And so an unfavourable prognosis went out; and those who watched him were directed more carefully than ever to note the quantity of urine that he passed—that they might give the earliest warning of its failure. They were told to look carefully for the first symptoms of an early delirium; a delirium which would probably be more continuous and more drowsy than the delirium of an ordinary case of typhus occurring in a young and previously healthy subject; a delirium which would perhaps prove the brain to be a more delicate test for urea

retained, than the rough measures of test tube and urinometer for urea excreted. And again, the high probability of a return of convulsion which should this time be more general than before, this time accompanied with loss of consciousness, and carry with it even graver import than before, was insisted on.

But none of these gloomy prognostications, fortunately for our patient, and just as fortunately for his doctor, were justified by the event; for the 'poorly nourished' boy who was admitted to the Hospital some two months before, had gathered strength sufficient in the interval between his two attacks of illness to make him equal to bearing up bravely against the second trial. Fourteen days saw him pass, not easily, but without any very untoward symptoms, through the climax of the disease; which being passed, and not until then, stimulants moderately employed, his youth, and what must have been originally a good constitution, helped him quickly to a complete and thorough reconvalescence. He left the Hospital in good health a month afterwards and has not been heard of since.

Aneurisms of the arch of the aorta—Aneurisms of the abdominal aorta.

Elizabeth Tucker, a washerwoman of 50 years of age, presented herself as an out-patient at St. Bartholomew's Hospital on the 7th of April 1864; and while waiting her turn for examination attracted the attention of the physician, by reason of the pecnliar stridulous character of her breathing. So marked indeed was this peculiarity, that it was at once pointed out as almost certain evidence of some tumour which was pressing either upon the trachea, or upon one or other bronchus; or which, without producing this compression of the air tubes, was causing in some way or other irritation of the recurrent laryngeal nerve.

Acting upon a rule the observance of which is good in all cases, and especially good where apparent grounds for arriving at a foregone conclusion and a diagnosis 'per saltum' present themselves, an examination of the chest was at once proceeded with, before any inquiries were made of the patient either as to the symptoms or the history of her case—inquiries which might have resulted in the receipt of biassing answers.

Seeking to establish the real nature, and, if possible, to localise the source of the hoarse stridor which was so attractive of attention, the stethoscope was first carried from the upper part of the sternum downwards; when it was found that a sound

nearly resembling what is usually known as 'tracheal breathing' was audible at points far lower than would be the case in an ordinarily healthy chest. It seemed also clear that the intensity of this sound was greater at a little distance down the sternum than it was at its upper margin. Next, it was found, by following up the auscultation horizontally, across the sternum, that the same sound, or a modification of the same sound, while it was heard feebly on either side of the chest (although this only close to either margin of the sternum and at its upper part) attained its maximum intensity at a point corresponding to the junction of the second right rib with the sternum. From a comparison of the results of these two auscultations, the vertical and horizontal, it was thus fairly established, first, that the noisy breathing was not due to any disease of the larynx; and that the noisiest breathing corresponded in situation nearly with the right bronchus. Moreover, it was also established, in the course of the examination, that the forced respiratory movements which the patient was called upon to make caused pain in the sternal region. Percussion now being resorted to (somewhat jealously it is true, and with a well-warranted dread of the possibly awkward results of any very rough proceedings in this direction) no appreciable departure from the natural resonance of the chest was detected; although from the sequel of the case it may be fairly conjectured that a more forcible and 'deeper' percussion than was ventured would have demonstrated the existence of dulness. The sounds of the heart and its impulse were found also to be natural, and the resonance of its region equally so.

The patient now being questioned as to the history of her ailment, gave the following account, intelligibly and clearly:—

Her present illness commenced in August of last year, 1863. On a particular day in that month, after lifting a tub of water, she felt suddenly a severe pain in her chest, which was quickly followed by faintness; but neither at the time, nor immediately afterwards, did she experience any difficulty of breathing. She gave up work at once. Difficulty of breathing supervening in a few weeks, and the 'res angustæ domi' increasing with the dyspnœa, she became an inmate of the Workhouse Infirmary in October, remaining there until the following March, when she left at her own request 'because she was getting no better.'

Such was the story she told. And imperfect enough it was, when taken by itself, if any positive conclusion was to be arrived at from it alone. But coming as it did, to supplement the physical examination of the chest—an examination undertaken with the expectation of finding some evidence of a tumour—

evidence which though weak was actually obtained—this history was wonderfully suggestive of the possibility of aneurism, which perhaps more often than is generally supposed would seem to have its origin and to be accurately dated from some violent exertion. At any rate, the story being heard, the next question, and the first leading question which was put to the patient, 'Have you any difficulty in swallowing?' was answered in the affirmative; as were also some others relating to paroxysmal attacks of dyspnœa and cough; their frequency; their greater frequency and severity in the recumbent as compared with the upright position—these all going far to strengthen the original probability of the existence of some intrathoracic tumour, pressing, as it seemed now, not only on the air passages but also on the œsophagus.

So much then being fairly established, the question arose: Granted the existence of a tumour in the situation supposed, were there any reliable signs, physical or physiological, from which might be determined the nature of the tumour; whether i.e. it was an aneurism, or whether it was some solid growth. And the question was answered in the negative. For setting aside the mode of inception of the symptoms, which, it has been already said, would in some persons' minds at any rate strongly point to a yielding artery only, there was in truth in all the assemblage of signs not one which might not have been satisfactorily explained on either supposition. Moreover, at the early stage of the disease now under discussion, there was no detectable impulse other than in the proper cardiac region—although this did become at a later period a distinctive feature; there was no difference (then or later) in the pulse at either wrist; and although sounds resembling the heart-sounds were heard, perhaps loudly, up the course of the aorta, these were only such as would be heard through the medium of any solid tumour—and such indeed as are heard in the course of many an aorta no longer young. Finally, the heart-sounds were healthy.

The evidence then being summed up, the question was left an open one by the following note being entered upon the patient's 'letter': 'Mediastinal tumour?—first symptoms consequent on lifting heavy weight;' but at the same time a strong conviction was expressed in favour of the aneurismal solution of the difficulty.

A small dose of ether and opium was ordered for the patient, by way of palliative treatment, with a compound rhubarb pill, to be taken as occasion might require its use; and this with good effect, so far as the cough and dyspnœa were concerned;

but upon the dysphagia, as may be readily supposed (from its more strictly mechanical origin), remedies had but little beneficial influence. During the warm months of summer (and the summer of '64 would be especially favourable to such an invalid) the patient, with the help of a strong will and kind friends, succeeded in keeping herself free from the workhouse, and came regularly to the out-patient room; where but little, if any, change in the nature of her symptoms could be observed. Towards autumn, however, when the cooler weather, by checking the skin's action, had deprived her lungs of that aid they stood so much in need of (her kidneys it may be said, by way of 'prolepsis,' were diseased), increasing distress of breathing and of cough drove her once more into her refuge. But again she succeeded in leaving it, and was under medical treatment at home up to the time of her admission to the Hospital on the 12th of May 1865.

At this date her condition was thus described: 'Emaciated; sitting forward in bed, propped up with pillows; breathing twenty-eight times in the minute; with a somewhat hoarse voice, and a peculiar wheezing sound accompanying each inspiration.' 'Her skin is natural, pulse 62, of moderate volume; and of equal volume on either side.' 'Her appetite is good, but she is afraid to take food on account of great difficulty of deglutition. She refers the pain felt on making the effort to the episternal notch, and about an inch below this; and says that she has more pain in taking solid than liquid food.' 'For the past two months she says that she has been getting rapidly worse; losing flesh considerably, and suffering more and more from dyspnœa; so that now she dreads to lie in the recumbent position, and usually sleeps while in a sitting posture.' 'She suffers occasionally from sudden and violent paroxysms of dyspnœa, brought on by making any unusual exertion, or taking food, or coughing.' 'The skin during these attacks assumes a dusky hue, her lips and extremities become livid, and she feels as if at the point of death.' 'She had an attack of this kind yesterday while taking her tea. At times she suffers from a lancinating pain on both sides—worse on the right. It shoots up the side of the head, between the scapulæ, and along the upper arms to the elbows.'

With this exaggeration, so well described, of all the symptoms from which she suffered when she ceased to attend as an out-patient some nine months previously, what alteration had taken place in the physical signs?

There were alterations, very marked, and very decided; alterations which were appreciable to the eye and to the hand,

but most of all to the ear; all pointing to a corroboration of the original diagnosis.

First of all there was observable 'a slight swelling to the right of the sternum on a level with the second rib—'previously unobserved' (it is added in the note) 'by the patient.' And indeed it was very 'slight;' so slight that, had it not been looked for, it might readily have been passed over as being an irregularity of cartilage much less marked than many a one seen on an emaciated chest. Taken however in conjunction with the previous history, signs, and symptoms of the case, it assumed the gravest importance; and told, together with its tenderness and dulness when percussed (new features these!) of probable pressure from within. Auscultation over this swelling gave even in an exaggerated degree the old 'noisy breathing;' and now, upon examination of the interscapular spaces behind, was heard a sound like to it in kind, and, on the right side much more intense in degree—all telling of pressure upon the right bronchus.

But even now there was no impulse to indicate with certainty the existence of aneurism. And so the diagnosis could honestly go but a little farther than before, 'Mediastinal tumour;' this time however, be it noticed, with no mark of interrogation after it.

By the occasional use of ether and opium, and from the inhalation of the vapour of poppy decoction, very considerable relief was afforded to the patient's sufferings; she was again enabled to take a good deal of spoon food, and, generally speaking, to sleep well up to three o'clock in the morning, at which time dyspnœa and cough would bring her night's rest to an end.

One morning an unusually severe attack of dyspnœa being followed by what was described as an 'epileptiform seizure,' she fell out of bed, dragging the charged inhaler with her, and scalding severely her right shoulder and infraclavicular region.

Here was counter-irritation on a large scale. And without doubt she was the better for it. So certain indeed was the patient herself of this point that she was promised a continuance of treatment on the same principle so soon as the scalded surface should have partly healed.* What was the true interpretation of this 'epileptiform' seizure? Her perfect recovery from it was against the notion of its being of the nature of ordinary convulsions resulting from sudden loss of blood from a suspected aneurism; and moreover there was no

* Dr. Stokes mentions a case in which the greatest relief from pain, cough, and dysphagia was produced by the action of issues.

alteration in the physical signs which would at all support such an explanation. Might it be owing to a sudden failure of action in an embarrassed heart? The hitherto steady and undisturbed performance of its functions by that organ under ordinary circumstances militated against such a solution.

Was it due to cerebral congestion, and a temporary coma, consequent on an unusually severe attack of her accustomed dyspnœa? or was it the exponent of a still more complete and sudden interference with respiration, the result of a genuine attack of spasm of the muscles of the larynx, brought about by more than ordinary irritation of the recurrent laryngeal nerve? Most probably the last of these suggestions was correct. The question was important for the patient, inasmuch as upon the answer which might be given to it depended in great measure the adoption or rejection of the only practice which seemed likely to afford chance of relief to the symptoms.

For, on the supposition that the 'fight for life' (so it was described by the patient herself and by those about her) was rendered necessary by spasm of the muscles of the larynx; and on the supposition that this spasm again was due to irritation of the recurrent nerve from the presence of a tumour, it seemed certain that no remedy less potent than the making of a permanent opening in the trachea would give a chance of safety. The adoption of the measure was discussed, and, perhaps unfortunately for the patient, was rejected; for, as the sequel will show, she died a few days later in one of these attacks. The phrase 'perhaps unfortunately for the patient' may seem to savour somewhat of indifference. But on the other hand, the venture of operative interference would have been of the boldest; and, granted that it might possibly have served to palliate the attacks, was it certain so to prolong her miserable existence (rendered in the intervals of these, still more miserable from the open wound) as to justify its being made?

For a few days after the occurrence of this alarming seizure she enjoyed a period of comparative comfort. But soon the small swelling became somewhat larger, painful, and more tender; and on the 5th of June, for the first time, the ear, or rather the head through the stethoscope, became aware of a distinct pulsation in it, which however was still so feeble as to escape observation of both eye and hand. It was now moreover found that percussion in the right interscapular space gave pain; and in both interscapular spaces the noisy breathing which had previously been heard in these situations became persistently more noisy. A profuse nummular expectoration

now set in, and, together with the growing frequency of the attacks of dyspnœa, with the consequent loss of sleep, threatened quickly to exhaust the patient. But again she rallied; and begging earnestly to be allowed to get up that she might 'breathe more freely,' was permitted to do so. On the 21st of June, while out of bed, she complained, in the nurse's words, of 'feeling queer; was sure that an attack was coming on; and that she should never leave the Hospital alive.' A few minutes later her breath became short and the nurse saw her stagger to her bed. She soon became blue in the face and hands; but 'as she had done so in former attacks it gave the nurse no particular alarm, until her hands unclenched, and after an attack less violent than usual she appeared to choke and died.'

Post-mortem examination forty hours after death.—Body poorly nourished, rigor mortis absent. The upper half of the mediastinum was occupied by the sac of an aneurism involving the whole of the arch of the aorta from about an inch above its valves (the dilatation commencing within the pericardium) down to the origin of the left subclavian. It had become firmly adherent, by dense cellular tissue, to the sternum, and to the second rib on the right of the sternum; but had produced no absorption of the bony structure. The left innominate vein passed across the summit of the tumour, but was quite pervious —although the lividity of the left arm was great as compared with that of the right. The left phrenic and pneumo-gastric nerves, and especially the recurrent laryngeal of that side, appeared to have been subjected to some pressure and tension in the part of their course in connection with the tumour. The innominate artery, given off from the upper and anterior aspect of the tumour, was somewhat pressed upon by that portion of it which lay behind the artery. The interior of the sac contained a considerable amount of laminated coagulum, an unusually firm dense mass of which was intimately adherent to the anterior and upper surface of the sac wall.

The œsophagus appeared to lie a little to the left, and not so immediately as usual behind the trachea; as if displaced by the tumour. The trachea itself exhibited no distinct signs of pressure; but the right main bronchus at its commencement was firmly adherent to the sac, and flattened from before backwards. There was a little atheroma in the aorta both above and below the aneurism; but none in the large vessels given off from the arch. The internal lining of the sac seemed to be continuous with the inner coat of the aorta.

The valves of the heart were all healthy, there was no hypertrophy of the left ventricle, and the heart hardly came up in

size and weight to the normal standard. In the pleuræ there was neither fluid nor adhesion. The lungs were œdematous and congested; their tissue a little softened posteriorly, probably from decomposition, and a considerable number of small ecchymoses were seen beneath the pleura of the right lower lobe. The spleen was somewhat enlarged, and soft. The liver was intensely congested. The kidneys were large; their capsules adherent, and when these were stripped off, the surface was left granular. On section their cortex was seen to be increased in amount, and contained two or three small cysts: intense congestion prevailed throughout.

Dr. Stokes, in his work on the 'Diseases of the Heart and the Aorta,' has the following paragraph:—

'EXISTENCE OF ANEURISM WITHOUT PHYSICAL SIGNS.—To those whose knowledge of aneurism is derived from written descriptions rather than bedside experience, it may appear strange that a disease of such importance should ever exist without being accompanied by signs, which, if not sufficient to determine the nature of the affection, would, at all events, indicate some important organic disease. Yet cases do certainly occur in which, at some period at least, the disease may elude the most careful investigation; and proof is not wanting of the continuance of this latency, even after a copious hæmorrhage has taken place from the sac itself.'

The case above narrated hardly comes under the category alluded to by Dr. Stokes. But in so far as the physical signs, at the onset of the disease, were so little marked, that, had not the striking physiological signs and their history suggested a search for them they might easily have been overlooked, the case may fairly be cited as a not wholly inapt illustration of his remarks.

Two other cases of obscure thoracic aneurism which occurred in the same out-patient room, in both of which post-mortem examinations were fortunately obtained, may well be added here, in evidence of the significance to be attached to the two signs of loud tracheal breathing and dysphagia in cases of suspected aneurism.

A stoutly-built, robust, and healthy-looking man, who at once attracted attention (as did the woman whose story has just been told) on his entrance to the room by the hoarse stridor of his breathing, complained, not of dyspnœa, but of dysphagia of the most distressing kind. Upon being led up to

the subject he did indeed allow that, at times, he was liable to severe paroxysms of difficulty of breathing; and that these were usually accompanied, preceded, or followed, by violent fits of coughing; but it was for relief from the dysphagia that he applied.

A careful examination, repeated at his second visit (he made but two), resulted in the discovery of nothing more than loud tracheal breathing, heard over the whole of the upper part of the chest, and, still more clearly, in the interscapular spaces behind. There was no dulness to the percussion which was ventured; and no pulsation could be detected either by hand, ear, or eye. Care being taken to exclude as far as possible the larynx from being the seat of actual disease (for the symptoms and physical signs were explicable on such a supposition), it seemed probable, in the highest degree, that a tumour of some kind was pressing upon the trachea and œsophagus at the same time. What was its nature?

The history of the case afforded the only real clue to an answer to this question. The man was clear as to this point, viz.: that being in good health about a month previously, he had suddenly been seized, after a day's hard work (as a carman), with pain at the upper part of the sternum; pain which was aggravated by any attempt at swallowing, and accompanied, at times, with violent cough and difficulty of breathing. Taking into consideration the sudden accession of his symptoms and his previous well-nourished condition, the supposition of the existence of a cancerous or other solid growth did not seem so probable an explanation of the difficulty as did the existence of aneurism; and accordingly a diagnosis to that effect was made. A few days afterwards news was brought to the Hospital of his death, which happened suddenly during a violent paroxysm of cough.

Dr. Andrew was so good as to undertake an examination of the body, which presented that extreme and waxen pallor usually seen in those dead from hæmorrhage.

The chest being laid widely open, no aneurism was apparent. Both lungs were removed from their attachment; and the aorta, seen in its whole course, seemed healthy. The abdomen being now opened to the pubes, it was seen that the stomach and intestines were full of blood. Visions of a mistaken diagnosis arose; and it seemed not altogether unlikely that an aneurism of some one of the larger arteries of the abdomen had burst into the stomach. The existence of such an aneurism would indeed have accounted for the dysphagia, and, through irritation of the pneumo-gastric nerve, for the occasional cough and

dyspnœa; but it would hardly sufficiently explain the loud tracheal breathing which had been heard so plainly over the upper part of the chest, both back and front. And so, reliance being felt in this one physical sign, confidence was regained, and the aorta carefully dissected out. Which being done, an aneurism, of the size of a small walnut, was found projecting backwards from the descending part of the arch, and pressing itself between the trachea and œsophagus. Into this latter the sac at its lower portion had opened; while at the same time it had, by its upper portion, still exercised pressure upon the œsophagus above; and so the whole stream of blood which should have passed down the descending aorta had been pumped into the stomach—not a single drop having been allowed to come upwards to the mouth. And not only was the stomach distended with blood, but (whether before or after death would be hard to say) a large portion of this had passed through the pylorus many feet down into the intestines, from which it was made to regurgitate in the shape of firm clots impressed, in the most curious way, with the stamp of the valvulæ conniventes. The heart and all the other organs of the body were healthy.

The second case was similar in all respects save in its mode of termination. In this too the only signs afforded were dyspnœa, which was more marked than in the former case, and dysphagia; and the same loud tracheal breathing. But death came here by hæmorrhage and suffocation, the aneurism having opened into the pleura, and being, as in the former case, too small and too deep-seated to give either impulse or dulness to percussion.

ABDOMINAL ANEURISM, which is perhaps more often than any other real disease wrongly suspected to exist, and very frequently positively and falsely diagnosed, is also, and on the other hand, when actually existent, of all diseases the one most obscure in its early stages.

How often has it not occurred to most practitioners, when examining the lax abdomen of a thin and nervous and dyspeptic person, to be alarmed at the violent throbbing of an aorta simply irritated! And again, how few among the recorded cases of aneurism of the abdominal aorta have not been taken at the commencement of their progress for gastrodynia, or enterodynia, or lumbago, or sciatica; and in their more advanced stages for disease of the spinal column, for abscess in the psoas, or lumbar muscles.

Nor need this liability to error be matter of much surprise. A patient comes complaining of pains in the back; dull aching pains; not more severe in many cases than those arising from rheumatic affections of the lumbar fibrous tissue, of a kind to which he 'has been liable all his life.' And this may be perhaps his sole complaint. Or again, he may complain of pain in the region of the stomach, with frequent spasm and flatulence, and speak of it himself as merely the aggravation of an accustomed dyspepsia. Who would blame any man for not at once baring the abdomen and using hand and stethoscope to both belly and back? Were he to do so, indeed, he would not often, in the earlier stages of an aneurism, find physical signs sufficient to warrant him in asserting even the probability of its existence.

Given, however, a persistence or an aggravation of any of these symptoms, and the neglecting long to look for evidence of some tumour, with the pressure necessarily consequent on its continued growth, would indeed be culpable. For a hospital physician, who in his wards has opportunities for making immediate and complete examination of every case, which are not given to one in private, less excuse can be made for any delay in perfecting his diagnosis.

The following interesting example of abdominal aneurism, mistaken, for a few days only, for lumbago, may serve as a wholesome warning, and help to establish the sound dictum, 'that every severe and long-persistent pain deserves an auscultation;' and this whether it be felt in the chest, in the abdomen, in the back, or in the neighbourhood of any important joint.

William Turner, aged 48, was admitted to Radcliffe (ward) on the 17th of March. The case is given as reported (and admirably it was reported) by the clinical clerk:—

'W. Turner, aged 48. A moderately well-nourished man; dark complexion; expression natural; eyes clear; alæ nasi natural; countenance moderately flushed; skin warm and moist; pulse 84, fair volume, regular; tongue thickly furred, moist, somewhat anæmic; appetite tolerable; bowels generally costive; urine in tolerable quantity, good colour, specific gravity 1022, no albumen, slight excess of phosphates. Sleep much disturbed by pain; no headache nor vertigo. Chest and abdomen apparently healthy. Heart-sounds natural.

Complains of pain, of an ill-defined character, about the back and abdomen, particularly the left hypochondrium.

History.—Is a boot-closer by trade, and has always been temperate. About the early part of December (three months ago) he was attacked by shooting pains across the loins and

down the back of the thighs and calves. In the early part of the year these became much aggravated; and with them he also got pains in his chest and shoulders. Now, the principal pain is in the back and left hypochondrium. Six years ago he had rheumatic fever, by which he was laid up for more than twelve weeks. His father is dead; cause of death unknown. His mother is alive and healthy.'

A few days later, attention having been called to the increasing severity of the patient's pains, a careful examination of the abdomen was made. Being full and somewhat tender to the touch, very firm and deep pressure could not be made. But the examination was quite sufficient to determine the existence of a firm pulsating tumour, situate in the left half of the epigastric region, at some little distance from the mesial line. So firm and so solid, indeed, did it feel, that in spite of the very audible bellows-murmur which it gave out through the stethoscope, some hesitation was at first felt in coming to a conclusion as to its real nature.

Was it a solid cancerous tumour pressing upon the aorta, receiving its impulse from the vessel, and producing the murmur by its pressure on it, or was it an aneurism? The 'well-nourished' condition of the patient, his moderately good appetite, his quiet pulse of 84, and the want of proportion observable between the severity of his sufferings and the little disturbance of his general health, all militated against the adoption of the notion of cancer; and the high probability of the tumour being aneurismal was insisted on. In two or three days during which the sufferings of the patient were extreme (occasionally mitigated? by feelings of faintness) a large, diffused, and very painful swelling made its appearance in the left iliac fossa. This, during the next two days, extended gradually into the hypogastric region; gave distinct evidence of fluctuation; but neither pulsation nor murmur could be detected in it. In another day or two an urgent call to the stool was followed by collapse, in which the patient quickly sank, with all the evidence of death by sudden hæmorrhage.

Post-mortem examination.—Body anæmic, poorly nourished; rigor mortis well marked. The pericardium contained a little clear fluid. The heart was healthy and its valves competent. In both pleuræ were numerous adhesions which broke down easily, except at the base of the left lung, which was firmly adherent to the diaphragm. The lungs were emphysematous.

On opening the abdomen the great omentum was found adherent at many points to the anterior wall; and, occupying the left iliac and hypogastric regions, dipping into and partly fill-

ing the cavity of the pelvis, was seen a large blood clot. A considerable quantity of blood-stained fluid was also present. On removing the intestines there was brought into view a tumour lying on the lumbar vertebræ, rather towards their left side, and extending also into the left iliac region. The lower portion of the mass was divided from the upper by a deep groove at the level of the bifurcation of the aorta. Over the upper margin of the tumour, which was much firmer and denser than the lower, and closely adherent to these organs, passed the pancreas, duodenum, and some of the upper fibres of the psoas muscle. In the lower portion of the tumour there was distinct fluctuation. The tumour was an aneurism communicating with the aorta, on its posterior aspect, by an orifice the size of a shilling, immediately above the origin of the renal arteries. The upper portion of the sac had produced considerable absorption of the bodies of the lumbar vertebræ, and also occupied part of the body of the psoas, so that it must have exercised some pressure on the lumbar plexus. The lower and softer portion of the tumour was a secondary sac communicating with the upper by a constricted orifice, so that the whole was of an hour-glass shape. The fatal hæmorrhage had taken place from the upper and inner aspect of the sac in the iliac region. The return of blood from the left kidney had been somewhat interfered with, and it was consequently congested. The other abdominal viscera were healthy, but anæmic.

Another case, similar in many respects to the one above narrated, occurred a few weeks later in one of the surgical wards, under the care of Mr. Coote; whose house-surgeon, Mr. Pearless, gives the following clear account of it, copied from his note-book:—

'Thomas Cook, æt. 44; admitted June 10th, complaining of severe pain, resembling neuralgia, extending along the course of the left sciatic nerve, which had existed for some months. He had been under medical treatment, and was supposed to have pelvic abscess, or some tumour pressing upon the sciatic nerve. There was some tenderness in the left iliac region, and on making firm pressure there seemed to be an indistinct swelling there. Various forms of treatment were tried, but the pain remained much the same. The man, however, seemed to get thinner, and to look more ill.

On July 6th he first drew my attention to a large indistinct swelling on the left side and back, over from about the ninth to the twelfth ribs, neither pulsating nor fluctuating. The next morning this had somewhat increased, but he was in

much the same condition, and sat up the greater part of the day.

July 8th.—He had been about the same all day and got into bed about 7 P.M. He then suddenly cried out with pain in his back, and fell back fainting, in which condition he continued for some time, but was gradually roused by the administration of stimulants sufficiently to speak. He complained of a suffocating feeling in his chest and great pain in the abdomen. He remained in much the same state all night. The following morning, July 9th, he complained much of pain in the abdomen, which was very tense and much swollen. No pulsation could be felt in the left femoral artery, and that limb was decidedly colder than the other. Several thought they could feel pulsation in the swelling at the side mentioned above (I could not). His aspect and pulse were clearly those of a man dying of internal hæmorrhage.

He died about 8 A.M. on the 10th July.

Post-mortem examination.—On making an incision into the abdomen, a large quantity of newly extravasated blood was found between the muscles and the peritoneum, but none in the abdominal cavity. The left kidney was thrust forward and lying quite superficially over a tumour occupying the position of and being the same shape as the psoas but very considerably larger. This contained old clots, and fibrine, the muscular tissue being quite absorbed. There was an aneurism of the aorta situated just where it passes through the diaphragm (about the size of a large orange), which had caused considerable absorption of the bodies of several vertebræ. This communicated with the dissecting or false aneurism above described, which in its turn had given way, causing first the external swelling noticed on July 6th, and then, secondly, the immediately fatal hæmorrhage between the muscles and peritoneum.

It would seem probable that the formation of the false aneurism dated from the commencement of pain in the thigh.

Cancer of Mediastinum and Cancerous Infiltration of Left Lung, with entire obliteration of Bronchi, mistaken for Empyema.

Thomas Clarkson, aged 34, a stoutly built but somewhat emaciated man, was admitted to John (ward) on the 26th of January. He was found the day after his admission breathing thirty times in the minute, lying upon his left side; and he stated, in answer to enquiries made, that change to the right side gave

him intense pain. His countenance was expressive of anxiety; his face was somewhat flushed though perspiring; his skin generally was hot and dry; pulse 108, somewhat jerking, but easily compressible. A loud straining cough with sighing occasionally interrupted the hurried frequency of his respiration. He complained of great shortness of breath with pain (this latter being felt over the whole chest, but rather on the right side than on the left), and made particular mention of cough, which distressed him especially towards morning. The cough was accompanied with a very scanty expectoration, and this consisted only of a little glairy mucus. His appetite was somewhat indifferent, but his thirst was great; his bowels were costive; and his urine scanty and loaded with lithates. Such was his general condition, and such were some of his special symptoms.

Having been sent into the Hospital with the diagnosis 'Pleuritic effusion into the left side following upon chronic bronchitis,' an examination of his chest was immediately undertaken; and the physical signs usually admitted as indicative of that condition were made out. Briefly stated they were as follow:—His chest being bared, and found to be nearly symmetrically rounded, with the intercostal spaces hardly perceptible, it was seen that the left side was quite immovable —even upon the fullest inspiration. To percussion it was dull throughout—the dulness extending somewhat beyond the mesial line—and no sounds save a very feeble, probably transmitted, slightly blowing expiration, together with occasional rhonchus, were heard on auscultation. On the right side there was coarse, probably compensatory, breathing; some sibilus, and great undue resonance to percussion. Auscultation and percussion posteriorly gave a corresponding difference for the two sides. Vocal vibration was entirely absent on the left, and the resonance of the voice was markedly greater on the right. It was not easy to determine the position of the heart, its sounds being feeble and its impulse imperceptible; but the existence of a faint murmur, synchronous with its systole, and loudest under the sternum, was clearly made out.

With physical signs so well marked as were these, supported by a history hastily gathered from the patient, no hesitation was felt in confirming the diagnosis previously arrived at; and the board was accordingly headed 'Pleuritic effusion into the left side.'

On the next day, the clinical clerk, having carefully cross-examined the patient, read out the following history: 'He is by occupation a carman, and much exposed to the weather;

has always been a strong and healthy man, but admits that for the last three or four winters he has been subject to cough. About ten weeks ago he began to get ill and rapidly weak, and was troubled with a bad cough and pain in the right side. Soon after this, about seven weeks ago, he took to his bed, and was under medical care for bronchitis and diseased liver. Subsequently he was treated for bronchitis with pleurisy of the left side, and ultimately was admitted to the Hospital as before said on the 26th of January.'

Moreover, it was announced that as the result of a careful measurement of the chest, the right side on a level with the ensiform cartilage was found to be half an inch larger than the left; and this fact, together with the patient's assertion of all the early pain having been felt on the right side, were very properly urged against the correctness of the diagnosis; although no alternative and better explanation of the physical signs could be suggested.

With regard to the more perfect history which had been obtained, and which referred all the pain felt during the early stages of the disease to the right side, it did not seem upon review to be incompatible with the diagnosis. For granting even that after so long an interval the patient was able to recall accurately, and in proper sequence, the various sensations he had experienced (a bold admission in the case of Hospital patients generally), still, an effusion into the side opposite to that in which the pain had been most acutely felt might easily have taken place insidiously, and without much notice.

But how account for the greater measurement of the right side, and the absence of that bulging of the intercostal spaces on the left? both which undoubted facts would seem to negative the supposition of fluid effused into the left pleura. In the first place it was answered: the right side of the chest is as a rule larger by half an inch than the left. Moreover, in the case under discussion, the right lung being (for some reason or other) alone pervious to air, had undoubtedly undergone a compensatory increase in size, and to this increase the elastic walls of the chest had yielded. Again, it was urged that congestion with enlargement of the liver consequent on obstruction to the pulmonary circulation would add something more to the measurement of the right side. And so it seemed fair to conclude that, after all, both sides were actually enlarged, the right having strictly maintained its original advantage. Moreover, a forty-eight hours' intercourse with the patient had taught those about him that he showed signs of hectic, and was liable to occasional profuse perspirations, making it not impro-

bable that, on the one hand, the fluid (if it were fluid) in the chest was puriform, and on the other, that with his profuse perspirations, and his increasing emaciation, some portion of the more fluid constituents of this pus had been absorbed, with some consequent lessening of the distension of the side.

These different points being taken into consideration, the objection to the diagnosis, on the score of the want of decided bulging of the intercostal spaces and the absolutely greater size of the right side, was weakened, although not entirely removed. Still, in the absence of all vocal vibration, and of nearly all vocal resonance, and of anything like bronchial breathing on the affected half of the chest, some or all of which, had they been present, might have led us to suspect consolidation of some kind, the diagnosis was adhered to; with the uncomfortable addition that the effusion was probably purulent, the whole conclusion being so little certainly true as not to warrant any operative interference.

At the end of some days, having got through them with various fortune, now better and now worse, his appetite alone, strange to say, improving, the patient called attention to a 'small sore lump' in the axilla of the affected side. On being asked how long he had felt it, he said a few days only; and inasmuch as he had been blistered, and had been using iodine to the side below the swelling, it was supposed to be an axillary gland inflamed by the irritation of these applications; and a poultice was accordingly ordered for it. A little later, however, it was found that this supposed gland was still enlarging, and a closer and more careful examination showed that it was of 'almost stony hardness and freely movable.'

Here was a hint not to be neglected; and the probability of the existence of a similar mass or masses within the chest immediately suggested itself; a suggestion which if correct would explain all the general symptoms, and supposing in addition a consequent pressure about the root of the lung, collapse, and a filling up of the vacant pleura with some fluid, would account for the physical signs as well.

What was the most likely seat of such mischief? Most likely of all, the mediastinum or the bronchial glands. Accordingly careful search was made with stethoscope and eye and hand for evidence of pressure, or of irregularity of surface, or of increase of vocal resonance or some vibration which might be limited to some one spot. But none of this evidence was forthcoming, neither in the sternal region in front, nor in the interscapular region behind; and so it was concluded that although the existence of some cancerous masses in the situation supposed was

almost a matter of certainty, still that fluid was there also and in sufficient quantity to obscure their special physical signs.

The propriety of tapping the chest, which had been freely discussed immediately before this discovery was made, appeared now to be more than ever doubtful. It seemed only too likely that such a proceeding, however much it might temporarily relieve the patient, would ultimately only too surely hasten his downward progress. In this dilemma it was determined to wait yet awhile, and see whether on the one hand any more certain evidence might offer itself, such evidence as would warrant the rejection of the operation as hopeless and hurtful, or whether on the other hand such intimations of failing power might be given by the patient as would justify us in adopting it as a last resource.

A few days were sufficient to decide the question. His growing feebleness and the failure of his general powers were well described in the following note. 'Has now to a certain extent lost his appetite, and says that he feels very much weaker and low. He has slept however for five or six hours every night; but is much harassed with his cough towards the morning. The hands are cold; arms mottled with a livid hue; pulse 102, small, feeble, and at times irregular.'

On this day for the first time the 'very feeble, probably transmitted, slightly blowing, expiratory sounds' which had been heard in the mammary region upon the first examination of the patient had become more noticeable, there was found now also to be some increase of vocal resonance in the same region, and in a foot-note it is remarked: — 'N.B. A few days ago on applying the stethoscope to the spine, towards the left side, the tracheal sounds were very plainly transmitted.' This latter sign, however, had proved fugitive; and was now no longer observable. Seemingly little to be relied upon as were these feeble and transitory physical indications when taken alone, they were still amply sufficient when taken together with all the other signs, physical and general, to establish with almost absolute certainty the existence of some probably cancerous growth at or about the mediastinum and root of the left lung. Further, they were sufficient, together with the first observed physical signs, that is to say, together with the absence of all sound, vibration, and resonance, to establish this alternative; either there must be here present fluid in large quantity together with tumour of some kind, or there must be the same tumour blocking up the left bronchus, and, simultaneously, solid infiltration of the whole lung—no other condition than this latter being equal, in the absence of fluid, to explain the

entire absence of sound, vibration, and resonance to percussion.

A consultation being held, and the nature of his condition having been explained to the patient, it was determined to make an exploratory puncture, and to act as the result might decide. This having been done, with a moderate-sized trochar, a small quantity of blood only was obtained, which under the microscope presented no unusual appearance. The operation was not followed by any evil consequences or immediate aggravation of symptoms, but the patient died two days afterwards, no sooner probably than he would have died had no exploratory opening been made.

Post-mortem examination.—The opposed surfaces of the left pleura were found to be universally adherent. The whole lung, except a small portion at the upper and anterior part of the upper lobe, was converted into a firm solid mass, which on section presented the usual characters of medullary carcinoma. The morbid growth had obliterated the air-tubes and blood-vessels of the lung, partly by pressure, but partly also by direct invasion of their walls. For in the larger bronchial tubes, and notably in the main bronchus itself, were yellowish-white masses sprouting through the mucous membrane, and completely filling the cavity. The mediastinal glands, and also those at the bifurcation of the trachea and about the root of the lung, were also greatly enlarged, and occupied by malignant deposit. In the section of the lung the rounded outline of these bronchial glands was easily recognised, embedded, as it were, in the more uniform infiltration of the organ. The enlarged gland in the axilla was found upon section to be also the seat of malignant disease.

Under the microscope the growth was found to consist, mainly, of the cells, varying in size and shape, which occur in so-called cancerous growths.

No secondary deposits were detected in any other part of the body. The heart was very large, its muscular fibre somewhat pale, and its valves healthy.

How came it, it may well be asked, that solid growths in the mediastinum, and a lung made solid by the infiltration of medullary cancer, was mistaken for a fluid empyema; or rather, how was it that any alternative diagnosis here found place? The answer to this question is to be found in the facts, revealed with certainty by the post-mortem examination, but the possibility of one of which was honestly anticipated during life; first, that the man's bronchus was wholly obstructed by the morbid

growth, and second, that the mass found in the mediastinum, and overlying the trachea, was of so yielding a nature as soft medullary cancer. The obstruction of the bronchus, and the entire solidification of the lung, by cutting off all communication with the trachea, did away with all vocal vibration, resonance, and bronchial breathing, thus assimilating the physical signs to those produced by the presence of fluid; and the yielding nature of the mediastinal mass prevented its exercising any such pressure on the wind-pipe as would produce the sound of exaggerated tracheal breathing, although quite sufficient to give rise to a murmur in the aorta. Moreover, it may be added that the heart, which was much enlarged, although its position was not determined during life, completed by its want of resonance the dulness at the lower part of the mediastinum which was necessary to support the notion of the presence of fluid.

Finally, no help to the diagnosis was derived from any peculiarity of expectoration. This was, throughout the progress of the case, extremely scanty, and consisted only of glairy mucus.

Enlargement of spleen, liver, thymus, and all the lymphatic glands, internal and external; accompanied with great increase in the white cell elements of the blood; purpura of the surface of the body, and hæmorrhage from the mucous membrane of the mouth and nose. Death from pneumonia.

W. J. Sweetapple, aged 6½, was admitted to John (ward) on the 8th of June.

His condition on admission was thus well described: 'He is an ill-nourished boy, of feeble frame, pale pasty complexion, and rather anxious expression. He is able to lie in all postures alike. Eyes and conjunctivæ natural, with a dusky appearance of the skin beneath them. Lips pale, dry, and cracked. Gums pale, rather spongy, and vascular at their attached margins. At times small quantities of blood ooze from the mouth and nostrils, staining the lips and corners of the mouth. Tongue moist at the edges, inclined to dry in the centre, coated on the dorsum with a thin brown fur. Appetite variable. Bowels regular. He is very thirsty and vomits occasionally.

'There is some tenderness on pressure of the abdomen; but no particular fulness, except in the splenic region, where it is considerable, together with hardness, irregularity of surface, and dulness to percussion. There is also dulness to percussion and deep-seated feeling of hardness in the right hypochondrium reaching as low as the umbilicus.

'His skin is warm and dry. Pulse 124, small, and rather jerking. Respiration thirty in the minute, and oppressed. Cough slight, without expectoration. Respiratory and heart-sounds natural, perhaps somewhat exaggerated. Scattered thickly over the abdomen, back, and legs, and more scantily over the chest, neck, and arms, are a number of distinct, well-defined spots about the size of a hemp-seed; varying in colour from a deep purplish red to a light pink; not elevated, and not disappearing on pressure. Upon the legs, thighs, nates, and arms, are some large irregular bruise-like patches, varying in tint from bluish black to yellow. The cervical glands are all of them without exception very much enlarged, hard, and somewhat tender. The inguinal and axillary glands are also enlarged and indurated, though to a less extent. The patient is very deaf; but sight, smell, and taste are unimpaired. He is said to be very restless at night, talking and wandering when asleep, and complains at times of pain in the epigastrium.

'He resides in Middle Street, Cloth Fair, which is, for London, a not very unhealthy locality. Two years and a half ago he suffered for two or three months with sores on the back; and appeared at that time to derive great benefit from the use of cod-liver oil and steel, recovering quickly. About nine or ten weeks ago he began to lose flesh. Seven weeks ago the cervical glands began to enlarge; since which time he has gradually become deaf. Three weeks ago, the purple spots came out; first on the back, and afterwards on the legs and abdomen.'

Here was the accurate painting of a picture of diseased 'blood-glands' which would have delighted Hewson; and the contemplation of which alone would probably have enabled him to demonstrate to conviction his conception of the true function of those organs. But Hewson, it would seem, was not so fortunate as to have the opportunity of strengthening his physiological position by the results of pathological observation. And so it was reserved for Professors Virchow and Bennett (for they may fairly divide the merit of the discovery) to complete the reasoning of Hewson from the phenomena presented in their Leukæmia and Leucocytosis. Professor Bennett in reference to this subject writes thus: 'Hewson was the first who distinctly stated that the blood-corpuscles were derived from the lymphatic glands; yet few have adopted his opinions. Even Cruickshank, who wrote on the lymphatic system immediately after him, and was one of his contemporaries, says of the lymphatic fluid in which these corpuscles swim, that "we do not know the use of this fluid." The correctness of Hewson's views

is not even admitted by his recent commentator, Mr. Gulliver, and has been denied by most physiologists in this country; and although Nasse, Wagner, Müller, and a few others have contended that the lymph-corpuscles in the blood are the same as those found in the lymphatic vessels, the mode of their origin, and their functional importance is not even alluded to.'

Professor Virchow, however, would seem to ignore altogether the conclusions of our countryman. Let him speak for himself:* 'It has only been by degrees, and indeed, as I am sorry to be obliged to confess, in consequence rather of physiological than pathological considerations, that people have come round to these ideas of mine, and only gradually have their minds proved accessible to the notion, that in the ordinary course of things the lymphatic glands and the spleen are really immediately concerned in the production of the formed elements of the blood; and that in particular the corpuscular constituents of this fluid are really descendants of the cellular bodies of the lymphatic glands and the spleen, which have been set free in their interior, and conveyed into the current of the blood.'

To return to the case before us. It seemed very certain that we had to do with disease which was not scrofulous in its nature, but consisted essentially, in its results at least, of simple hypertrophy of the whole glandular system, without any morbid deposit of a kind foreign to the proper elements of gland-tissue. A drop of blood taken from the patient's finger showed under the microscope a large increase in the number of its white cells, and helped to confirm the diagnosis; which was still farther strengthened by the discovery, made next day, of a very unusual amount of lithates contained in the urine—a condition always observed in cases of the kind supposed.

Upon the completion of the diagnosis unfortunately followed an only too well warranted unfavourable prognosis. Too well warranted, not only by the result, but because it seems certain that up to the present time (with perhaps one doubtful exception) of all the well-marked attacks of the disease hitherto recorded, not one has been recovered from. Under the beneficial influences of a better air and better diet than had fallen to the patient's lot before his admission to the Hospital, some slight improvement of his symptoms did indeed show itself temporarily. And it may have been that cod-liver oil and quinine and steel and the mineral acids (all of which however were but ill borne, even in small doses, by his irritable stomach) may have had some share in effecting the improvement manifested by the disappearance of the purpurous spots. His appetite, when

* Cellular Pathology, trans. by Chance, p. 172.

not interfered with by the recurring irritability of his stomach, remained fairly good. But soon the restless nights became more restless; and the glands continued to enlarge, and the blood to ooze from the mouth and nose, until symptoms of pneumonia (set up as it seemed likely by incautious exposure to cold) showed themselves, and were quickly followed by his death.

The post-mortem examination, which was made under strict supervision and circumstances of some difficulty, at the patient's own home, whither the body was removed immediately after death, was not so complete as it would have been if made at the Hospital, All that was recorded however may be strictly relied upon; and probably, under the most favourable circumstances but little more could have been made out.

Post-mortem examination nine hours after death. — The body was scarcely cold; but rigor mortis was present; it was poorly nourished, very little fat being found in the subcutaneous tissues; a few purpurous spots were seen scattered over the trunk and limbs; a few large ecchymoses on the legs and arms. The muscles of the thorax were pale. Numerous small ecchymoses covered the posterior surface of both lungs. The lower lobes of both lungs were consolidated, softened, and œdematous; the upper lobe of the left was emphysematous, and in parts affected with lobular pneumonia. The bronchial glands were enlarged, but not very much so; they were pink, watery, and brittle. The spleen measured six inches long by two and a quarter inches thick, but could not be weighed; it was firm and liver-like in consistence. The liver was large and pale. Ecchymoses were present on the peritoneum, especially on its bladder portion. The mesenteric glands were everywhere enlarged, but not to any great extent, as were also the lumbar glands. The thymus gland was very large and firm; some of the lymphatic glands in connection with it being enlarged also. Numerous ecchymoses covered the surface of both ventricles of the heart, and all its cavities contained loose watery clots. The blood generally was but imperfectly clotted, and showed a large increase of white cells under the microscope. No definite microscopic change, save simple hypertrophy of gland tissue, was discoverable in any of the viscera.

It may be remarked simply, in reference to the results above given, that they were similar in kind but less in degree than those usually found in such cases; and that the sudden cutting short of the patient's life by the attack of pneumonia had prevented their full development.

Cirrhosis of left lung; fatty and amyloid degeneration of kidneys; with similar amyloid change of spleen, liver, intestines, suprarenal capsules, and bronchial glands.

W. Singleton, aged 21, was admitted to Radcliffe (ward) with the diagnosis 'advanced phthisis.'

The notes of the case unfortunately not being now at hand, no account can be given, in accurate detail, of the patient's condition upon admission, nor of the progress of the case. But the general features were so prominent and well marked as to be readily reproduced from memory.

Reversing the usual order of things, and taking the physical signs afforded by an examination of the chest first, the patient's right side was found to be expanded generally, unduly resonant both before and behind. The breathing was coarse, and the expiration was especially coarse, and prolonged. Upon approaching the mesial line both before and behind, loud gurgling sounds were heard, probably transmitted from the other side. The left side was dull throughout, as compared with the right; but still gave to forcible percussion a tympanitic 'boxy' resonance of short vibration. Expansion movement of this side was scarcely perceptible, even upon forced inspiration, with which latter however were heard loud gurgling cavernous sounds over the whole of the side, both back and front.

Setting aside the fact of the right lung being free from signs of tubercle; and that the mischief, whatever it might be, in the left, had evidently affected the lung from top to bottom (points which taken singly or together militated somewhat against the idea of this mischief having tubercular origin), the general condition of the patient seemed almost too good to allow of the supposition of his being the subject of advanced phthisis. He was not sufficiently emaciated for pronounced and extensive tubercular softening, although some allowance had to be made for a general œdema which was setting in and giving him a puffed appearance. His appetite was very good, and the signs of hectic were imperfectly marked. Moreover, his expectoration, which was more copious even than usually accompanies the existence of large tubercular cavities, consisted of a remarkably fœtid greenish liquid pus; and, finally, it turned out that his urine was highly albuminous.

What was his history? Some two years ago, being previously healthy, he had been thoroughly wet through; and as a consequence of this drenching there followed a dropsy and a chest attack of which he could give no very clear account.

From that time he has never been well, and has been treated continuously for phthisis.

Here was evidence which seemed satisfactory of the malady having set in suddenly, and of its having been, not unlikely at any rate, a pneumonia, secondary to the kidney mischief, running on to suppuration, and riddling the lung with a number of small abscesses, these being shut off from the general lung tissue, but communicating freely with the bronchi and external air. Again, it was suggested that the auscultatory signs were quite readily explicable upon the supposition of simple but general dilatation of the bronchi, together with extensive adhesion; although the small volume of sound given out to percussion seemed hardly to be so accounted for. At any rate it seemed that either of these alternatives would better coincide with the patient's general symptoms than the suggestion of advanced phthisis, and either would furnish physical signs such as had been observed.

The progress of the case may be briefly told. He had been some time in the Hospital without losing very much ground, when a troublesome and painless diarrhœa gradually set in. A careful watching of the evacuations, and, as the case grew older, the continued absence of any abdominal pain, enabled us to assert with tolerable certainty that tubercular ulceration was not the cause of this diarrhœa. The opinion was now hazarded, that, whatever might be the real condition of the lungs, the existence of amyloid degeneration of the kidneys and intestines seemed highly probable. The exhaustion brought about by the diarrhœa and by the profuse expectoration (although this latter varied in quantity inversely as the former) began now to tell rapidly on the patient, who before his death however was doomed to undergo the further suffering produced by the successive plugging of the femoral veins. It was curious, towards the termination of this painful case, to watch the gradual lessening of the quantity of expectoration and the gradual absorption of the œdema; dried up as were both these, probably, by the diarrhœa; and how with the disappearance of the œdema became manifest the real emaciation.

Post-mortem examination thirty-six hours after death.—Body emaciated, rigor mortis absent. The pericardium contained about half an ounce of serum. The heart weighed six ounces, and its valves were competent. The left pleura was universally adherent, the heart and pericardium being displaced towards the left. In the right pleura were two or three ounces of serum, a few adhesions at the apex.

The vesicular structure of the left lung contained no air, in

any part, and was found on section to be infiltrated throughout by a dense, fibrous, greyish, speckled material; and riddled throughout by numerous small cavities, filled with yellowish viscid mucus. These cavities were nearly all of them dilated bronchial tubes; at the apex only were one or two which presented no trace of a mucous lining and resembled tubercular vomicæ. The right lung was somewhat emphysematous throughout; no tubercle was detected in it; but at its anterior margin were one or two firm resisting portions about the size of a hazel-nut, where the lung was increased in volume, and œdematous; but its tissue was not softened. The characters of these portions closely resembled what would have been produced if portions of the indurated tissue of the left lung had become œdematous. The lower lobe posteriorly was œdematous, congested, and its tissue a little softened. The bronchial glands were greatly enlarged; on section, of a greyish-white colour, and speckled with pigment. The trachea and bronchi were slightly congested. The spleen weighed six and a half ounces, was firm, and studded throughout with numerous small sago-like bodies. The liver weighed two pounds ten ounces; its texture and colour to the naked eye were all but natural. The supra-renal capsules were somewhat firmer than usual in their cortical substance. The kidneys weighed, left and right respectively, six and three quarter ounces and seven ounces; their capsules separated readily, leaving the surface smooth, except that here and there were one or two small depressions resembling cicatrices. On section the cortex was pale and tallowy-looking, the bases of their pyramids being frayed out. The mucous membrane of the stomach and intestines was everywhere entire, but of a greyish tint.

Under the microscope the epithelium of the renal tubes was found to be in a state of extreme granular and fatty degeneration. With iodine the so-called amyloid reaction was obtained in a marked degree in the bronchial glands (where the change appeared to have affected the small vessels), in the spleen, in a few of the hepatic cells, in the cortical substance of the supra-renal capsules, in the intestinal epithelium, and in the glomeruli of the renal Malpighian bodies. It was not obtained in the tissue of the left lung, which was found to consist of a material more or less distinctly fibrillated, with numerous small nuclei laid in it, and masking almost completely the proper structure of the organ. No appearances at all resembling those of tubercle were anywhere detected.

Article XVII.—*Case of Acute Necrosis of the Tibia—Death from Pyæmia.* By William S. Savory, F.R.S.

THE following case illustrates so well the relation in which the spots and patches of congestion or ecchymosis, that are sometimes found in the lungs and other organs after death, in cases of blood-poisoning, stand to the secondary abscesses of pyæmia,* that it is worth recording. I am indebted for the notes of it to Mr. Bloxam.

On Monday, the 3rd of July, an infant ten months old, evidently dying, was brought by his mother to the Hospital. The skin was cold. The countenance dusky and collapsed. The pulse could hardly be felt. Respiration rapid and difficult. The child vomited frequently, and the mother stated that he had been much purged during the morning.

The whole of the right lower extremity, but especially the leg, was much swollen and œdematous. Over the tibia, just below the knee-joint, was a patch of redness, and at this point some slight fluctuation could be detected.

The mother said that three days previously—on Friday—the child appeared to be quite well, but in the afternoon he became very sick, and then she first noticed that the right limb was somewhat swollen; but she did not consider the child very ill, as he had vomited before on several occasions. On Saturday the child refused the breast, and was feverish and altogether worse. The right limb was more swollen. On Sunday the child appeared to be much the same, except that the right limb was still more swollen, and slightly red. On Monday, the day of admission, the child altered very much for the worse, and now vomiting and purging became urgent, and he breathed with difficulty.

A small incision was made in the leg just below the knee-joint, where fluctuation was felt. A little serum, but apparently no pus, escaped. A poultice was applied to the wound, and the limb was wrapped in cotton-wool. Milk and brandy were ordered, and small doses of aromatic confection. But the child never rallied, and died five hours after admission.

Post-mortem examination sixteen hours after death.—The body was well nourished. Surface livid. Rigidity strongly marked.

The right lower limb was not nearly so swollen and œdematous as during life.

There was no fluid or adhesions in the pleural cavities.

Over the surface of both lungs, more especially about their

* See the Seventh Article.

bases, were scattered numerous spots and patches of congestion or ecchymosis, of a livid colour, and slightly elevated. On section, they extended into the lung tissue for some distance; but there were no traces of abscess in them, or any signs of suppuration throughout the lungs.

The pericardium did not contain more fluid than usual, but there were one or two small ecchymoses on its surface, close to the vessels, and three or four others upon the surface of the heart, the largest the size of a small pea.

Small clots were found in all the cavities.

All the cardiac valves were healthy. On the septum of the ventricles, between the endocardium and muscle, several small ecchymoses were seen.

The kidneys were generally congested, but there were no spots or patches about them.

The liver and all the other organs were apparently healthy.

On examining the right leg, the whole shaft of the tibia was found in a state of necrosis. The periosteum was, for the most part, separated, and so softened that very little of it could be removed with the bone; but what adhered appeared very vascular, with here and there a few patches of ecchymosis. There was no pus between the periosteum and bone, but a brown fluid with flakes of lymph. The veins of the limb, which contained fluid blood, appeared perfectly healthy. Nothing wrong could be discovered in any of them.

The tibia, heart, and lungs, are in the Museum of the Hospital.

It cannot be doubted that the spots and patches of congestion and stagnation which were found in the lungs and heart, were an early stage of the secondary abscesses of pyæmia, the formation of which was cut short by the death of the child, in little more than seventy hours from the onset of the mischief.

These spots and patches corresponded in every respect to those which were produced in animals by the experiments described in my paper.

Article XVIII.—*Note on Hippuric Acid.* By William Odling, M.B. Lond. F.R.S.

THERE are few bodies about whose intimate constitution greater differences of opinion have prevailed, than with regard to hippuric acid—a compound of very considerable interest in a purely chemical, as well as in a physiological point

of view. Leaving out of consideration certain interpretations which have never met with any general acceptance, we find hippuric acid represented by Pelouze and Fehling as a compound of benzamide with some form of acetic or glycolic acid. But according to Socoloff and Strecker, it is a compound of benzoglycolic acid and ammonia; while, according to Dessaignes, it is a compound of benzoic acid with glycocine. The object of this note is to show how these discrepant notions have arisen, and to reconcile them with one another.

It is well known that the complex chemical molecules produced in animal and vegetable organisms, or resulting from artificial processes, are formed, for the most part, by a combination with one another of two or more comparatively simple molecules. This combination, however, is usually attended by an elimination of water, so that the complex molecule does not contain its constituent molecules in their entirety, but only greater or less proportions of them. Accordingly, when such a complex molecule undergoes decomposition into its constituent molecules, it can only do so upon the condition of its taking up a quantity of water equal to that eliminated at the moment of its formation. Ordinary butyric ether, or artificial pine-apple essence, will serve to illustrate my meaning. This compound is formed by the union of a molecule of alcohol and a molecule of butyric acid, with elimination of water, thus:—

Alcohol	C_2H_6O
Butyric acid	$C_4H_8O_2$
	$C_6H_{14}O_3$
— water	H_2O
Butyric ether	$C_6H_{12}O_2$

Conversely, under suitable conditions, the residues of alcohol and butyric acid existing in butyric ether, take up the water necessary for the completion of their respective molecules, which, upon this condition only, can be reobtained in their separate and perfect state.

Now, according to each of the three prevailing views with regard to its constitution, hippuric acid is represented to contain some particular body of the same class as butyric ether, namely, benzamide, or benzoglycolic acid, or glycocine. Thus benzamide is a compound of benzoic acid and ammonia, with elimination of water, and, under suitable conditions, is reconvertible into benzoic acid and ammonia by an absorption of water, as shown on the next page:—

α. Benzoic acid	$C_7H_6O_2$
γ. Ammonia	H_3N
	$C_7H_9NO_2$
— water	H_2O
Benzamide	C_7H_7NO

Similarly benzoglycolic acid is a compound of the benzoic and glycolic acids, formed by an elimination, and decomposed by an absorption of water, thus:—

α. Benzoic acid	$C_7H_6O_2$
β. Glycolic acid	$C_2H_4O_3$
	$C_9H_{10}O_5$
— water	H_2O
Benzoglycolic acid	$C_9H_8O_4$

Lastly, glycocine, or sugar of gelatine, is an analogous compound of glycolic acid and ammonia, thus:—

β. Glycolic acid	$C_2H_4O_3$
γ. Ammonia	H_3N
	$C_2H_7NO_3$
— water	H_2O
Glycocine	$C_2H_5NO_2$

Seeing that benzamide, benzoglycolic acid, and glycocine are all procurable from hippuric acid, the notion naturally arises that this acid is itself a complex body of the same class as butyric ether, except that instead of being formed by the union of two, it is formed by the union of three constituent molecules, with elimination of water, thus:—

α. Benzoic acid	$C_7H_6O_2$
β. Glycolic acid	$C_2H_4O_3$
γ. Ammonia	H_3N
	$C_9H_{13}NO_5$
— 2 water	H_4O_2
Hippuric acid	$C_9H_9NO_3$

So that by subtracting two atoms of water from the sum of the atoms of carbon, hydrogen, nitrogen, and oxygen, in the three molecules of benzoic acid, glycolic acid, and ammonia, there is left a residue having the formula of hippuric acid.

The different views already adverted to would seem, then, to have arisen in this way:—Each successive chemist who has examined hippuric acid has acted upon it with a different reagent, and accordingly, as the reagent employed has attacked one or other of the constituent molecules, so has a different product

been obtained, and hence a different hypothetical formula been accorded. Of its three constituent molecules, the glycolic is by far the most easily oxidisable, and accordingly, when hippuric acid is acted upon by oxidising agents—peroxide of lead, for instance—the glycolic residue is destroyed, while the benzoic and ammonia residues remain combined with one another in the form of benzamide. Hence hippuric acid was represented by Fehling as a compound of glycolic or some allied acid with benzamide; which is itself resolvable into benzoic acid and ammonia.

Ammonia, as is well known, undergoes a very remarkable decomposition when acted upon by nitrous acid, its hydrogen being transformed into water, and its nitrogen liberated in the gaseous state, thus:—

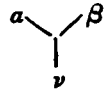
Ammonia.		Nitrous acid.		Water.		Nitrogen.
H_3N	+	HNO_2	=	$2H_2O$	+	N_2

Accordingly, when hippuric acid is treated with nitrous acid, its ammoniacal residue is similarly destroyed by the nitrous acid, while the other two residues are left combined with one another in the form of benzoglycolic acid. Hence hippuric acid was represented by Strecker as a combination of ammonia with benzoglycolic acid; which is itself susceptible of decomposition into its constituent benzoic and glycolic acids.

There are no known reagents capable of destroying the benzoic residue, and so leaving the glycolic and ammoniacal residues in combination with one another; but on boiling hippuric acid with acids or alkalies, the benzoic may be separated from the other two residues which are thus obtained in the form of glycocine. Hence hippuric acid was represented by Dessaignes, and is now generally admitted to be, a compound of benzoic acid with glycocine; which is itself resolvable into glycolic acid and ammonia.

So far, then, our actual knowledge of the constitution of hippuric acid amounts to this, that it contains the residues of three distinct molecules, which, by an absorption of water, are capable of being obtained separate from one another. When any one of these residues is destroyed or removed, the other two residues are left in combination, and accordingly, by treating hippuric acid with different reagents, we may obtain the benzoic and ammonia residues in the form of benzamide, or the benzoic and glycolic residues in the form of benzoglycolic acid, or the glycolic and ammoniacal residues in the form of sugar of gelatine.

Admitting, then, that hippuric acid is formed of the residues of three molecules, it remains to be ascertained in what manner they are combined with one another; whether each of the three

stands in one and the same relation to both of the other two, as in a star of three rays,  or whether any two of them are merely associated with each other through the intervention of the third, as in a chain of three links, $\underline{\alpha}\ \underline{\beta}\ \underline{\nu}$

Now, although hippuric acid is alike decomposible into benzamide and glycolic acid, or into benzoglycolic acid and ammonia, or into glycocine and benzoic acid, it has hitherto been recomposed only by the combination of the last two products, namely, benzoic acid and glycocine, of course with elimination of water; whence it might be inferred, that the ammoniacal constituent of hippuric acid is actually in more intimate association with the glycolic than with the benzoic residue, and that the composition of the acid should be expressed by a chain of this sort:—

Benzoic acid + (glycolic acid + ammonia).

But before any stress can be laid on this synthesis, it is obviously necessary to learn whether hippuric acid may not also be made either by combining ammonia with benzoglycolic acid, thus:—

Ammonia + (benzoic acid + glycolic acid);

or by combining glycolic acid with benzamide, thus:—

Glycolic acid + (benzoic acid + ammonia).

These last two combinations are doubtless practicable, but until they have been actually performed, and until it has been ascertained whether the resulting bodies are identical or only isomeric with ordinary hippuric acid, the intimate constitution of this acid must still be considered unproven.

I have myself made one or two endeavours to settle the point, but not with very much success, although with sufficient encouragement to induce me to follow up the subject. Benzoglycolic acid is so easily decomposed into its constituent acids, that all my attempts to unite its molecule with a residue of ammonia have hitherto failed. I have, however, succeeded in uniting the residues of benzamide and glycolic acid with one another, but, through operating on insufficient quantities, have not been able to satisfy myself whether the compound I have obtained is or is not identical with normal hippuric acid, though I incline to the latter opinion.

Some time back Professor G. C. Foster prepared an isomer of hippuric acid, by combining acetic with oxibenzamic acid, but in this case the residues of the isomer being different from those of the normal body, the influence of mere difference in arrangement could not be determined.

ARTICLE XIX.— *Fractures injuring Joints — Fractures interfering with the movements at the Wrist, and with those of Pronation and Supination.* By GEORGE W. CALLENDER.

FRACTURES which involve adjacent joints are often followed by unsatisfactory results. Such results are frequently referred, in some measure at least, to the treatment which has been adopted, but it will not be difficult to show that a great number of these hurts must have a comparatively unfavourable issue, however good the management which is bestowed upon them. Still there remain many cases in which the recovery is not so good as it might have been, if only the original injury had been accurately determined, and the right plan of treating it properly carried out.

From either of these considerations no fractures perhaps require more careful examination than those of the carpal extremity of the radius, for neither is their precise nature clearly defined, nor yet are their unsatisfactory after-consequences sufficiently, as a rule, impressed upon the patients. These hurts are important too, amongst severe fractures, if only from the frequency of their occurrence, as many as seventy-eight being found, for instance, amongst the one hundred and fifty-five fractures of the forearm, of all kinds, which were under treatment in our casualty department during the year 1864.

A female, æt. 51, came to my out-patient room with a fracture of the carpal extremity of her right radius, of four weeks' duration. The forearm had been kept continuously at rest, in the prone position, on a straight splint. For the last week she had been directed to use the wrist twice daily. She complained of pain about the seat of fracture, and of a considerable deformity. The bone had been broken across about three-quarters of an inch from the carpus, and the distal fragment formed a well-marked projection on the palmar aspect; on the dorsal the proximal end was of course prominent. The wrist was fixed, and half the rotation of the radius was lost, that is to say, there was no movement beyond that which placed the thumb uppermost from extreme pronation. By long-continued passive movements her condition was somewhat improved, so that flexion and extension at the wrist were slowly acquired. Whilst, however, flexion was exaggerated, extension was, in the end, less complete than natural. The bone deformity persisted.

In this case no treatment could, I believe, have obviated the deformity or the damaged extension, although supination

might, perhaps, have been bettered. Such bad results are sufficiently accounted for by examination, post-mortem, of similar fractures.

In the Museums connected with the London Schools of Medicine, are thirty-six specimens of various fractures of the lower end of the radius, all, those that is to say which are united at all, more or less badly joined together. They show clearly enough that the cause of each deformity is the impaction of the proximal into the distal portion of the broken bone.

In its ordinary adult state, the carpal end of the radius consists, almost entirely, of cancellous tissue, nor are the bone-plates arranged on any such plan as would add to their strength for resisting a violent blow falling upon them in the direction of the long axis of the shaft. Around and enclosing this cancellous tissue is a thin layer of compact bone, so thin, indeed, that its thickness is nowhere sufficient to admit of ordinary measurement. At about eight-tenths of an inch, however, from the carpal surface, the compact outer-wall rapidly thickens, and acquires in less than five-tenths of an inch nearly two-tenths of an inch in thickness. Thus a wedge-like end of compact outer-wall lies above, on the proximal side of, the loose cancellous structure. When the shaft of the radius has to resist, as with falls upon the hand, a violent shock transmitted in the line of its long axis, the weak cancellous tissue is broken across, and the wedge-like end of the compact wall is driven into the distal portion of the bone, not always in the same direction, and is there firmly impacted. The line of fracture is almost invariably transverse, though its direction may be made irregular by various complications.

This explanation of the manner in which these fractures occur, has, however, been questioned, and by no one with greater care, or apparent accuracy of observation, than by R. W. Smith, in a well-known treatise on the subject. That it is correct is abundantly shown by specimens of the recent fracture.

In the Museum of the London Hospital is a recent fracture of the carpal end of a radius. The bone is broken across nine-tenths of an inch from the wrist-joint, the latter being unhurt. The proximal portion of the shaft is driven into the distal for some distance on the inner and dorsal side, thus displacing, and fixing, the distal fragment backwards, at an angle of 153° with the upper part of the shaft.* In the Middlesex Museum is a recent fracture of a radius eight-tenths of an inch from the wrist-joint. The posterior compact wall of the

* The posterior surface of the carpal end of the radius inclines from the shaft at an angle of about 171°.

shaft of the bone is driven into the carpal extremity, and is there fixed at an angle of 162°. The impaction is greatest on the inner and dorsal aspect, and the carpal end is displaced backwards and inwards. The ulna is also broken seven-tenths of an inch above its styloid process, and its lower end is bent towards the radius. In the same Museum,* is a radius with a comminuted fracture of its lower extremity. The fragments are forced upwards and backwards, but there is not much shortening. Impaction of the upper into the lower fragment, is well-marked, chiefly on the back and towards the ulnar side, and there is a split extending into the wrist-joint. The carpal end forms an angle of 156° with the remainder of the shaft.†

It is not, however, in recent fractures only that this impaction can be seen. It is equally distinct after firm union of the parts. Thus in the Museum of St. Bartholomew's Hospital ‡ is a section of the radius of a young man. The bone has been fractured three-quarters of an inch above its carpal articular surface. The posterior or dorsal margin of the upper fragment is driven into the cancellous tissue of the lower one: their palmar margins are in contact, but a projecting angle is here formed, in the front of the wrist, at the line of fracture. The fracture is united. The compact tissue of the proximal part of the shaft can be distinctly traced into the carpal end. Its outline is well defined, and above it is a considerable thickness of cancellous tissue.

Further, as the general characters are the same—the relations of the two portions of the shaft resembling those noticed in the specimens already referred to—there can be no question but that impaction is the cause of the displacement, which an osseous union has rendered permanent, in other radii I have examined.§ But to remove all doubt on this subject, I give an account of three fractures of the radius, dissected shortly after the occurrence of the injury.

On May 27, 1853, a male, æt. 43, fell off a scaffold, a height of thirty feet, and fractured his spine. Local pain and inability to move the left wrist were the only symptoms of the hurt done to the radius; there was no displacement. He died, sinking

* Of these three specimens two have no numbers attached to them, the last is marked i. 23 a.

† Similar fractures of the radius have been described, not altogether correctly, by Voillemier. His essay is the best which has been written on the subject. See Archives Générales de Médecine, 1842, p. 261.

‡ Series iii. 78.

§ The following specimens may be referred to:—College of Surgeons Museum, 2954; Middlesex Hospital Museum, i. 22 c.; London Hospital Museum, a second preparation, no number; University College Museum, C. 3180, 4265.; St. Bartholomew's Hospital Museum, Series iii. 94, C. 31, 35.

rapidly, seven hours after his admission to the Hospital. The carpal extremity of the radius was the seat of a comminuted fracture, nine-tenths of an inch above the articular surface, extending into the wrist-joint.* The compact tissue of the proximal portion of the shaft had penetrated the cancellous tissue of the lower end, and a deep groove marked the degree of impaction, but the dorsal surface of the carpal portion of the bone, breaking into many pieces, had allowed the upper fragment to free itself from the lower. Thus only a slight amount of displacement resulted from the injury, and the absence of deformity during life was accounted for. In the immediate vicinity of the fracture, the periosteum was torn from the bone, and the pronator quadratus muscle was lacerated and bruised.

On April 3, 1857, a male, æt. 18, got entangled in the band connecting a series of wheels, and was drawn into the machinery. In addition to other very severe injuries, from which he died, his left forearm having been compressed in the direction of its long axis, he sustained a fracture of the carpal extremity of the radius.

The bone was broken across seven-tenths of an inch from its lower extremity. The proximal end was wedged into the cancellous tissue of the carpal portion, but on the dorsal and outer aspect only, to a distance of four-tenths of an inch. The wrist-joint was uninjured. All the muscles and tendons around the seat of the bone-hurt were bruised and torn, especially the pronator quadratus, which was wrenched away, with the periosteum, from the bone, the latter, immediately below and for about two inches above the line of fracture, being completely denuded.

On May 7, 1864, a male, æt. 14, fell from a window. His skull was fractured, his left thigh was broken, and he died a few hours after being taken into the Hospital. I examined the right radius in consequence of the deformity caused by the projection of the lower end of the bone, by which our attention was attracted.

The bone was broken transversely at a point one inch from its articular surface. The shaft was impacted and driven into the cancellous tissue of the carpal extremity, so that the latter was displaced backwards, and fixed at an angle of 161° with the shaft. In connection probably with this impaction, the lower end of the bone was split in two places, the fissures extending, through the epiphysis, into the wrist joint.† Owing to the impaction no crepitus could be felt, even after removal of the bone from the surrounding structures.

* St. Bartholomew's Hospital Museum, Series iii. 125.
† St. Bartholomew's Hospital Museum, C. 136.

Hitherto, with the exception of the first, I have referred to cases in which the carpal end of the radius is displaced, after fracture, backwards and to one side, the outer or the inner, as the case may happen to be. That this should be the character of the distortion is just what we might expect, if we remember that in falling upon the palm of the hand, the arm being stretched forward, the weight of the body continues to act through the forearm after the hand has been brought to a standstill by the resistance, for example, of the ground. The radius is first broken, then, by the momentary continuance of the force in the direction of the falling body, forwards and outwards, the shaft is driven into the carpal end, burying itself chiefly from the dorsal surface towards the palm, and towards the outer or the inner side. In a great number of cases this impaction so fixes the fragments that they cannot be unlocked, and the deformity is permanent.

Granting that the ends of the bone may be wedged together so firmly as to resist all attempts at reduction, we ought to be in a position to foresee the inconveniences which, in addition to the deformity, must necessarily ensue. Fortunately, though vexatious enough, they are not absolutely serious, provided the complications, which will presently be noticed, are escaped. To understand them, however, the relations of the carpal portion of the fractured bone must be accurately recognised.

The distal end of a radius, thus broken and permanently impacted, projects at the back of the forearm, from the wrist, in front of the line of the styloid processes, to a point usually (it varies by measurement from seven-tenths of an inch to one inch and one-tenth) eight-tenths of an inch above, that is, on its proximal side. The backward angle which this end of the bone forms with the long axis of the shaft varies from one of 143° to one of 166°, in the average of cases it measures 156°.* There is no rotation of the carpal end upon the proximal, for the shaft, in every specimen examined,† retains, throughout,

* The smallest backward displacement occurs in a specimen in the Museum of University College, C. 4265. The lower end of the radius is projected outwards. There is no history to the fracture, which was obtained from the dissecting-room.

† Middlesex Hospital Museum, Specimen i. 22 c. is an apparent exception. The left radius is broken at its carpal end and is twisted backwards and outwards on its long axis, so that the ulna is dislocated forward. I believe this to be merely an instance of the great irregularity with which the outer or inner displacement combines with the dorsal, according to the direction in which the original violence is applied.

Specimen, Series i. 93, in St. George's Hospital Museum, is described as illustrating slight rotation of the lower end of a broken radius from the action of the supinator longus muscle. On referring to Mr. Holmes's notes of the post-mortem, I find as follows: 'The lower fragment had been displaced very slightly, being

its natural relations, so far as its long axis is thus much concerned.*

The carpal extremity may, however, be driven by the original violence to one side or the other, as may be seen in many of the specimens; a displacement referred to in explaining the manner in which the impaction is established. This is simply a lateral displacement; in no way can it be spoken of as a rotation of the end of the bone, and it is chiefly to be noticed on account of the effect it has upon the relations of the ulna to the broken radius.

In the greater number of cases the two bones have their mutual relations but little altered. I have met with only the following displacements. In one case the lower end of a radius being driven towards the radial side of the upper portion, with half an inch of shortening, the ulna retaining its natural length, the carpus and hand are in consequence inclined to the radial side, and the ulna appears unnaturally prominent.† After fracture of the carpal extremity of a radius, the ulna has been dislocated forward, towards the pisiform bone.‡ In consequence of the displacement of the lower end of the bone, towards the radial and dorsal aspect of the upper portion, a radius has been shortened, and a new articular surface has been formed on the lower end of the ulna, by the growth of a half ring of bone upwards from the margin of the surface by which it before articulated with the radius.§ In another case the ulna is broken across seven-tenths of an inch from its carpal extremity, and the lower fragment inclines outwards, towards the displaced radius.‖ Instead also of being displaced forwards, the ulna, in another specimen, is driven backwards, lying on the inner dorsal surface of the radius, the carpal end of the latter bone being displaced backwards, at an angle of 152°, and very considerably to the outer side.¶

In the great majority of cases, then, the relations of the ulna to the radius are but little altered, the ulna adapting itself to the distortion of the extremity of the other bone.** If then we admit the occurrence of penetration and consequent impaction,

rotated a little backwards, apparently by the supinator longus muscle. The displacement, however, was very trifling.'—*Case Book*, 1860, p. 89.

* The smooth anterior surface of the carpal end of the radius being taken as a plane, a line drawn to it through the centre of the tubercle for the biceps should form with it, in the natural relation of the parts, an angle of 84° on the inner, ulnar, side. By measuring this angle, deviations by rotation from the line of the long axis can be accurately determined. The term rotation is strictly limited to define the relations of the long axis just referred to.

† College of Surgeons Museum, 2954.

‡ St. Thomas's Hospital Museum, B. 16. Middlesex 1. 22 c:

§ St. Bartholomew's Museum, C. 31.

‖ Middlesex Museum, specimen not numbered; also St. Bartholomew's, C. 136.

¶ University College Museum, C. 3180.

** For bending in of the ulna, see St. George's Hospital Museum, Series i. 104.

we have of course to account for the maintenance of the natural relations between the carpal ends of the two bones. The injury to the radius is, in fact, attended with so slight an amount of shortening that the ulna, carried back with it, is otherwise scarcely, if at all, disturbed in its relations. That this is possible will be evident from consideration of the consequences of the fracture, so far as the length of the radius is concerned.

The deepest impaction does not exceed five-tenths of an inch,* usually it is much less; and this impaction is limited, be it remembered, to the dorsal aspect of the bone. The average of the displacements I have measured places the carpal end of the bone at an angle backwards from the proximal of 156°. But granting that the two be coincident, the greatest degree of impaction with the greatest displacement, which indeed is not the case, it follows, with a radius measuring five-tenths of an inch in its antero-posterior thickness at the carpal end, that there will be shortening of the shaft on its palmar aspect to the extent of two-tenths of an inch, and upon its dorsal, to the amount of five-tenths of an inch; and if we take the middle of the arc of a circle described between the two as representing pretty accurately the position of the articulation for the ulna, we have, even in an extreme case, less than four-tenths of an inch of shortening,† to which, by stretching and yielding of ligaments, shifting of the long axis of its shaft and pushing out a little of the carpus, that bone has to accommodate itself. There is no difficulty, then, in understanding how the ulna comes to retain pretty much its usual relations to the radius, despite the fracture of the last-named bone.

Lest it should be objected that it is difficult to explain how even the slight shortening of the radius can occur without separation of the bone from the adjacent fibrous and other structures, the cases already noticed may be referred to, in which, as in others examined shortly after the occurrence of the injury, the radius was seen to have been shot out of its periosteal coverings, as though they had been cleanly dissected off the bone, and thus, loosened from all its surroundings, was free to suffer impaction to a considerable extent. Indeed, until these fractures are examined in their recent state, no adequate idea can be formed of the great bruising and rending of the coverings of the bone notably of the pronator quadratus muscle, which is commonly, with the periosteum, torn away from the palmar surface of the radius.

* In a specimen in St. Bartholomew's Museum, C. 35.

† Most often the shortening is much less, not exceeding, on an average, two-tenths of an inch.

In the examination, then, of these fractures of the radius, the impaction, the degree of displacement and its direction, and the influence of these changes upon certain joint movements, are the material points for our consideration.

We may, I believe, safely conclude that it is very often impossible to reduce the impaction of the proximal portion of the shaft, and that a certain amount of deformity is necessarily permanent.

Whether the impaction be or be not reduced, it is of some consequence, even when the ulna is not broken, to determine the position in which the forearm should be kept at rest during the progress of repair; for although there is no alteration in these cases in the long axis of the shaft, so far as rotation is concerned, and although the interosseous space is not encroached upon, but the broken bone keeps well together and so unites, even when not impacted, yet it is necessary to fix the radius, more especially if the ulna is broken, much nearer to supination than to pronation. The reason for so doing will be evident when we come to consider the relations of the pronator quadratus to the broken radius.

It is, I suppose, scarcely necessary to add, that the bandage which secures the forearm to the splints should not be applied too tightly, for a good deal of swelling of the damaged structures usually ensues and has to be allowed for. Some ten years ago, from neglect of this precaution, a child suffered from sloughing of the entire thickness of the forearm, in great part of its extent, so that a fissure was formed between the radius and the ulna through which the fingers could be passed. It should be added that the parents of this child neglected to bring him to the Hospital for many days after the first application of the bandage.

If the radius is much displaced, either to the outer or to the inner side, an attempt should always be made to lessen the deformity, by adducting the hand towards the ulna or the radius, as the case may happen to require. These lateral displacements are, however, generally permanent, for they occur, as a rule, with deep impaction and fast locking together of the portions of the broken bone.

Pronation and supination are seldom interfered with by the changes as yet referred to, never by any alteration in the relations of the long axis of the shaft. In rare cases they are damaged, in consequence of the displacement of the ulna, either backwards or, more often, forwards; the end of the bone getting entangled, so to speak, with the adjacent carpal bones or otherwise obstructing the free play of the radius, and checking the extreme of either of the movements referred to. More often

rotation is hindered by other causes, not peculiar to these fractures of the radius, and which will presently be alluded to.

By reason of the angle which the carpal end forms with the proximal portion of the shaft, the direction of the articular surface is altered, and when permanently so, extension at the wrist is increased, whilst flexion is in proportion diminished. Giving to these movements at the wrist an arc of a circle of 145°, there will be, with a displacement such as that described at page 287,* a loss of about 40° in the range on the side of flexion. It is almost superfluous to add, that a patient should be warned of the possibility, or rather the probability, of such a result.

There are many other fractures of this carpal extremity of the radius, although those hitherto referred to are of all by far the most common. Of those remaining to be described, some, like the preceding, are characterised by the impaction of the bone ends, the distinction between the two being indeed accidental. The case first related is an example of this variety, and the following case will show how this accident occurs:—

A man employed in the General Post-Office attended my out-patient room in February 1864. He had fallen, a day or two previously, with his left arm under him, the elbow projecting. The hand, bent at the extreme of flexion, was crushed beneath his body; the full force of the blow falling upon the radius as it was fixed between the bent hand and the ground. The nature of the injury had not been diagnosed. The wrist was the seat of great pain, and he was unable to move it. On the dorsum of the forearm was a well-marked prominence, about three-quarters of an inch above the wrist-joint, towards which—the wrist—the radius inclined, at an obtuse angle with the remainder of the shaft, to the palmar surface, where it projected at the wrist. On this aspect, and opposite to the dorsal prominence, was a considerable depression. No crepitus could be detected, nor could I in any way reduce or lessen the deformity. The forearm and hand were fixed in partial supination by means of splints. Ten months later the deformity persisted; he had good rotation, but whilst flexion was exaggerated he failed to extend the hand beyond a straight line with the forearm.

In such cases, in fact, just the reverse takes place to that which happens in those previously described. They are only less common because the accident which produces them is less

* This displacement of the articular surfaces of the radius is well seen in a specimen in the Museum of St. George's Hospital, Series i. 103.

frequently met with. From the direction in which the force is applied it is here the palmar, instead of the dorsal, wall of the compact tissue of the shaft which is driven into the carpal extremity, and the latter is displaced forwards.

This kind of impaction is seen in a specimen in the Museum of the Westminster Hospital.* The carpal extremity of a radius has been fractured, and the ulna is also broken at its styloid process. The distal end of the radius is displaced forwards and outwards, chiefly in the last-named direction, but there is no rotation of the shaft on its long axis. The proximal portion is driven into the cancellous tissue of the carpal end on the palmar aspect and towards the outer side, burying itself, as is seen in the section, to a depth of a trifle more than three-tenths of an inch. In our own Museum there are portions of a radius and ulna, the radius having been fractured a little more than an inch above its carpal end. The union is firm, but there is a prominent angle on the dorsal aspect of the radius in the line of the fracture, and an elevation of new bone on the corresponding part of the palmar surface, where it is probable that the palmar margin of the upper fragment was driven into the cancellous tissue of the lower one. The triangular fibro-cartilage was almost completely separated from the radius.†

Of fractures such as these it may suffice to remark that they are especially difficult to reduce. They may be recognised by the distortion they give rise to. The prominence on the dorsal surface commences about an inch above the wrist, instead of immediately at the line of the articulation, whilst on the palmar side the end of the bone projects at the carpus, but a depression marks the point opposite to the dorsal elevation. For the rest they are treated like the other impactions, recollecting always the management of lateral displacement, if present, and remembering that in these cases, if the deformity persists, flexion will be increased, whilst extension will be permanently diminished—not absolutely, but relatively.

Other fractures about the wrist may be best, perhaps, described as simply irregular, depending for their peculiarities upon the direction of the breaking force, and upon the degree of violence; for the latter may be sufficient to fracture the radius, but not enough to occasion an impaction of the bone, or may be so great as to break its extremity into many pieces. These hurts will be best illustrated by a brief enumeration of such as I am acquainted with.

* No number is attached to the preparation. † Series iii. 89.

There is first the complete breaking to pieces of the carpal end of the bone, the comminution separating the bone into many small fragments.* There may be various modifications of the ordinary transverse fracture. Thus we may have an oblique split from without inwards, detaching the styloid process and a considerable portion of adjacent cancellous tissue, and extending into the wrist,† or a still more oblique split may carry the crack into the joint through the articular surface for the semilunar bone, or the split may be oblique from before backwards, as with an instance in which the line of fracture is four-tenths of an inch from the end of a radius on the palmar surface, but on the dorsal passes into—along the edge of—the articular facets. In the young we may have separation at the epiphysis, simple,‡ or with fracture on the distal side,§ or on the proximal, in the latter case with impaction, and sometimes with cracks extending through the epiphysis and so into the joint.‖ On April 16th 1854, a male, æt. 8, was brought to the Casualty, having fallen off a ladder upon the palms of both hands. He was unable to move the wrists, but there was no displacement of the bones. On examination, unnatural mobility was detected above the joints, and the extremity of either radius was the seat of well-marked crepitus. He made a good recovery in two months, with wrist movements unimpaired.

Lastly, there are the fractures from direct violence, in which, at the wrist, or at an uncertain point above the joint, the bones are usually crushed into many pieces.¶

Two rather important points come out of the examination of these irregular cases. It is clear that these fractures do not give during life any evidence of displacement; there is of course pain and helplessness from the injury, but no distortion is to be seen, and, as a rule, no crepitus to be felt. This was observed in many of the cases I have examined. It happened, for ex-

* Guy's Museum, 1119[22]; St. Thomas's, B. 17.

† St. Thomas's Museum, B. 16. London; specimen not numbered. Middlesex, 1. 23 c.

‡ London Hospital Museum, Specimen marked 'Mr. Ward's;' St. George's Hospital Museum, Series i. 94. It has been suggested that separation at this epiphysis is liable to be followed by some arrest of growth in the length of the radius. The cases adduced are not conclusive. It is a result which may possibly ensue should the injury be compound, or should it be followed by local suppuration. It is a result of which no example has come under my observation. Separation at this epiphysis is a rare accident. The bone almost invariably breaks above or below it. See on this point Pathological Trans. vol. xiii. p. 264.

§ St. Bartholomew's Museum, C. 135.

‖ St. Bartholomew's Museum, C. 136. See p. 284.

¶ See for example Middlesex Museum, 1. 23 b.

ample, in the case of a lad, who died from other injuries, about whose wrist, even when looked at in the Post-mortem Theatre, no distortion whatever existed, although the radius was extensively comminuted. A male, æt. 47, whose right radius had been broken, but had been treated for some days as a sprain, had no kind of displacement, but in his case the fracture was made certain by the presence of bone crepitus when the ends were rubbed against one another. In June 1854 a male, æt. 37, fell on the palm of his left hand and fractured the carpal end of the radius. There was great effusion into the wrist-joint, and crepitus could easily be detected, but there was no distortion of the bone. This man's wrist remained permanently stiff. In a case previously referred to, and mentioned by Mr. Flower, there was a comminuted fracture of the radius extending into the wrist-joint, but there was no displacement, and no deformity existed during life.* Voillemier also refers to similar cases.†

The second point comes out of this absence of deformity in such fractures as the above, for they show conclusively that in impacted fractures the distortion is not due, as has been so often asserted, to the action of muscles or to the influence of tendons. If it were so, some similar displacement ought to have been observed during life in the cases, examined post-mortem, in which fracture, simple or comminuted, but without impaction, is shown to be present. Especially is it impossible to assign the displacement of the radius, as some would have it, to the pronator quadratus, which in the specimens dissected at our Hospital has been found so bruised, torn, and separated from its attachments as to be quite spoiled for the exercise of any such influence. It is only in some rare fractures, such as splitting off of the styloid process, that muscular agency can effect displacement or distortion of the fragments.

Whilst, in the cases we have been last considering, the absence of distortion, and the frequent absence too of crepitus, should make us jealous lest we pass over one of these hurts as a simple sprain, it will be well to bear in mind the secondary difficulties which surround these fractures, both the impacted and those not so.

Although, from a rapid effusion into the joint, it is clear that the wrist is often involved in the hurt, yet, when this damage is due to an extension of a fracture into the articulation, it is seldom, indeed, that the articular facets are in themselves seriously or permanently distorted. Of nineteen of the fractures

* Holmes's System of Surgery, vol. ii. p. 557. † Op. cit. p. 275.

of the end of the radius which have been referred to, seventeen extend into the wrist, three of these from general crushing of the lower extremity of the radius, fourteen from splitting of the carpal end, through the wedging in of the proximal portion of the shaft.* In several specimens, not included with the above, in which union has taken place, it can only be said, if, as may be fairly presumed, the joint was fractured, that the repair has been practically excellent. In the great majority of the preparations the distortion of the articular facets is so inconsiderable for all practical purposes, that we may fairly ignore this hurt as a common source of trouble. Rather it may be assumed that the stiffness, long continued, often permanent, which is so frequent and so troublesome a complication, follows from, and is due to, the damage — the bruising or tearing — which the adjacent tendons and muscles suffer at the time of the fracture, and which leads to their subsequent inflammation with adhesion amongst themselves. If any one muscle is to be named, it would seem to be probable, from the severe hurt which dissection of recent cases shows it to be liable to, that the pronator quadratus is, of all, the most frequent cause of the most common form of subsequent stiffness. Contracting whilst the bone is repairing, and acquiring for itself new adhesions in every possible direction, in lieu of those from which it has been torn, it is apt so to fix the radius to the ulna that, whilst pronation is fully permitted, supination is destroyed, rotation in that direction stopping short when the thumb is uppermost.

It is needless to give examples of this very common and well-known inconvenience resulting from these fractures. The best chance of obviating it is by fixing the radius semi-supine, in the manner already referred to, so as to keep the pronator on the stretch during the process of repair.

Occasionally rotation is destroyed by displaced bones joining together, or by an overgrowth of bone about a fracture uniting the radius to the ulna. In the Museum of Guy's Hospital† is a fracture of a radius and ulna just above the wrist. The radius has united well, but the end of the shaft of the ulna has become incorporated with it, so that both bones appear equally connected with the articulating extremity below. The lower end of the ulna is almost detached, being united only by a slender portion of bone to the shaft. The styloid process curves round and forms an articular surface with the outer side of the cunei-

* The articulation appears to have the best chance of escape when the impacted bone is driven to one side, the outer or the inner, it matters not which.

† No. 1119[38].

form bone. But this is the only specimen I am acquainted with, from examination, in which this bad result has happened at the wrist, although there are yet several preparations which illustrate analogous changes at various parts of the shafts of the two bones; and as these changes directly affect the movement of rotation, they may as well be referred to.* The nearest approach to it may be seen in St. George's Hospital Museum,† but in this specimen the ends of the bones have been greatly crushed from the wrist upwards, and the union of ulna to radius is complete for about two inches above the joint.

More interesting still are the two following cases, in which, despite circumstances favouring their bony union, the bones have remained separate. A radius and ulna having been broken near their upper ends, were both firmly united, and a large quantity of new bone was formed around the seats of union. The surface of the new bone on the radius and of that on the ulna, meeting in the interosseous space, were roughly adapted to each other, but did not coalesce. All rotation was, however, prevented.‡ In the second case, both bones of a forearm having been broken, were united, but a quantity of new bone, thrown out from either seat of fracture, projected into the interosseous space. A smooth concave surface formed on the side of the ulna, to which a convexity on the new bone springing from the radius adapted itself, so that rotation could be carried on perfectly, the radius moving upon the ulna with an additional articular facet.§

It is some satisfaction to know that these cases of bony union of the radius with the ulna are of very rare occurrence, and that with well-adapted splints and bandages there is comparatively little risk of the shafts, even, of the two bones, when broken, falling together, and so by position favouring any such unnatural union. Even with great breaking of the bones at the wrist, I believe that this fusion, if it may be so termed, of the radius and ulna is one of the rarest of complications.

Lastly, by reason also of its rarity, non-union of a broken radius should be mentioned. I am not acquainted with a single example, however, of the occurrence of this trouble after frac-

* The following specimens are alluded to:—St. Thomas's Museum, A. 75. Radius broken and united to ulna two and a half inches from the wrist. Guy's, 1119. Ulna fractured and united, also united to the radius. London, Gc. 174; this specimen will be subsequently referred to. College of Surgeons, 467. Radius and ulna united to one another after fracture two and a half inches from the carpus.

† Series i. 92.

‡ St. Bartholomew's Museum, C. 29.

§ No number is attached to this specimen. It is in the Museum of King's College.

ture at the wrist, and, for many reasons, it will be more convenient to defer speaking of non-union of the broken shaft until we consider other fractures, and other faulty unions, which interfere with the movements of rotation.

There are yet other hurts to add to the number of those involving the carpal end of the radius. 'Green stick' fractures,* for example, though by no means common, do, occasionally, occur at the wrist, and although they cannot be much benefited by treatment, they must be kept for some time perfectly at rest to preclude the risk of an onset of inflammatory mischief, which might otherwise involve the surrounding structures. On Whit-Monday, 1854, William G., æt. 14, went to the Polytechnic, and was there galvanised. He was in good health, and free from distortions of any kind. Whilst holding on to the conductor the shocks were increased in force, and he struggled violently to free himself, but for a time was unable to do so. His wrists subsequently became very painful, and the next morning he was unable to go to his work. A week later, after having been treated for a sprain, he came to the Hospital. Either radius close to the carpal end was bent at a considerable angle to the shaft, so that, on the dorsum, there was on either forearm a well-marked prominence, greater on the right. All his other bones were natural. Mr. Stanley, who took much interest in the case, kept him under observation for some time, and by degrees he recovered good movement at the wrists, but he retained an unsightly deformity. It was presumed that either bone, above its epiphysis, had been bent, or partially broken, during the violent muscular efforts.

Of compound fractures at the wrist the consequences are most serious, as will be seen from the following short account of cases which have come under my notice.

A labourer, æt. 45, of robust health, was admitted during April 1853, having just fallen from the roof of a house. Besides an extensive scalp wound, he had sustained a compound and comminuted fracture of the right radius and ulna, extending into the wrist joint. No pulse could be felt beyond the hurt. The hand was cold and numb. A punctured wound over the radius bled profusely, and through this, and also through a torn wound over the ulna, the finger reached a number of bone fragments, and pieces of articular cartilage. The forearm through-

* There is one good specimen of this kind of fracture, of the shaft of a radius, in King's College Museum, No. 65.

out was tense and emphysematous. Mr. Stanley amputated immediately below the elbow. Muscles, tendons, and cellular tissue were found bruised and torn about the broken bones, the median nerve was lacerated, and the radial artery, and the radial and ulnar veins, were torn across. The patient died on the eighth day, from pyæmia.

On May 6th, 1855, Catherine A., æt. 56, ran out of a public-house, where she had been drinking, and threw herself beneath the wheels of a passing cab. Her left wrist was crushed. Mr. Stanley amputated by double flaps, just below the elbow. On examining the forearm the muscles about the wrist were found to be greatly lacerated. Of the arteries, the ulnar was torn across one inch above the pisiform bone; the nerves were uninjured. Both bones were extensively comminuted just above their carpal ends, and the fracture of the radius extended into the wrist joint. On the eleventh day she died from tetanus.

A male, æt. 29, of temperate habits, was lifting a piano into a cart, on the 3rd of July 1864, when he was driven against by a cab, and his wrist was crushed against the edge of the case, his forearm being also squeezed. There was a good deal of bleeding. A lacerated wound extended across the front of the forearm, about an inch above the wrist; the flexor tendons were exposed, one being torn across. The ulnar artery required deligation; the radial pulsated. The radius was crushed through its carpal extremity, so that the finger passed amidst the broken pieces to the wrist joint. The ulna was torn away from the triangular ligament. Mr. Paget, and those who saw the case with him, considered that there was some chance of saving the limb, but on the third day gangrene supervened, and, extending rapidly, proved fatal on the sixth.

There is one remarkable instance of recovery after a bad hurt of this description which was under the care of Mr. Cock, in Guy's Hospital. E. L., æt. 30, had his wrist caught in a threshing-machine, which hurled him some distance. The arm was severely lacerated, the wrist joint laid open with the ends of the bones of the forearm protruding. The radius being fractured some inches above, the whole piece was removed, whilst the projecting end of the ulna was sawn off. The man made a good recovery, and was able to use his arm.* The portion of radius removed measures three inches and a half in length

These cases, and others may be referred to—those related by Sir Astley Cooper, for example—show the very serious nature of these hurts. The injury to the wrist joint and to

* Catalogue of Museum of Guy's Hospital, 1119 [10].

the adjacent structures, usually from direct violence, is indeed of such a nature that primary amputation is almost always required. Of course there are exceptional cases: the young, for instance, will often recover from very bad hurts of this description. Some years ago a male, æt. 12, fell from a tree, and ultimately recovered well from a compound and extensively comminuted fracture of both bones of the forearm at the wrist joint; and quite recently I saw, under Mr. Birkett's care in Guy's Hospital, a lad, æt. 14, who is convalescing after a somewhat similar hurt, caused by his wrist having been crushed beneath a swing. But such cases do not affect the question of treatment for adults.

Passing to fractures of the shafts of the radius and ulna, we may dismiss the latter bone for the present, and keep to the radius. In eighteen* specimens of fracture of its shaft, to be found in our Museums, the bones being broken somewhere between the carpal end and the neck, there are but three in which good union has resulted. The fault, as was suggested by Lonsdale, is invariably that the bone in uniting has been allowed to rotate on its long axis. How seriously such a union must affect the movements of rotation is evident enough.

That the case may be clearly understood, the bearings, if they may be so termed, of the shaft, must be once again referred to. The front surface of the radius just above its carpal end is smooth and comparatively plane. A line drawn across this plane, as the bone lies supine, is nearly horizontal. If a second vertical line be drawn through the centre of the tubercle for the biceps to the centre of the shaft of the bone, it will meet the horizontal line, or a line parallel to it, at an angle of 84° on the inner, ulnar, side. A line drawn in like manner for the fractured radii, gives, for the best (I have made three exceptions), an angle of 90° on the ulnar side of the lines; for the worst, an angle of 148°, that is, of 32° on the radial side; and for the average, one of 120°, or of 60° on the radial side. In other words, the upper fragment, as compared with its natural relations, has moved outwards by rotation upon the lower portion of the broken bone through as many as 36°.

The faulty union results from the treatment, and may be easily avoided. When an ordinary radius is examined it is found, by

* It is needless to refer in detail to individual specimens. Those I have examined are to be found in the following Museums:—St. Bartholomew's, C. 128, C. 30; Guy's, 75, 80, 81, 85, 83, 87, 1114[46]; London, Gb. 20; University, D. 1379; C. 3885, C. 3192; College of Surgeons, 2950, 2951, 502; King's College, no number, 80.

its unaided movement, to describe in rotation, from extreme pronation, an arc of a circle of about 160°; and the tubercle of the biceps points all but exactly to the centre of this arc when the thumb is uppermost, that is, midway between pronation and supination. Such, then, would appear to be an index for the proper position in which to fix the bone when broken. In nearly every case in which this treatment is adopted supination is, however, damaged, often it is lost altogether. Thus in nearly every specimen of these united fractures in our Museums, the tubercle of the radius points to an angle of about 120°, whilst with the thumb uppermost the lower fragment points an angle of 90° in the arc, the difference marking rather less than the amount of displacement, for the tubercle of the radius should be at 84° when the thumb is uppermost. It happens thus—The lower (distal) portion of the bone is easily secured by apparatus, and is held firmly between pronation and supination. Two muscles are thus fixed and accounted for—the pronator quadratus and the supinator radii longus. The pronator radii teres is often damaged at its insertion by the fracture: suppose it, however, to be capable of its ordinary action. The upper, proximal, portion of the broken bone is not well commanded by apparatus; its muscular coverings and the peculiar movements at its head, preclude its being so. It is clear, from the dissected preparations, that the supinator brevis and the biceps rotate the head to the outer side, overpowering the pronator teres, and fix the proximal portion of the shaft so that the tubercle of the biceps points to an angle of about 120° in the arc of the circle, though with the radius moves in rotation.

To meet this displacement as nearly as possible—for it is only by meeting it that the difficulty can be got over—the lower portion of the radius should be supinated to at least the same angle, by measurement, and be there retained. This position, first hinted at by Lonsdale, is easily maintained by the use of ordinary side splints provided with firm angular pads, the angle of each pad being adapted to fix the distal end of the radius in the requisite position.

Although it may escape the notice of any but a close observer, the imperfect supination of the radius after fracture of its shaft is a result which should not be permitted. It may seem a somewhat trivial matter, but it is really a considerable hurt to anyone to have rotation of this bone stopped abruptly midway between pronation and supination, the natural movement being but badly compensated for by an awkward action from the shoulder, with bending in of the elbow.

ARTICLE XX.—*The Hospital Registration.* By GEORGE N. EDWARDS, M.D. Cantab.

DURING the year 1859, public attention having been directed to the question of Hospital Statistics, through a paper by Miss Nightingale, which was read before the meeting of the International Statistical Congress, the Governors of St. Bartholomew's determined upon publishing an Annual Report of all the patients treated in the wards of the Hospital, and accordingly I was appointed to the office of Statistical Registrar; the duties of the appointment being to keep an accurate record of every patient admitted and discharged, and to prepare a report at the end of each year. A short account of the manner in which these duties have been carried out may, perhaps, prove not uninteresting.

In every ward a book is provided, called the ward book, each page being divided into columns, the headings of which are as follows:—

Date of Admission	Name of Patient	Age	Occupation	Name of Disease	Date of Discharge	Result					No. of Days in Hospital	Operation	Remarks
						Cured	Relieved	Not Relieved	Discharged for other reasons	Died			

The first four columns are filled in on the admission, and the remainder on the discharge or death of the patient; the entry under the column headed 'Name of Disease' being taken, in every instance, from the diagnosis of the physician or surgeon in charge of the case, and which is written on the prescription paper placed at the head of the bed. A double record is thus kept of all patients, and the possibility of numerical error almost entirely avoided.

From these ward books the Annual Reports are compiled. These consist of a series of tables, in which the patients are classified in accordance with an uniform system of nosology; and, after much consideration, it was determined to employ the forms, slightly modified, which had been used by the Registrar-General in the weekly bills of mortality, not as being the best possible, but because it was

felt that the preparation of a nosological table which would be generally accepted by the profession, would be a task of extreme difficulty, and that, to be really useful, statistical tables of disease taken at one Hospital should be capable of ready comparison with those of all others, as well as with those of the public authorities of the country.* The names, however, which are given in the Registrar-General's tables to the several orders of diseases have been omitted in our tables, as they serve no practical purpose, and involve theories to which we are unwilling to commit ourselves. On the whole, this plan has been found to work fairly well; all cases of disease being placed pretty easily under some one of the names given in the tables, and upon this basis five Annual Reports have already been published.

Each of these Reports consists of a series of tables, six of which, classified according to the sex of the patients, and age in decennial periods, are thus headed:—I. Patients remaining in Hospital on the first of January (in each year). II. Patients admitted during the year (excluding those whose treatment is incomplete, and who form Table I. of the Report for the following year). III. Patients discharged cured and relieved. IV. Patients discharged unrelieved. V. Patients discharged for other than medical reasons: that is, for misconduct, self-discharged, or discharged at their own request. VI. Deaths during the year.

Table VII. contains a resumé of the six tables, and is thus headed:—

Remaining January 1st	Admitted during ____	Total Patients under Treatment	Discharged Cured and Relieved	Discharged Unrelieved	Discharged for other than medical reasons	Died	Mean Residence of Patients in Hospital, in days		Percentage of Deaths to Number of Patients of each Disease	Percentage of Deaths to Mortality from all Causes
							Male	Female		

* At a meeting held at Guy's Hospital, in June 1861, soon after the publication of my first Annual Report, at which representatives were present from eight of the principal hospitals of London, a series of resolutions was adopted, by which it was determined that 'the metropolitan hospitals should adopt one uniform system of registration of patients,' and that, 'as far as practicable, the nomenclature employed by the Registrar-General be adopted, with the additions contained in the forms submitted by Miss Nightingale to the International Statistical Congress.' This plan has not, however, been generally carried out.

To these seven tables are added, a summary of the whole, a statement of the occupations of the patients, a table of surgical operations performed, and of the causes of death in the fatal cases after such operations, a table of dislocations and fractures, and, in the two last Reports, an account of the cases of disease arising within the Hospital, in patients admitted for other maladies—Hospital disease as it may be called. The Report closes with a comparative table of the number of patients admitted, and the average mortality for each disease during three years.

After some time it was found that the work of registration of the entire Hospital could not be efficiently performed by a single officer, unless he could devote his whole time to it; and accordingly a Surgical Registrar was appointed at the commencement of 1863. The arrangement of the tables in the last two Annual Reports has therefore been slightly altered, although the original plan has been strictly adhered to, a separate series of the first seven tables being published for the medical and surgical wards respectively; and these being preceded in the Report by the general summary, and other tables relating to the whole number of patients. The tables of operations, and of other surgical matters, have, moreover, been considerably enlarged.

A numerical analysis of the five years' Reports is contained in the two following tables, from which, perhaps, some idea may be formed of our work.

TABLE I.

SUMMARY OF ANNUAL STATISTICAL REPORTS FOR THE FIVE YEARS, 1860—1864 INCLUSIVE.

Patients remaining January 1st, 1860				521
Patients admitted during	1860	5724		
" "	1861	5565		
" "	1862	5389		
" "	1863	5462		
" "	1864	5543	27683	
				28204
Patients discharged cured and relieved	1860	4575		
" "	1861	4409		
" "	1862	4371		
" "	1863	4449		
" "	1864	4324	22128	
Patients discharged unrelieved*	1860			
" "	1861	293		
" "	1862	236		
" "	1863	148		
" "	1864	300	977	
Patients discharged for other than medical reasons	1860	488		
" "	1861	303		
" "	1862	218		
" "	1863	236		
" "	1864	315	1560	
Patients died	1860	623		
" "	1861	597		
" "	1862	605		
" "	1863	557		
" "	1864	617	2999†	
				27664
		Remaining January 1st, 1865		540
Patients brought in dead		106		

* The patients who were discharged unrelieved during 1860 are included under the next heading, 'Discharged for other than medical reasons.'

† Of this number, 429, or 14·30 per cent., died within 24 hours of admission into the hospital.

TABLE II.

SHOWING THE NUMBER OF CASES ADMITTED FOR EACH DISEASE, WITH THE RESULT, FOR EACH YEAR OF THE QUINQUENNIAL PERIOD 1860–1864 INCLUSIVE.

Diseases	Remaining Jan. 1, 1860	Admitted during 1860	1861	1862	1863	1864	Totals Admitted	Discharged during 1860	1861	1862	1863	1864	Totals Discharged	Died during 1860	1861	1862	1863	1864	Totals Died	Percentage of Deaths to Total Number of Patients under Treatment for each Disease
ORDER I.																				
1. Smallpox	..	5	3	3	4	4	19	4	3	3	4	3	17	1	..	..	..	1	2	10·53
2. Chickenpox	..	..	..	..	1	..	1	..	..	..	1	..	1							
3. Measles	..	9	1	11	3	2	26	7	1	8	3	2	21	2	..	3	..	..	5	19·23
4. Scarlatina	3	79	73	92	117	59	423	61	55	67	94	53	330	13	18	23	23	16	93	21·99
5. Diphtheria	..	7	7	6	4	3	27	3	5	2	3	..	13	3	2	5	1	3	14	51·85
6. Quinsy	1	49	32	22	36	20	160	47	30	26	33	23	159	..	1	..	..	..	1	0·62
7. Croup	..	15	26	15	18	19	93	7	14	8	10	13	52	7	18	8	8	7	41	44·86
8. Continued Fever	..	99	54	43	13	11	220	85	43	32	14	11	185	13	9	13	..	..	35	15·91
(a) Typhus	1	9	21	168	59	75	333	7	16	135	46	59	263	..	1	31	13	25	70	21·02
(b) Typhoid	3	34	74	51	50	35	247	30	49	63	41	37	220	2	10	5	3	7	27	10·03
(d) Remittent	..	..	..	..	1	..	1	..	..	..	1	..	1							
(e) Febricula †	..	4	61	57	55	44	221	..	63	54	56	48	221							
9. Hooping Cough	..	12	11	9	5	8	45	7	7	5	2	6	27	5	4	4	2	3	18	40·
10. Diarrhœa	4	28	32	15	10	33	122	26	27	16	11	31	111	4	4	1	..	2	11	9·02
11. Dysentery	1	5	10	7	9	5	37	4	10	4	7	6	31	1	1	2	1	1	6	16·22
12. Cholera	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	1	100·
13. Catarrh	..	6	5	2	2	1	16	5	6	2	2	1	16							
14. Influenza	..	4	1	2	3	1	11	4	1	2	3	1	11							
15. Ague	2	27	5	6	2	1	43	29	5	5	3	1	43							
16. Erysipelas	8	115	111	121	213	181	749	112	100	107	198	191	708	6	9	7	11	8	41	5·46
17. Erythema	1	11	11	14	8	8	53	9	14	14	7	9	53							
18. Pyæmia	1	5	10	13	6	8	43	..	1	7	3	2	13	5	9	6	3	7	30	69·77
19. Hospital Gangrene	..	..	3	13	..	..	16	..	..	14	..	..	14	..	..	2	..	..	2	12·50
20. Metria	..	..	..	..	2	..	2	..	..	..	2	..	2							
21. Rheumatism	26	263	283	286	384	264	1506	262	265	293	360	315	1495	1	2	..	1	7	11	0·73
22. Glanders	..	..	..	2	..	..	2	..	..	1	..	..	1	..	..	1	..	..	1	·50
24. Syphilis:—																				
(a) Primary	12	199	223	158	146	167	905	192	227	150	147	182	898	1	2	..	3	1	7	0·77
(b) Secondary	16	135	176	135	226	212	900	135	168	136	208	247	894	1	..	2	2	1	6	0·66
* (c) Inherited	..	..	..	2	9	8	19	..	..	..	11	7	18	..	..	..	..	1	1	5·26
25. Gonorrhœa	30	432	373	260	194	252	1541	428	375	276	185	274	1538	..	..	..	..	3	3	0·19
26. Purpura	..	11	17	8	5	6	47	8	14	6	4	5	37	1	5	2	1	1	10	21·28
27. Scurvy	..	5	1	3	2	3	14	5	1	3	2	3	14							
29. Purulent Opthalmia	..	5	3	8	..	..	16	5	3	8	..	..	16							
30. Rickets	..	..	..	1	..	..	1	..	..	1	..	..	1							
32. Worms	..	5	1	..	3	1	10	5	..	1	3	1	10							
33. Hydatids	..	3	2	1	5	4	15	3	..	2	3	6	14	..	..	..	1	..	1	6·66
Totals	109	1581	1630	1534	1596	1435	7885	1490	1503	1451	1467	1537	7448	66	88	115	74	94	437	5·54

The Diseases marked thus (*) were not separately classified till 1863.

† The cases of Febricula for 1860 are placed underthe heading 'Continued Fever.'

TABLE II.—*continued.*

Diseases	Remaining Jan. 1, 1860	Admitted during 1860	1861	1862	1863	1864	Totals Admitted	Discharged during 1860	1861	1862	1863	1864	Totals Discharged	Died during 1860	1861	1862	1863	1864	Totals Died	Percentage of Deaths to Total Number of Patients under Treatment for each Disease
ORDER II.																				
1. Gout	..	16	11	15	9	7	58	15	10	14	9	9	57	..	1	..	..	..	1	1·72
2. Dropsy	6	51	11	19	10	7	104	30	8	4	8	2	52	25	5	13	4	5	52	50·
3. Anæmia	2	12	20	10	11	3	58	11	16	11	11	5	54	..	2	2	..	..	4	6·90
4. Cancer :—																				
(*a*) Of external organs	7	66	69	73	60	76	351	54	62	60	56	73	305	10	12	9	10	5	46	13·11
(*b*) Of internal organs	1	44	46	38	35	24	188	21	27	24	25	14	111	19	23	15	7	13	77	40·96
5. Melanosis	..	1	..	1.	..	..	2	1	..	1	..	..	2							
6. Lupus	2	4	2	..	6	7	21	6	1	1	6	7	21							
7. Fungus Hæmatodes	..	..	1	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	1	100·
8. Polypus	..	3	2	6	3	1	15	3	2	6	3	1	15							
9. Tumours	6	73	71	74	69	57	350	70	70	69	64	60	333	4	3	3	4	3	17	4·86
10. Mortification	..	1	3	1	11	1	17	..	2	..	6	2	10	1	1	..	4	1	7	41·18
11. Phagedæna	..	4	3	3	1	2	13	2	..	3	1	1	7	2	3	..	..	1	6	46·15
12. Bedsores	1	1	1	..	3	..	6	1	..	..	2	..	3	1	1	..	1	..	3	50·
13. Fistula	..	20	18	22	15	16	91	17	21	18	17	16	89	..	..	..	1	1	2	2·20
14. Scrofula	4	44	52	45	70	44	259	43	51	36	56	50	236	1	3	..	6	13	23	8·88
15. Psoas Abscess	..	3	14	16	22	25	80	..	5	8	15	23	51	1	11	4	7	6	29	36·25
16. Tabes Mesenterica	..	4	3	3	..	..	10	2	2	3	..	..	7	2	..	1	..	..	3	30·
17. Tubercular Peritonitis	1	1	2	..	4	2	10	2	..	1	..	..	3	..	2	..	3	2	7	70·
18. Phthisis	24	183	164	153	144	140	808	108	94	77	79	74	432	80	76	76	64	80	376	46·53
19. Hydrocephalus	..	9	..	3	4	3	19	3	..	1	2	1	7	6	..	2	1	3	12	63·16
Totals	54	540	493	482	477	415	2461	389	371	336	361	338	1795	152	144	125	112	133	666	27·06

TABLE II.—*continued.*

Diseases	Remaining Jan. 1, 1860	Admitted during					Totals Admitted	Discharged during					Totals Discharged	Died during					Totals Died	Percentage of Deaths to Total Number of Patients under Treatment for each Disease
		1860	1861	1862	1863	1864		1860	1861	1862	1863	1864		1860	1861	1862	1863	1864		
ORDER III.																				
1. Meningitis	..	11	8	7	8	3	37	..	1	3	..	1	5	9	7	6	6	4	32	86·49
2. Encephalitis	..	..	3	3	1	..	7	..	1	1	..	..	2	..	2	2	1	..	5	71·43
3. Myelitis	1	..	1	..	..	..	2	..	1	..	..	..	1	1	..	..	..	..	1	50·
4. Apoplexy	..	13	10	14	9	7	53	1	..	..	..	..	1	12	10	14	9	7	52	98·11
5. Paralysis	1	26	14	..	9	2	52	24	15	..	7	4	50	2	..	..	..	..	2	38·46
(a) Hemiplegia	8	33	44	41	32	42	200	34	36	37	27	41	175	2	4	9	4	6	25	12·50
(b) Paraplegia	4	18	20	21	16	8	87	13	17	19	16	8	73	2	4	2	6	..	14	16·09
6. Paralysis Agitans	..	6	1	1	2	..	10	5	2	..	3	..	10							
7. Chorea	5	28	27	25	37	44	166	32	23	24	31	54	164	..	1	..	..	1	2	1·20
8. Epilepsy	..	52	38	65	45	31	231	49	34	61	43	32	219	2	2	4	2	2	12	5·19
9. Tetanus	..	7	3	2	4	5	21	..	1	..	..	2	3	7	2	2	3	4	18	85·70
10. Hysteria	2	23	16	25	16	11	93	25	15	25	14	14	93							
11. Convulsions	..	7	8	4	2	1	22	6	7	3	2	..	18	1	1	1	..	1	4	18·18
12. Insanity	..	5	1	2	4	9	21	5	1	2	3	10	21							
14. Neuralgia	2	14	23	21	17	27	104	12	23	25	17	27	104							
16. Disease of Brain	3	8	13	11	10	9	54	2	8	8	6	5	29	8	5	1	7	4	25	46·30
17. Delirium Tremens	..	12	18	15	9	10	64	6	13	11	9	6	45	6	4	2	3	4	19	29·69
18. Disease of Spinal Cord	1	1	..	3	10	10	25	2	..	..	10	10	22	..	..	2	1	..	3	12·
19. Conjunctivitis	1	2	6	14	23	10	56	2	7	10	27	10	56							
20. Amaurosis	..	4	4	4	5	1	18	3	5	4	5	1	18							
21. Cataract	1	1	1	1	9	7	20	1	2	..	7	10	20							
22. Iritis	4	6	5	9	19	3	46	10	5	9	18	4	46							
23. Corneitis	..	5	19	11	16	13	64	4	18	13	13	16	64							
24. Disease of Eye	2	25	36	11	3	15	92	25	36	13	3	15	92							
25. Disease of Ear	..	..	..	..	2	3	5	..	..	..	2	3	5							
Totals	35	307	319	310	308	271	1550	261	271	268	263	273	1336	52	42	45	42	33	214	13·61

TABLE II.—*continued.*

Diseases	Remaining Jan. 1, 1860	Admitted during					Totals Admitted	Discharged during					Totals Discharged	Died during					Totals Died	Percentage of Deaths to Total Number of Patients under Treatment for each Disease
		1860	1861	1862	1863	1864		1860	1861	1862	1863	1864		1860	1861	1862	1863	1864		
ORDER IV.																				
2. Pericarditis	..	7	1	4	1	3	16	3	..	1	..	1	5	4	..	4	1	2	11	68·75
3. Endocarditis	3	9	17	16	17	..	62	7	12	17	13	..	49	5	3	..	5	..	13	20·97
4. Hypertrophy of Heart	..	3	3	2	1	..	9	3	3	2	1	..	9							
6. Disease of Heart	8	65	59	52	63	61	308	34	28	30	28	40	160	29	37	24	30	28	148	48·05
7. Aneurism of Aorta	1	3	8	8	10	6	36	2	5	3	7	6	23	2	2	5	4	..	13	36·11
8. Aneurism of other Arteries	1	3	2	4	..	6	16	3	3	4	..	3	13	..	..	..	..	3	3	18·75
11. Disease of Arteries	1	..	..	..	2	3	6	1	..	..	2	2	5	..	..	..	..	1	1	16·66
12. Phlebitis	1	3	2	12	9	8	35	3	2	11	7	11	34	..	..	1	..	..	1	2·94
13. Disease of Veins	3	22	15	15	24	26	105	23	16	12	27	26	104	1	..	..	..	..	1	0·95
14. Nævus	2	7	4	5	14	8	40	9	4	5	14	8	40							
Totals	20	122	111	118	141	121	633	88	73	85	99	97	442	41	42	34	40	34	191	30·17
ORDER V.																				
1. Epistaxis	..	4	11	5	8	10	38	4	11	5	8	10	38							
2. Hæmoptysis	..	19	17	7	23	18	84	10	17	9	21	18	75	4	3	..	1	1	9	10·71
3. Laryngitis	3	9	12	6	5	12	47	11	10	6	5	10	42	1	1	1	..	2	5	10·64
4. Œdema of Glottis	..	..	1	2	..	2	5	..	..	..	..	1	1	..	1	2	..	1	4	80·
5. Bronchitis	24	176	124	106	92	102	624	135	98	73	66	65	437	49	29	32	28	49	187	29·97
6. Pleurisy	2	28	11	10	9	7	67	21	11	10	9	8	59	6	2	..	..	..	8	11·94
(*a*) Hydrothorax	..	7	5	6	11	5	34	6	5	5	8	5	29	..	1	1	3	..	5	14·71
(*b*) Empyema	2	6	5	7	5	8	33	6	3	3	2	7	21	2	1	4	2	3	12	36·36
8. Pneumonia	3	81	109	62	68	75	398	47	71	46	44	64	272	31	34	21	20	20	126	31·66
9. Pleuropneumonia	..	24	31	28	24	28	135	18	28	20	26	18	110	3	4	6	2	10	25	18·52
10. Asthma	..	..	2	..	..	..	2	..	1	..	..	..	1	..	1	..	..	..	1	50·
11. Emphysema	1	5	4	3	2	1	16	4	1	2	3	1	11	2	3	..	..	..	5	31·25
12. Disease of Lungs	..	3	..	..	..	..	3	2	..	..	..	..	2	1	..	..	..	..	1	33·33
Totals	35	362	332	242	247	268	1486	264	256	179	192	207	1098	99	80	67	56	86	388	26·11

TABLE II.—*continued.*

Diseases	Remaining Jan. 1, 1860	Admitted during					Totals Admitted	Discharged during					Totals Discharged	Died during					Totals Died	Percentage of Deaths to Total Number of Patients under Treatment for each Disease
		1860	1861	1862	1863	1864		1860	1861	1862	1863	1864		1860	1861	1862	1863	1864		
ORDER VI.																				
1. Stricture of Œsophagus	1	4	6	..	2	1	14	3	5	..	2	1	11	..	3	..	..	..	3	21·43
2. Teething	..	..	..	4	..	..	4	..	..	4	..	..	4							
3. Stomatitis	1	7	7	16	11	12	54	5	7	11	9	14	46	..	2	5	1	..	8	14·81
4. Gastritis	1	5	2	2	3	..	13	6	2	2	3	..	13							
5. Enteritis	..	2	10	3	4	6	25	2	6	6	3	6	23	..	1	..	1	..	2	8·
6. Colonitis	..	1	2	3	1	..	7	1	2	3	1	..	7							
7. Peritonitis	1	13	9	10	14	12	59	4	2	3	5	4	18	10	7	7	7	10	41	69·66
8. Constipation	..	11	19	11	17	12	70	10	19	11	18	12	70							
9. Intussusception	..	..	1	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	1	100·
10. Stricture of Intestines	1	11	7	4	3	3	29	7	4	1	2	1	15	5	3	3	1	2	14	48·28
11. Ulceration of Intestines	..	1	4	4	4	3	16	1	..	..	2	2	5	..	4	4	2	1	11	68·75
12. Perforation of Intestines	1	2	..	..	2	..	5	..	..	..	..	..	..	3	..	..	2	..	5	100·
13. Hernia	..	1	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	1	100·
(*a*) Femoral	3	27	21	32	24	15	132	20	19	20	15	14	88	8	10	14	9	3	44	33·33
(*b*) Inguinal	..	22	27	46	26	33	154	11	28	42	17	26	124	6	3	4	8	9	30	19·48
(*c*) Otherwise	1	1	2	6	9	3	22	2	..	7	4	2	15	..	1	..	4	2	7	31·82
14. Dyspepsia	..	12	12	20	8	9	61	9	15	19	8	10	61							
16. Chronic Vomiting	3	5	6	4	4	2	23	7	6	4	4	2	23							
17. Hæmatemesis	1	11	5	10	8	7	42	12	5	9	6	8	40	..	..	1	..	1	2	4·76
18. Melæna	..	..	3	2	3	2	10	..	2	3	2	2	9	..	..	..	1	..	1	10·
19. Hæmorrhoids	3	7	13	16	15	4	58	10	12	16	16	4	58							
20. Disease of Stomach	..	..	1	1	1	..	3	..	1	..	1	..	2	..	..	1	..	..	1	33·33
22. Disease of Spleen	..	..	3	2	1	..	6	..	3	2	1	..	6							
23. Disease of Liver	..	15	12	3	6	5	41	6	8	3	4	1	22	6	6	1	2	4	19	46·34
24. Jaundice	2	18	17	16	11	16	80	18	14	13	11	14	70	2	1	4	..	3	10	12·50
25. Hepatitis	..	1	2	..	5	..	8	..	2	..	4	..	6	1	..	..	1	..	2	25·
26. Cirrhosis	..	..	3	5	2	4	14	..	1	3	1	1	6	..	2	1	1	4	8	57·14
27. Gallstones	..	1	..	1	..	2	4	1	..	1	..	2	4							
28. Ascites	..	11	18	13	9	12	63	3	6	11	8	5	33	6	11	5	1	7	30	47·62
29. Colic	..	11	3	..	5	8	27	8	6	..	5	8	27							
30. Lead Poisoning	1	27	14	10	8	15	75	26	16	9	9	15	75							
Totals	19	227	239	244	206	186	1121	172	191	203	161	154	881	48	55	50	41	46	240	21·41

TABLE II.—*continued.*

Diseases	Remaining Jan. 1, 1860	Admitted during 1860	1861	1862	1863	1864	Totals Admitted	Discharged during 1860	1861	1862	1863	1864	Totals Discharged	Died during 1860	1861	1862	1863	1864	Totals Died	Percentage of Deaths to Total Number of Patients under Treatment for each Disease
ORDER VII.																				
1. Nephritis	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1	100·
2. Albuminuria	12	69	59	66	56	51	313	42	41	30	38	35	186	26	29	33	18	21	127	40·57
3. Ischuria	..	3	4	7	..	..	14	3	4	7	..	..	14							
4. Diuresis	..	..	3	..	..	..	3	..	3	..	..	..	3							
5. Diabetes	..	9	8	6	8	6	37	5	7	3	3	6	24	3	2	2	2	4	13	35·15
6. Disease of Kidneys	..	4	7	..	1	1	13	2	4	..	..	..	6	2	3	..	1	1	7	53·85
7. Hæmaturia	2	1	1	8	4	9	25	2	1	9	4	8	24	..	..	..	..	1	1	4·
8. Stone	4	27	13	18	12	9	83	24	15	15	13	7	74	3	2	..	1	3	9	10·84
10. Cystitis	..	17	15	10	9	12	63	11	14	6	8	13	52	4	2	4	1	..	11	17·46
11. Disease of Prostate Gland	..	4	4	3	6	5	22	3	2	2	5	3	15	..	3	1	1	2	7	31·82
12. Stricture of Urethra	4	47	46	65	48	30	240	43	47	55	46	28	219	5	2	5	5	4	21	8·75
13. Extravasation of Urine	..	..	4	..	29	13	46	..	2	..	19	13	34	..	2	..	7	3	12	26·09
14. Incontinence of Urine	..	..	..	..	1	1	2	..	..	..	1	1	2							
Totals	22	181	164	184	174	137	862	135	140	127	137	114	653	43	45	46	36	39	209	24·26
ORDER VIII.																				
1. Varicocele	..	1	..	..	..	..	1	1	..	..	..	..	1							
2. Orchitis	..	8	14	19	6	4	51	8	13	20	3	7	51							
3. Hydrocele	1	13	13	10	11	11	59	14	13	9	11	12	59							
4. Hæmatocele	..	1	..	2	4	6	13	1	..	1	5	5	12	..	..	..	..	1	1	7·69
5. Disease of Testicle	..	11	15	10	4	4	44	9	17	8	6	4	44							
6. Disease of Male Generative Organs	2	9	12	7	..	..	30	11	10	9	..	..	30							
7. Metritis	..	..	..	..	13	5	18	..	..	..	12	6	18							
8. Ovarian Dropsy	8	7	7	3	7	7	34	5	3	3	5	6	22	5	3	2	1	2	13	35·29
9. Ovarian Tumour	..	6	9	6	13	7	41	6	7	6	10	5	34	..	3	..	2	3	7	17·07
10. Disease of Ovaries	..	..	2	1	1	..	4	..	2	1	..	..	3	..	..	..	1	..	1	25·
11. Uterine Tumour	..	15	14	5	5	8	47	11	16	4	4	8	43	2	..	1	1	..	4	8·51
12. Uterine Polypus	..	6	3	5	9	6	29	5	4	5	7	6	27	..	..	..	2	..	2	6·89
13. Recto Vesical Fistula	..	1	..	3	..	..	4	1	..	3	..	..	4							
14. Vesico Vaginal Fistula	..	7	2	..	..	..	9	6	3	..	..	..	9							
15. Recto Vaginal Fistula	1	1	..	3	..	..	5	2	..	3	..	..	5							
16. Disorders of Menstruation	5	46	19	15	16	19	120	48	21	14	18	19	120							
17. Disease of Uterus, &c.	6	63	77	101	142	133	522	57	82	94	141	130	504	3	1	1	2	11	18	3·45
Totals	18	195	187	190	231	210	1031	185	191	180	222	208	986	10	5	4	9	17	45	4·36

TABLE II.—*continued.*

Diseases	Remaining Jan. 1, 1860	Admitted during					Totals Admitted	Discharged during					Totals Discharged	Died during					Totals Died	Percentage of Deaths to Total Number of Patients under Treatment for each Disease
		1860	1861	1862	1863	1864		1860	1861	1862	1863	1864		1860	1861	1862	1863	1864		
ORDER IX.																				
1. Synovitis	2	26	17	37	93	77	252	28	16	30	91	85	250	..	..	..	1	1	2	0·79
2. Periostitis	..	5	4	8	13	11	41	5	4	7	14	11	41							
3. Exostosis	..	1	7	14	5	3	30	1	5	16	4	3	29	..	..	..	1	..	1	3·33
4. Caries	..	2	..	2	14	16	34	..	..	..	13	19	32	2	..	..	..	..	2	5·88
5. Necrosis	8	44	39	38	60	59	248	40	35	43	52	62	232	2	2	1	4	7	16	6·45
6. Disease of Bone	5	20	24	20	1	2	72	24	23	19	2	2	70	1	..	..	1	..	2	2·77
7. Curvature of Spine	1	30	16	14	2	6	69	21	21	12	6	6	66	3	..	..	..	..	3	4·55
8. Disease of Joints	34	244	234	185	72	66	835	230	219	203	72	63	787	11	11	7	8	11	48	5·75
*(a) Glands and Bursæ	..	..	..	..	88	109	197	..	..	..	78	117	195	..	..	..	2	..	2	1·02
9. Muscular Atrophy	1	1	..	..	..	..	2	1	1	..	..	..	2							
Totals	51	373	341	318	348	349	1780	350	324	330	332	368	1704	19	13	8	17	19	76	4·27
ORDER X.																				
1. Carbuncle	6	41	29	24	26	22	148	41	31	23	26	19	140	1	1	2	..	4	8	5·41
3. Abscess	25	258	329	279	154	111	1156	252	306	303	153	120	1134	7	4	5	5	1	22	1·90
*(a) Chronic	..	..	..	..	6	17	23	..	..	..	5	16	21	..	..	..	1	1	2	8·70
4. Ulcer	14	156	164	131	112	59	636	145	169	127	120	65	626	1	2	2	3	2	10	1·57
5. Disease of Skin	..	10	17	8	13	..	48	8	19	8	11	1	47	..	..	..	1	..	1	1·66
6. Roseola	..	..	..	..	2	1	3	..	..	..	2	1	3							
8. Eczema	..	24	25	19	10	19	97	22	27	16	11	21	97							
9. Herpes	..	5	1	2	1	1	10	5	1	2	1	1	10							
10. Lepra	1	2	1	1	..	1	6	3	1	1	..	1	6							
11. Porrigo	..	..	1	..	..	..	1	..	1	..	..	..	1							
12. Scabies	1	4	1	4	3	2	15	5	1	3	4	2	15							
13. Pemphigus	..	5	3	..	1	3	12	4	4	..	1	3	12							
14. Rupia	..	1	..	..	..	..	1	1	..	..	..	..	1							
15. Ecthyma	..	1	1	2	..	..	4	1	1	2	..	..	4							
16. Impetigo	..	2	..	1	..	..	3	2	..	1	..	..	3							
18. Mentagra	..	..	1	..	..	..	1	..	1	..	..	..	1							
19. Lichen	..	1	..	..	..	..	1	1	..	..	..	..	1							
20. Prurigo	..	..	..	..	1	..	1	..	..	..	1	..	1							
21. Psoriasis	1	3	1	4	3	3	15	4	1	2	5	3	15							
22. Pityriasis	..	..	1	..	..	..	1	..	1	..	..	..	1							
25. Whitlow	..	..	..	3	..	..	3	..	..	3	..	..	3							
26. Erythema Nodosum	..	..	..	..	4	4	8	..	..	..	4	4	8							
27. Gangrena Senilis	..	2	3	3	1	6	15	..	1	2	..	4	7	2	2	1	1	2	8	53·33
Totals	48	515	578	481	337	249	2208	494	565	493	344	261	2157	11	9	10	11	10	51	2·31

TABLE II.—*continued.*

Diseases	Remaining Jan. 1, 1860	Admitted during 1860	1861	1862	1863	1864	Totals Admitted	Discharged during 1860	1861	1862	1863	1864	Totals Discharged	Died during 1860	1861	1862	1863	1864	Totals Died	Percentage of Deaths to Total Number of Patients under Treatment for each Disease
ORDER XI.																				
1. Intemperance	..	24	14	37	16	17	108	24	14	37	16	17	108							
2. Privation	..	2	3	3	3	3	14	2	2	1	1	2	8	..	1	2	1	2	6	42·86
5. Malformation	9	36	64	50	69	50	278	38	65	40	75	58	276	..	..	1	1	..	2	0·72
7. Old Age	..	4	..	1	..	..	5	3	..	..	..	..	3	1	..	1	..	..	2	40·
8. Debility	8	76	59	43	28	32	246	81	59	41	32	33	246							
9. Poison	..	33	34	30	27	23	147	29	34	28	24	21	136	4	..	2	3	2	11	7·48
10. Violence and Injury	14	376	308	418	..	..	1116	352	295	402	..	..	1049	20	18	29	..	..	67	6·00
(*a*) Burns and Scalds	14	135	117	146	122	129	663	98	89	110	88	103	488	36	32	39	25	33	175	26·39
*(*b*) Contusions	..	..	..	..	205	267	475	..	..	..	189	272	461	..	..	..	7	7	14	2·95
*(*c*) Sprains	..	..	..	..	65	64	129	..	..	..	63	66	129							
(*d*) Gunshot Wounds	..	4	..	1	2	2	9	4	..	1	2	..	7	..	..	..	..	2	2	22·22
*(*e*) Laceration of Limbs	..	..	..	..	15	8	23	..	..	..	10	8	18	..	..	..	4	1	5	21·74
(*f*) Wounds	3	71	128	154	216	221	793	63	126	150	205	234	778	2	1	4	4	4	15	1·89
*(*g*) Concussions	..	..	..	8	86	94	188	..	..	..	84	98	182	..	..	..	5	1	6	3·19
(*h*) Fractures :—																				
Simple	43	327	299	260	353	302	1584	322	291	257	293	320	1483	11	14	2	40	34	101	6·38
Compound	6	22	23	44	88	63	246	24	22	27	64	63	200	1	2	17	14	12	46	15·85
*Ununited	..	..	..	..	..	5	5	..	..	..	..	4	4	..	..	..	..	1	1	20·
(*k*) Dislocations	2	18	18	14	..	..	52	16	19	15	..	..	50	1	1	..	..	..	2	3·92
*Simple	..	..	..	5	20	25	50	..	..	..	24	26	50							
*Compound	..	..	..	..	3	7	10	..	..	..	3	3	6	..	..	..	..	4	4	40·
12. Drowning	..	1	1	4	..	1	7	1	..	2	..	1	4	..	1	2	..	..	3	42·87
13. Suicide	..	9	11	4	10	9	43	6	7	2	8	9	32	3	3	2	3	..	11	25·58
Totals	99	1138	1079	1225	1328	1322	6191	1063	1023	1113	1181	1338	5718	79	73	101	117	103	473	7·62
Diseases not classed	8	184	91	64	68	41	456	172	97	62	74	42	447	3	1	..	2	3	9	1·97

ST. BARTHOLOMEW'S HOSPITAL & COLLEGE.

PRESENT MEMBERS.

Consulting Physician, DR. BURROWS.

Physicians to the Hospital.

DR. FARRE, DR. JEAFFRESON, DR. BLACK, DR. MARTIN.

Consulting Surgeons, MR. LAWRENCE, MR. SKEY.

Surgeons to the Hospital.

MR. WORMALD, MR. PAGET, MR. COOTE, MR. HOLDEN.

Assistant Physicians to the Hospital.

DR. EDWARDS, DR. HARRIS, DR. ANDREW, DR. SOUTHEY.

Assistant Surgeons to the Hospital.

MR. SAVORY, MR. CALLENDER, MR. T. SMITH, MR. WILLETT.

Physician Accoucheur, DR. GREENHALGH.

Apothecary, MR. WOOD.

SCHOLARS.

1861	Baker, W. Morrant	Langdon, John	1851
1856	Barford, James G.	Nesbitt, Francis A.	1854
1864	Bateman, F.	Newman, William	1854
1855	Best, Henry D.	Paine, William	1860
1860	Brook, Charles	Rhind, Samuel	1850
1851	Brown, John A.	Richards, F. W.	1863
1852	Callender, George W.	Sadler, Michael J.	1855
1864	Cole, T.	Senior, Charles	1858
1857	Crowfoot, William M.	Sharpin, Henry W.	1849
1861	Done, John	Shepard, W. L.	1865
1865	Garrett, W. J.	Snook, J. W.	1864
1856	Goodall, Ralph	Thompson, Charles R.	1850
1858	Helm, George F.	Turner, William	1853
1862	Hingston, Albert	Vernon, Bowater J.	1862
1853	Humphry, Frederick A.	Winkfield, William B.	1857
1859	Jeaffreson, Horace		

M.D.

1808 La Cloche, Thomas, St. And.
1814 Rudge, Henry, Erlangen
1815 Lyon, Edmund, Edin.
1816 Latham, Peter Mere, Oxon.
Hurlock, Joseph, Oxon.
George, James, Oxon.
1819 King, William, Cantab.
1821 Daubeny, C. G. B., Oxon.
1822 Cooke, William, St. And.
Williams, Richard L., St. And.
1823 Norris, William, St. And.
1824 Evans, H. Norman, Glasg.
1825 Bullock, John J. A., New York
Jeanneret, H., Edin.
Watson, Thomas, Cantab.
Wavell, Robert M., Edin.
1826 Blundell, Thomas L., Glasg.
Grant, Klein, Edin.
1827 Arding, Willoughby, Edin.
Galindo, R. Miles, Aberd.
1828 Elliott, William, Edin.
Graham, Thomas J., Glasg.
1829 Goodeve, H. Harry, Edin.
McKechnie, Alex., Glasgow
1830 Borrett, James, Edin.
Bond, Henry J. H., Cantab.
1831 Burrows, George, Cantab.
Dew, Edward, Edin.
Gwillim, William, Erlangen
1832 Gooch, William H., Edin.
Evans, G. F., Edin.
Johnstone, James, Cantab.
1833 Cape, Lawson, Edin.
Cooke, Augustus, Albany, U.S.
1834 Diamond, Hugh, Kiel
Sandwith, Humphry, St. And.
Ward, Thomas O., Oxon.
1835 Bell, George W., Edin.
Heberden, T., Oxon.
James, Edward, Edin.
1836 Bushnan, J. S., Heidelb.
1837 Farre, Frederic J., Cantab.
Livett, Henry W., Pisa
Miles, John, Erlangen
West, Charles, Berlin
1838 Jeaffreson, Henry, Cantab.
Paget, George E., Cantab.
Ray, Charles, Pisa
1839 Brush, John R, Heidelb.
Black, Patrick, Oxon.
Evans, G F, Cantab.
Evans, Owen, Erlangen
Falconer, Randle W., Edin.
Lanchester, Thomas W., Erlangen
1840 Porter, John H., Erlangen
Williams, Owen W., Edin.
1841 Buchanan, William, Erlangen
Dolton, W. B., Heidelb.
Farre, Arthur, Cantab.
Goodfellow, S. J., Lond.
Hutchinson, Francis, Erlangen
Moore, E., Tüb.
Moore, George, St. And.

M.D.

Prichard, A., Berlin 1841
Stanton, John, Heidelb. 1842
Williams, William, St. And.
Griffith, J. W., St. And.
McNicoll, D. H., Glasgow
Moore, E., Tubingen
Wise, Robert S., St And.
Buckley, Nathaniel, St. And. 1843
Currey, J. E., St. And. 1844
Dewes, Edward, Glasg.
Lawrence, R. M, Berlin
Smith, Protheroe, Aberd.
Vallance, J., Erlangen
Bartley, R. T. H., St. And. 1845
Brent, Robert, St. And.
Cocker, John, Erlangen
Davies, John, Aberd.
Ellison, James, Lond.
Griffith, J. William, St. And.
Head, Thomas, St. And.
Husband, George, Giessen
Palmer, Edward, St. And.
Sandwith, Thomas, Erlangen
Stacpoole, G. C., Edin.
Gibb, G. Duncan, Montreal 1846
Harcourt, George, St. And.
Stevenson, John F., Edin.
Wood, Thomas, Aberd.
Burgess, Joshua, Aberd. 1847
Griffiths, S. Clewin, St. And.
James, George W., Paris
Phillips, Edward, Jena
Scholfield, Henry D., Oxon.
Williams, A. Wynn, St. And.
Winstone, Benjamin, Aberd.
Parry, Richard, Aberd. 1848
Randall, John, Lond.
Brown, W. H., Giessen 1849
Churchill, S., Aberd.
Corfe, George, Aberd.
Scott, William, St. And.
Chomley, William, St. And. 1850
Davies, John, Aberd.
Gibbs, John H., Aberd.
Hewett, Joseph, St. And.
Latham, R. G., Cantab.
Sandwith, H., St. And.
Sankey, W. H. O., Lond.
Williams, Edward, St. And.
Armstrong, John, Aberd. 1851
Ashford, J. B., Aberd.
Blundell, John W. F., Giessen
Clarke, J. Say, Aberd.
Grayling, John, Aberd.
Ledsam, John J., St. And.
Montgomery, James B., Glasg.
Ormerod, Edward L., Cantab.
Young, Robert, Aberd.
Blackmore, Samuel, St. And. 1852
Bryan, John M., Aberd.
Cautley, John, St. And.
Elliott, Ernest
Pickford, James H., Aberd.

	M.D.
1852	Richards, Owen, Aberd.
	Swift, George, Aberd.
	Matthews, John, St. And.
1853	Amsden, George, Jena
	Callaway, Rev. Henry, Aberd.
	Cregeen, James J., St. And.
	Dixon, Thomas G., St. And.
	Mackinder, Draper, St. And.
	Roberts, John, Erlangen
	Russell, George J., Aberd.
	Sanderson, Hugh J., St. And.
	Taylor, J. Stopford, Aberd.
	Tibbits, J., St. And.
	Tuke, Daniel H., Heidelb.
1854	Deane, J., Glasg.
	Farrar, Charles, Heidelb.
	Goodwin, John W., Cantab.
	Haviland, Henry J., Cantab.
	Helps, William, St. And.
	Lloyd, John A., Aberd.
	Palmer, Charles, St. And.
	Steel, John S., Aberd.
1855	Adam, Joseph, Edin.
	Banks, William R., St. And.
	Blomfield, Josiah, Aberd.
	Pitt, Edward, Aberd.
	Skelton, John, Mass. U.S.
	Thompson, Charles T., St. And.
1856	Allen, George, St. And.
	Bishop, Edwin, Erlangen
	Coucher, Martin S., St. And.
	Croft, J. McGrigor, Aberd.
	Dobell, Horace, St. And.
	Furley, Edward, St. And.
	Jones, Walter, St. And.
	Lombe, Thomas R., Aberd.
	Warry, S. Taylor, St. And.
	Waugh, J. N., St. And.
1857	Batt, Augustine, St. And.
	Blackmore, Humphry, St. And.
	Drage, Charles, Aberd.
	Gray, T. Scott, St. And.
	Hatherley, N. Collins, Aberd.
	Henderson, William, Aberd.
	Reeve, John F., Aberd.
	Roberts, J. Thomas, Erlangen
	Rogers, Thomas L., St. And.
	Rolleston, George, Oxon.
	Smith, Frederick M., St. And.
	Smith, W. Abbotts, St. And.
	Stillwell, Henry, Edin.
1858	Diver, Thomas, St. And.
	Harries, George J., St. And.
	Harrison, John, St. And.
	Mayne, Robert F., Jena
	Waylen, J. R., St. And.
	Warwick, Richard A., St. And.
	Wilson, F., Heidelbay
	Wood, Alfred J., St. And.
	Woodhouse, J., Aberd.
1859	Adams, James, St. And.
	Bogge, Edward B., St. And.
	Burd, Edward, Cantab.

	M.D.
	Chappel, J. J., St. And.
1859	Coombs, James, Erlangen
	Dyer, W. Thiselton, St. And.
	Edwards, G. Nelson, Cantab.
	Evans, Nichol, St. And.
	Fox, Luther Owen, St. And.
	Gilbertson, Joseph G., Aberd.
	Guppy, Thomas S., Aberd.
	Harris, Francis, Cantab.
	Holden, George, St. And.
	Humphry, George M., Cantab.
	Martin, Robert, Cantab.
	Mead, George B., Giessen.
	Newman, William, Lond.
	Noble, T., Aberd.
	Pinchard, Benjamin, Aberd.
	Ridley, Joseph S., St. And.
	Wotton, Charles, St. And.
	Smith, Charles E., St. And.
1860	Batten, Rayner W., Lond.
	Candy, John, Aberd.
	Cann, T., St. And.
	Cooke, William H., Aberd.
	Dudley, J. Gardner, Cantab.
	Dudley, W. Lewis, St. And.
	Goodacre, Francis B., Cantab.
	Hall, Egerton F., St. And.
	Hayden, Nathaniel J., St. And.
	Hoskins, E. J., St. And.
	Ingram, Charles, Cantab.
	Jackson, J. Hughlings, St. And.
	Kitching, Alfred, Aberd.
	May, E. H., St. And.
	Stutter, Frederick J., St. And.
	Thomas, J. Henry, Aberd.
	Turner, Roger, St. And.
	Tylecote, Edward T., Aberd.
	Williams, Jno., St. And.
1861	Baller, Joseph H., St. And.
	Brigstocke, H., St. And.
	Cotton, Thomas, St. And.
	Davis, Th., St. And.
	Ducket, C. A., St. And.
	Gray, Edward B., Oxon.
	Harrison, Charles, St. And.
	Hawkes, J., St. And.
	Iles, Albert, St. And.
	Neatby, Thomas, St. And.
	Lemon, Henry H., St. And.
	Parsons, Francis H., Glasg.
	Sadler, M. T., Lond.
	Starke, A. G H., St. And.
	Wallace, Alexander, Oxon.
1862	Adams, J. D., St. And.
	Andrews, F. F., St. And.
	Angier, G. A., St. And.
	Barwise, Joseph, St. And.
	Beattie, H., St. And.
	Buckle, F., St. And.
	Chippendale, Walter, St. And.
	Crompton, S., St. And.
	Davey, A. G., St. And.
	Davey, R. S., St. And.

M.D.

1862 Davies, F., St. And.
Dunderdale, William, St. And.
Evers, C., St. And.
Farrington, W. H., St. And.
Fitzgerald, C. E., St. And.
Foote, C. N., St. And.
Gardiner, G. G., St. And.
George, H., St. And.
Gimson, W. G., St. And.
Godwin, Ashton, St. And.
Geatrex, A. B., St. And.
Griffiths, G. H., St. And.
Hilton, C. S., St. And.
Hodgson, W. J., St. And.
Howell, H. S, St. And.
Hulme, J. D., St. And.
Longhurst, A. E., St. And.
Matterson, W., St. And.
Miller, C. M., St. And.
Milsome, F., St. And.
Needham, F., St. And.
Noad, G. W., St. And.
Monro, Henry, Oxon.
Norton, W. A., St. And.
Pierpoint, N. B., St. And.
Powell, Josiah L., St. And.
Pullen, T. H. S., St. And.
Reed, G., St. And.
Rendle, J. D., St. And.
Rogers, B., St. And.
Savory, Charles T., St. And.
Selwood, H. C., St. And.
Simons, J. A., St. And.
Stokoe, R., St. And.
Teare, T. M., St. And.
Tuckwell, H. M., Oxon.
Waghorn, F., St. And.
Warner, John, St. And.
Williams, S. Duckworth, St. And.
Wray, D. C., St. And.
Yearsley, J., St. And.
1863 Andrew, James, Oxon.
Duckworth, D., Edin.
Davey, J. G., St. And.
Ludlow, T., St. And.
Mackintosh, H., Erlangen
Monro, H., Oxon.
Reynalds, T., Erlangen
Roberts, T. S., Edin.
Waters, W. S., Edin.
1864 Church, W., Oxon.
Evans, J. Tasker, Aberd.
Latham, Peter W., Cantab.
Stowell, T., New York
Willis, Francis, Oxon.
1865 Lanchester, H. T., Lond.

M.B.

1845 Evans, D. P., Lond.
1849 Drake, Augustus, Cantab.
1850 Lewis, Robert B., Lond.
1851 Gibbon, Septimus, Cantab.

M.B.

Rice, Bernard, Lond. 1852
Walker, John W., Lond. 1853
Whitby, Charles W., Aberd.
Trollope, Thomas, Cantab. 1854
Beard, Charles I, Cantab. 1855
Chance, Frank, Cantab.
Galton, Robert C., Cantab.
Powell, Frank, Lond.
Day, Edmond H., Cantab. 1856
Delagarde, J. Lempriere, Lond. 1857
King, Alfred, Aberd.
Turner, William, Lond.
Stallard, J. Harrison, Lond. 1858
Crowfoot, William M., Lond. 1859
Newman, Augustus, Oxon
Ward, Samuel M., Cantab. 1860
Andrew, William, Cantab. 1861
Ferguson, George, Lond.
Fish, John C., Cantab.
Mackenzie, John I., Cantab.
Southey, Reginald, Oxon.
Evans, Herbert, Oxon. 1862
Jeaffreson, H., Lond.
Harington, J. D., Oxon.
Shuttleworth, J. Cantab.
Balls, Walter, Cantab. 1863
Heaton, F. L., Oxon.
Hoffman, W., Cantab.
Paxton, F. V., Oxon.
Southam, G. T., Lond.
Taaffe, R. B., Lond.
Fairbank, H., Lond. 1864
Graham, A. R., Cantab.
Griffin, T. C., Oxon.
Hingston, C. A., Lond.
Redwood, T. H., Durh.

F.R.C.P., Lond.

Hue, J. W., M.A., Cantab. 1856
Hunt, H. 1859

M.R.C.P.

Hitch, S. 1859
Smart, Thos. 1860
Hinxman, H. J. 1861
Witt, Charles
Edwards, D. Owen 1864

F.R.C.S.

Arrowsmith, J. Y. 1843
Balls, W., Cantab.
Carden, Henry D.
Chapman, Henry
Cooper, G. Lewis
Crookes, James F.
Curling, T. B.
Delagarde, P. Chilwell
Dickin, John
Dover, Frederick
Fox, Douglas

F.R.C.S.

1848 Gay, John
Gore, R. T.
Gulliver, George
Hallowes, Price B.
Hammond, Josiah
Harrison, Charles H. R.
Hodgson, Joseph
Holthouse, Carsten
James, John H.
Johnson, John G.
Kiernan, F.
Lawrence, William
Lestourgeon, Charles
Macilwain, George
McWhinnie, A. M.
Martin, Sir J. Ranald
Middlemore, Richard
Owen, Richard
Paget, James
Parker, Langston
Partridge, Richard
Pennington, William
Perry, John G.
Rae, Sir William, C. B.
Skey, Frederick C.
Smith, H. Spencer
Solly, Samuel
Stubbs, Henry
Toogood, Jonathan
Wilson, Erasmus
Wilton, John W.
Wormald, Thomas

1844 Ball, Daniel
Barton, Samuel
Birch, William
Brooke, Charles
Bullen, George
Chavasse, Thomas
Colthurst, John
Coote, Holmes
Griffith, Thomas T.
Holden, Luther
Martin, Robert
Mayo, Charles
Middleton, William
Norris, Henry
Robarts, H. Pratt
Sankey, William
Waylen, William

1845 Cooper, W. White
Fereday, Thomas
Firth, George W. W.
Meade, Richard
Stilwell, James
Ware, James T.
White, John L.

1846 Newton, Edward

1848 Moore, Charles H.
Walton, Haynes

1849 Barker, Edgar
Girdlestone, T. M.
Havers, John

F.R.C.S.

Haynes, Raymond 1849
Hulme, Edward C.
Hussey, Edward L.

Barnes, C. Hewetson 1852
Bartleet, Edwin
Berry, Samuel
Blenkinsop, Henry
Brendon, Peter
Brewer, J.
Chavasse, Charles A.
Church, William J.
Covey, W. H.
Cross, William
Fortescue, William
Harding, John Fosse
Hester, James T.
Hutchinson, W. Barclay
Irving, William
Jones, Henry D.
Lowdell, George
Pollock, Robert J.
Rye, Arthur B.
Savory, W. Scovell
Snowden, George S.
Spooner, Edward Ore
Startin, James
Tarleton, William
Theed, Frederick
Vicary, George
West, William C.
Wright, W. K.

Bramley, Lawrence 1853
Daglish, G.
Hands, Benjamin
Harris, William
Jackson, William
May, Edward C.
Pollock, Robert J.
Rogers, Arnold

Burlton, Thomas 1854
Cooper, Thomas S.
Dayman, Henry
Dawson, William
Hawkins, Clement
Henry, Mitchell
Kesteven, W. Bedford
Langshaw, James P.
Power, Henry
Sleeman, Philips R.
Scott, John
Solomon, J. Vose
Weekes, George

Bateman, Henry 1855
Callender, George W.
Jepson, E. C.
Phillips, George
Slyman, William
Smee, Alfred
Turner, John
Wells, Richard F.

Clifton, Nathaniel 1856
Humphry, F. Abell

F.R.C.S.

1856 James, Henry
Lindop, William
Starling, Robert J.
Turner, James W.
Webb, Joseph
Wetherhead, T.
Wraith, S. Hope
1857 Nicholson, John F.
Owen, Edward R.
Robinson, Charles
1858 Bird, Henry
Ebbage, Thomas
Eccles, Alfred
Hayman, Henry
Hughes, John
Mathew, James E.
Moore, Edward
Parsons, James St. J. G.
Ree, Henry Pawle
Smith, Thomas
1859 Archer, John
Benfield, Thomas W.
Brodhurst, B. Edward
Cowen, Henry L.
Harston, A. D.
Martin, H. Victor
Metcalfe, Edmund
Oldham, Riton
Steel, Charles D.
Warwick, John
Webber, William
Williams, James
1860 Bancks, Thomas
Bedwell, Henry
Crosse, Thomas W.
Earle, Edward S.
Heslop, Luke C.
May, Joseph
Ness, John
Wood, Frederick
1861 Baker, Robert
Holmes, Charles
Kempe, Arthur
Kingdon, John A.
Michell, S. V.
Taylor, Thomas
1862 Barrow, Benjamin
Hall, William
Holbrow, Anthony
Hutchinson, Jonathan
Marson, J. Furness
Sadler, Samuel C.
Sharpin, H. Wilson
Willett, Alfred
Vernon, Bowater J.
1863 Helm, G.
Ilott, Edward
Langdon, T. C.
Lowe, George
Nesbitt, F. A.
Thomson, C. E.
1864 Greenhill, J. R.
Pooley, Charles

F.R.C.S.

Selwood, H. 1864
Tothill, F. D.
Baker, W. M. 1865
Barter, C. S.
Langton, John

M.R.C.S.

Chapman, Thomas 1800
Sutton, John 1801
Price, James 1806
Fincham, George 1807
Haffenden, Thomas
Combe, Henry 1808
Moore, John 1810
Baker, William 1811
Gay, John
Godfrey, Joseph J.
Meade, Robert 1812
Reeve, J. Foster
Dandy, C. 1813
Fowler, W.
Godfrey, Race
Tate, Robert
Propert, John 1814
Wing, Charles
Batty, Bryan 1815
Harris, Thomas
Marchant, Robert
Millard, George H.
Rymer, James
Williams, Henry
Cholmondeley, J. 1816
Costall, John
Davies, Robert
Gent, John S.
White, Richard
Gay, Joseph 1817
Shipman, George
Thompson, Charles M.
Ware, John
Eastment, John W. 1818
Fletcher, Matthew
Forder, James
Jerrard, Charles H.
Salmon, Frederick
Taylor, Thomas
Troughton, Nathaniel
Bunn, William P. 1819
Dixon, Charles
Gaye, Charles
Godrich, Francis
Hammond, Charles C.
Mayou, John
Wood, G. L.
Bond, E. T. 1820
Brookman, Hugh
Crawford, David
George, Richard H.
Summers, R.
Sutton, C. Frederick
Baker, Robert 1821
Gatehouse, Charles
Hunter, John C.

M.R.C.S.

1821 Mitchell, Samuel
Price, William
1822 Bogg, John
Cooke, William
Curtis, Frederick
Hawett, Thomas
Hitch, Samuel
Leech, E.
Overton, John
Randall, Alfred M.
Terry, William
Thursfield, Richard
Walmsley, Thomas
Williams, John
1823 Atkinson, Richard
Biddle, Henry
Brodribb, William
Cary, W. H.
Chapman, George
Davis, Theodore
Green, Thomas
Ingram, William
Johnston, John
Latham, John
Turner, Thomas W.
White, Samuel
1824 Gardner, John
Jeston, Alfred F. W.
Lawton, John
Long, Edward
Savory, Joseph T.
Simpson, William
Smith, Thomas
Taplin, Thomas
Tutin, Septimus
Warner, Thomas
Whitaker, Edward F.
Woodward, John R.
1825 Baillie, Arthur
Bird, James
Cary, William H.
Curtis, William
Douglas, Richard
Else, John Ogle
Evans, T. John
Hingeston, William
Hunter, Thomas D.
Newton, Thomas
Pridham, Thomas L.
Southcomb, William T.
Thompson, John N.
Walker, George
Watson, Job
Williams, William
1826 Angier, James H.
Barter, Thomas
Caird, William
Coleridge, Ernest
Camden, George
Hele, Henry H.
Hilder, Henry H.
Hutchins, William
Moore, Edward D.

M.R.C.S.

Pearce, Thomas 1826
Rogers, George O.
Rowley, E. Butler
Sankey, Frederick H.
Terry, John
Ware, Richardson
Bond, H. Hollier 1827
Box, John
Caswell, Charles
Davies, Thomas
Elliott, John
Evans, Owen
Freeman, Spencer
Gisborne, H. F.
Gutteridge, Thomas
Hoare, William
Jackson, Matthew
Jotham, George
Miller, William E.
Moore, John
Oriel, Frederick H. C.
Pyne, Richard
Rogerson, George
Trevan, Frederick
Vise, Charles 1827
Watson, Robert M.
Winzar, John
Wood, Thomas
Burroughs, J. Beames 1828
Hansard, Frederick A.
Hole, John
Lansdown, Joseph G.
McLeod, A. William
Parsons, William A.
Saunders, Edwin D.
Sewell, John J.
Stilwell, George
Tidboald, John A.
Tomlinson, Robert S.
Whitcombe, Edmund B.
Beach, Henry 1829
Bellis, Benjamin
Brickwell, John
Bulmer, William
Bush, Edwin
Butler, W. H.
Caudle, John
Fallows, John
Farwell, John
Jenkins, Henry J.
Maskelyne, Henry
Mudge, Henry
Pennington, Thomas
Potter, T. H.
Skeel, David
Smith, Robert
Vincent, George
Wright, Thomas G.
Ascroft, E. Hatton 1830
Atkinson, H. Miles
Bott, Thomas
Brickwell, James
Brown, William H.

M.R.C.S.

1830 Burt, S. John
Chapman, Thomas
Clark, James E.
Covey, George
Faithorn, George
Griffin, Richard
Harbroe, Edward
Harries, Charles A.
McGuire, William
Philbrick, Samuel A.
Proctor, A. George
Taylor, William

1831 Bennington, Robert
Bowes, Richard
Brown, J. Mavor
Bullmore, Frederick C.
Carter, Daniel D.
Cattell, Thomas W.
Corsellis, N. C.
Crosby, Thomas
Gillott, Edward D.
Greaves, William T.
Hitchcock, Thomas
Hughes, H. H.
Ledgard, J. Armitage
Leppington, Hildyard M.
Ley, William
Loveless, William K.
Manby, Aaron
Payne, G. S.
Radcliffe, Henry J.
Sandell, Henry W.
Sicard, Amelius
Southam, T.
Steele, Henry C.
Stocker, George S.
Twigge, Nathaniel B.
Walker, George A.
Walter, John
Walter, Odiarne C.

1832 Bedwell, John B.
Blick, Thomas C.
Brewer, Alexander
Cartwright, John T.
Chatto, John
Copeland, George F.
Foster, Joseph
Gerrans, James G.
Hammond, Arthur
Jackson, Richard S.
Lang, William
Maling, E. H.
Martin, Thomas D.
Norris, Thomas S.
Parsley, William H.
Powell, Alfred
Price, Rees C.
Rendell, Robert
Rumsey, Charles
Ward, William S.
Wyman, George

1833 William Bainbridge,
Baker, Thomas J.

M.R.C.S.

Brickwell, Charles J. 1833
Coates, W. Martin
Cotterell, Thomas S.
Dakeyne, Bowden
Edkins, Clement
Edwards, Conway T.
Kelly, James
Lee, Henry B.
Mousley, George
Orton, William
Pearce, Francis D.
Rouse, Eusebius
Simonds, Thomas R.
Toogood, Isaac B.
Tuckwell, William J. S.
Wilks, George F.
Williams, Thomas
Wiseman, W. Wood

Allen, Richard 1834
Anderton, Charles
Barnett, Henry
Bird, John
Clark, John L.
Elliott, Philip
Evans, Samuel
Gayleard, John
Green, J. C.
Harvey, William
Hitchcock, Charles
Gayleard, John
James, James
Jones, Henry Prout
Jones, John
Phillips, John
Powell, John J.
Sladden, John
Smith, Edwin
Smith, William
Squire, Arthur
Stewart, Z. Robert
Tucker, Richard P.
Wynne, John

Bore, George H. 1835
Bostock, J. A.
Chadwick, Peter C.
Dawson, Thomas
Dawson, William
Edwardes, Thomas
Elston, William A.
Francis, John
Gibson, George
Hall, William
Kirkman, John M.
Lavery, Thomas
Leigh, Percival
Michell, George A.
New, Henry
Newbold, Henry
Newman, George
Owen, Albert P.
Potter, Frank D.
Prichard, Hopkin L.

	M.R.C.S.
1885	Ruddock, R. Beadon
	Sawkins, James
	Sharples, William
	Square, W. J.
	Taunton, Thomas
	Thackwell, William
	Walton, John S.
	Ward, Joseph
	Webb, John S.
	Webb, Thomas F.
	Whitney, William
1886	Barsham, J. Brigham
	Beveridge, James E.
	Burt, Giles R.
	Bowra, H. Goodeve
	Franklin, Arthur W.
	Eland, J. L.
	James, Thomas
	Lascelles, Robert M.
	Moore, Walter
	Oliver, William H.
	Pearse, W. D.
	Quick, James R.
	Roper, Giles S.
	Spencer, J. H.
	Stone, Robert N.
	Taynton, William
	Thomas, James
	Tuck, Rev. T. Ridout
	Vallack, Adoniah
	Wilson, Thomas
	Wood, John G.
1887	Cotterell, Thomas R.
	Evans, Thomas
	Evans, Thomas
	Ferris, George
	Gillard, F. J.
	Gorham, Richard V.
	Hodson, Charles F.
	Ilott, James W.
	Kemm, William
	Laity, Richard J.
	Latten, Robert
	Laycock, William
	Puddicombe, J. Morgan
	Rowley, John
	Sargent, D. Warne
	Sawer, Thomas
	Shurlock, Manwaring
	Staning, Richard
	Taylor, Thomas
	Warren, Frederick H.
	Whateley, Thomas
1888	Baxter, Henry F.
	Bostock, J. Ashton
	Burman, Thomas S.
	Coates, Mervin
	Cooke, William R.
	Danford, Frederick
	Duff, William H.
	Fenn, Thomas H.
	Heaton, Charles
	Hitchings, Thomas

	M.R.C.S.
	Houghton, John H.
1838	Hunt, Henry
	Knight, Morrison
	Lloyd, David
	Master, Alfred
	Mathias, John E.
	Nutt, William
	Prichard, William
	Skell, Thomas
	Stowers, Nowell
	Tayler, Christopher
	Thurnall, William
	Wraith, John H.
1839	Archer, George S.
	Barringer, Thomas S.
	Bartlam, Edward G.
	Bennett, James
	Brickwell, Henry
	Blaker, H. M.
	Brewer, William H.
	Burton, B. T.
	Dain, Frederick R.
	Donald, J. Rickerby
	Eccles, John H.
	Freer, Richard L.
	Heatley, John
	Hughes, Hugh R.
	Latham, Charles
	Leather, Peter W.
	Lingard, A. Rowson
	Little, J. Carruthers
	Newton, Launcelot
	Powell, Henry
	Pritchett, George M.
	Rigden, George C.
	Roskruge, Thomas H. A.
	Sugden, William
	Sylvester, George M.
	Waylen, George
	Wilding, Richard
	Woollett, Robert F.
1840	Acton, William
	Basley, Charles
	Chapman, Thomas
	Cock, J. E.
	Cornwall, John
	Daniel, William
	Gilbertson, Richard
	Hardwicke, Haynes
	Hill, Robert S.
	Mant, Newton
	Maughan, John B.
	Orr, John A.
	Partridge, Joseph H.
	Reynolds, Charles
	Stones, William
	Twining, E.
	Upton, Thomas S.
	Verity, A. J.
1841	Brownless, A. Colling
	Cresswell, John
	Freer, Walter C.
	Gay, John

M.R.C.S.

1841 Graham, Thomas
Jones, Thomas
Lawrence, William F.
Leggatt, Richard S.
Marsh, Augustus A.
Newman, Henry
Parker, Samuel
Turner, Charles C.
Vicary, G. Thomas
Vise, Edward
Weatherly, Frederick
Witt, Charles

1842 Alger, J. Speller
Allen, Edward
Briscoe, John
Carillo, F. de Paula
Cockey, Edmund
Dixon, Henry
Evans, Thomas
Hawthorn, F.
Hawthorn, Henry O.
Haig, John B.
Harrison, E. T. D.
Hayes, Henry
Hill, William
Jackson, John T.
Jones, George T.
Little, Thomas, S.
McNab, Duncan R.
Moore, David
Oates, Joseph P.
Phillips, George M.
Prince, Thomas
Rusher, James G.
Sison, Edward
Southam, Francis
Skeel, Thomas
Stone, Daniel
Sumner, W. Allen
Taylor, Thomas
Vardy, Joseph
Williams, William
Wrixon, John

1843 Austin, Thomas J.
Bagg, George W.
Boodle, Robert H.
Coveney, James H.
Culling, Robert
Fox, George F.
Gabb, Alfred W.
Goddard, L. Morse
Growse, John
Johnson, George
Lawrence, Leonard A.
Lee, Richard
Linnecar, Edward
McCheane, William
Ogle, E. Ledge
Parson, Edward K.
Perry, Charles H.
Pollard, William
Reid, James
Reynolds, H. Wells

M.R.C.S.

Sheppard, William 1843
Smith, C. Manners
Swayne, Samuel H.
Tyrer, Robert
Wadams, Edmund
Warren, Thomas A.
Wheeler, Thomas R.

Badger, Samuel T. 1844
Brake, W. N.
Brine, John
Fenton, Henry
Hore, Henry A.
Givins, G. Edward.
Key, W. Dundas
King, Richard
Lowne, B. T.
Morse, Arthur C.
Philbrick, Thomas
Peirce, R. King
Read, Charles G.
Sankey, William
Scott, Richard J.
Shaw, Henry E. F.
Willey, Thomas

Allen, A. B. de Lisle 1845
Barnes, F. W.
Bullen, George
Collyns, John B.
Collyns, William
Cripps, Edward
De Crespigney, E. C.
Daubeney, James
Eccleston, Thomas
Gabb, David H.
Garrington, William H.
Gaved, Arthur
Goodwin, Charles
Hayward, John
Hooper, John T.
Horne, Thomas B.
Husband, Charles
Hunt, William C.
Hutchinson, J. R.
Kite, William J.
Mann, Robert M.
Newell, Henry A.
Pilkington, William H.
Pratt, George
Roscow, Peter
Saunders, George
Taylor, James E.
Thornley, Robert S.
Vicary, Charles

Allen, F. Freeman 1846
Beale, John S.
Clark, Alfred
Collins, Charles H.
Francis, M.
Gaved, Arthur
Hall, Edward
James, Thomas
Kite, W. J.
Marshall, Thomas H.

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1846 Riscoe, Richard B.
Robinson, Charles
Smith, John B.
Yates, James
1847 Alsop, Edward
Badley, James P.
Barrow, John K.
Beecroft, John
Button, Benjamin
Courtney, Charles F. A.
Cutliffe, John L.
Davies, William
Harris, Richard D.
Hepworth, George A.
Hughes, William E.
Ingman, John
La Fargue, Peter A.
Munday, Charles
Orford, William C.
Pemberton, Oliver
Rogers, T. A.
Sympson, Thomas
Waterland, Henry J.
Wilkins, Ernest P.
Worship, J. L.
1848 Andrews, Edward
Archer, Edmund
Boughton, John H.
Chapman, Edgar G.
Clark, Robert Oke
Daniel, Alfred H.
Dunn, George
Gregory, Joseph
Hinton, James
Jackman, Thomas S. H.
Jones, A. Barron
King, Francis
Knight, Gustavus T.
Knott, Thomas B.
Leech, Henry P.
Mackenzie, George W.
Mason, Robert
Miles, Charles
Parke, John L.
Piper, Charles C.
Rogers, Henry
Taunton, George
Thomas, David R.
Thurston, George J.
Walker, Charles
Waylen, Edward
1849 Bratt, William
Cautley, William C.
Evans, Franklin G.
Gaskell, William A.
German, Joseph
Hanbury, Cornelius
Hoskins, H. R.
Hurst, Robert C.
Hutchinson, Thomas
Manifold, W. Hargreaves
Payne, Sturley
Prowse, William

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Sheppard, J. Brigstock 1849
Smith, John
Spackman, F. Charles
Tompson, Charles A.
Tracy, S. John
Waylen, Edward
Weekes, John
Woolhouse, Henry H.
Adams, Edward B. 1850
Attfield, George
Bennett, George A.
Blyth, Edward J.
Brown, John A.
Caird, T. Wilson
Clarke, William M.
Clubbe, W. Henchman
Dingley, William
Forster, John E.
Furnell, M. C.
Grammer, S. Richard
Hillier, James T.
Lobb, Harry W.
Marsh, John
Marriott, John
Penfold, Henry
Perkin, Richard C.
Roper, Charles H.
Stevens, N. Henry
Thompson, Charles R.
Tinsley, William W.
Voss, Howell
Watts, George H.
Wills, John S.
Archer, Lewis H. 1851
Barbeau, Alcide
Bickersteth, Edward R.
Brereton, C. Le Gay
Brown, J. Ansell
Bucknill, Henry W.
Bringloe, Capel
Cupiss, Francis P.
Gatty, William H.
Hardey, Key
Hichens, James S.
Johnson, Thomas R.
Jones, David
Langdon, John
Leverton, Henry S.
Mercer, Edward
Mitchinson, George
Moore, Ebenezer
Odell, Thomas
Osborn, Henry
Rainey, William B.
Reece, Richard
Sheehy, William
Stafford, Stephen J. F.
Stretton, William H.
Webb, Harry S.
Webster, George E.
Wolstenholme, John H.
Yates, William H.
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1852 Costerton, Horatio
Curgenven, J. Brendon
Dansey, George F.
Davenport, Charles
Denny, John
Edmunds, John
Foquett, H. R.
Hall, Francis R.
Hartley, J.
Hazard, Joseph
Hewer, John H.
Hooper, L. G.
Hosking, Richard
Ingram, William G. L.
Jackson, Peter N.
Jeeves, William Y.
Julian, John P.
Kirkhouse, George
Moorhouse, J. W.
Palmer, Charles
Raymond, Lewis R.
Rhind, Samuel
Rogers, Henry J.
Russell, George
Salter, John R.
Tact, E. W.
Terry, George
Walters, R. B
Wilton, John P.
1853 Baker, Slade I.
Bromley, Frederick
Croft, R. Charles
Davies, T. G. D.
Favell, W. F.
Hester, James
Hewlett, C.
James, Edward
Jones, Henry
Lawrence, J. Trevor
Lewis, William T.
Longhurst, Arthur E. T.
Pepler, William B.
Philpott, Henry G.
Pritchett, John B.
Rendell, William J.
Raymond, Henry H.
Scobell, Rev. George
Spicer, Northcote W.
Sturkey, Henry G.
Thomas, Richard H.
Thomas, Richard
Turner, Charles
Tyte, Robert H.
Vaudin, Charles
Vaughan, William E. W.
Williams, Isaac M.
Wright, John
1854 Adams, Richard
Aldridge, Charles J.
Barrett, Charles A.
Bennett, Frederick
Blackman, Frederick
Brown, R. Gibson

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Buswell, Richard 1854
Coates, Geo. V.
Cornish, S. Henry
Davis, Arthur A.
Elkington, Thomas
Fryer, Thomas W.
Harris, Samuel
Haward, Wallace
Hichens, G. L.
Hooper, Lucas G.
Jalland, Robert
Jowers, Frederick W.
Keal, William
Langdon, H. W.
Langworthy, John M. B.
Marrack, William
Meldola, Raphael
Miles, H. Chalmers
Morris, Edward
Moss, William B.
Muschamp, W. H.
Pennington, F.
Permewan, John
Pollard, James
Savory, J. Egerton
Soame, Charles V.
Stretton, Samuel
Taplin, Benjamin D.
Vise, Ambrose B.
Webb, Randolph
Whitling, Henry T.
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Allen, Joseph
Andrew, John M.
Best, Henry D.
Betham, John
Bletchley, Edmund
Bowen, Wardle
Baly, George
Bicknell, Herman
Blackman, Frederick
Collyns, George N.
Dalley, William C.
Davey, Richard S.
Dunne, Frederick
Eaton, F. J.
Forshall, F. H.
Fulcher, G. A.
Furnival, Edward T.
Gray, William
Greatrex, A. B. W.
Harding, William W.
Hitchins, Charles V.
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Jacob, Edward L.
Jeans, Joseph H.
Jones, Morgan
Oldfield, Edmund
Picken, Samuel
Shepherd, F.
Shipton, J. N.
Soper, J. H.
Stanwell, William

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1855 Slyman, W. Daniel
Stephenson, Thomas A.
Stevens, Daniel F.
Watkins, D. Rees
Wilson, William J.
Wilton, Francis
1856 Andrews, C. E.
Barker, Edgar
Beale, Thomas Miles
Brickwell, John
Campion, Henry
Croff, Robert
Cuff, Robert
Daniel, William J.
Daniel, William C.
Dearden, James
Edwards, Charles L.
Evans, Charles
Fisher, Frederick
Girdlestone, William T.
Gover, R. Mundy
Hine, Samuel D.
Howell, Griffiths
Hunt, T. Oliver
Jones, Thomas Eyton
Jones, Melville
Langford, Edwin C.
Nicholls, Lucius
Perrot, Henry
Perrin, William J.
Phillips, J. W.
Pinder, John B.
Powne, William
Pugh, John L.
Rainbird, Horace
Smith, William A.
Storrs, Robert
Terry, Charles
Thompson, William W.
Turner, Edward W.
Turney, Thomas H.
Tyack, J.
Williams, Charles
Williams, Peter
Winterbotham, Lauriston
Witten, Edward W.
Woods, Francis B.
1857 Allas, L.
Barford, J. Gale
Bodilly, J. D
Bower, William E.
Bradshaw, Alexander F.
Cope, Ricardo
Curtis, Albert
Denne, T.
Edwards, Henry J.
Evans, Abel
Foster, W. Frederick
Gross, John E.
Goodall, Ralph
James, John D.
Lawrance, F.
Lee, Newton

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Menzies, James T.
Morris, Richard
Moxon, John
Pughe, Hugh K.
Radley, William H.
Russell, John
Smith, W. Josiah
Stevenson, Nathaniel
Tench, Edward B.
Thomas, John
Wallis, George
Wood, William
Yarde, William
Baillie, B. Tillyer 1858
Bond, Florio
Bury, John W.
Callaway, E.
Carter, Albert
Dashwood, W. H.
Davey, Richard G.
Dearden, John
Davies, Henry H.
Dow, John
Falwasser, F.
Franey, Edward
Giles, William F.
Gray, Charles
Hall, Henry J.
Hallowes, Frederick B.
Hewlett, Thomas
Higgins, Henry
Hill, Thomas J.
Holmes, Arthur
Hoare, William
Hughes, T. H.
Jeaffreson, John B.
King, Edward P.
Knight, H. J.
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Senior, Charles
Turner, Thomas
Wingate, Robert
Winkfield, William
Wood, William James
Wookey, James
Wyer, Otho
Wynter, John
Aldrich, Pelham 1859
Antrobus, Daniel
Barreau, Francis H.
Bennett, G. John
Bett, Robert S. L.
Blaker, Edward S.
Bossy, Horsley

		M.R.C.S.
1859	Bridger, John	
	Brigstocke, Richard W.	
	Buck, Henry J.	
	Burrows, W. Adcock	
	Catlin, William	
	Close, Henry A.	
	Cox, Henry	
	Daniel, Thomas P.	
	Davies, T. E.	
	Dowker, Frederick W.	
	Edge, S.	
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	Freeman, S. A.	
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	Godfray, C. Le Visconte	
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	Hanslip, Thomas	
	Harris, William J.	
	Harrison, Reginald	
	Head, Robert T.	
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	Lloyd, David	
	Lloyd, Francis	
	Llewellyn, Ernest	
	Martin, Henry E.	
	May, John H.	
	Mitchell, Thomas C.	
	Mitchinson, C. C.	
	Moore, Thomas	
	Nunn, J. Robert	
	Parker, Robert	
	Quennell, John C.	
	Richardson, William H.	
	Sequira, H. L.	
	Sherwin, Henry C.	
	Shine, William L.	
	Smith, J. R.	
	Spouncer, Frederick C.	
	Thompson, Herbert	
	Van, Arthur F.	
	Verey, George	
	Wilson, J. A.	
	Winkfield, A.	
	Withers, Francis O. B.	
	Woods, Francis H.	
1860	Batty, Thomas	
	Bettington, John	
	Bright, J. W.	
	Brown, Frank H.	
	Butler, T. Mapleson	
	Cheese, James	
	Chune, Henry C.	
	Coleman, Alfred	
	Collins, John	
	Davies, Henry	
	Dawson, John	
	Dawson, William	
	Dowling T.	
	Dunn, Christopher B.	
	Edge, Howard	
	Egles, Gabriel M.	
	Eldershaw, Frederick	
	Evans, H. Norman	1860
	Evers, Charles	
	Ford, B. B.	
	France, William H.	
	Grigg, Nathaniel B.	
	Hammond, E. C.	
	Hammond, Frederick	
	Harris, Benjamin	
	Harvey, Octavius	
	James, Edwin M.	
	Jones, Thomas	
	Lancaster, William J.	
	Luke, Henry	
	Meade, Harry	
	Merry, Robert R.	
	Mickle, David	
	Nathan, Henry F.	
	Paine, William	
	Parker, Duncan	
	Pearse, William	
	Pocklington, Evelyn	
	Pridham, John W.	
	Riley, Henry	
	Russell, G. T.	
	Schollick, T. J.	
	Smith, Richard W.	
	Sprague, Charles G.	
	Stonehouse, Cornelius	
	Strickland, Edmund	
	Sutton, Henry	
	Tuxford, J. E.	
	Swales, Edward	
	Walker, W. H.	
	Weekes, W. H. Carlile	
	Williams, Evans E.	
	Armstrong, S.	1861
	Baker, W. Morrant	
	Bazeley, William	
	Bendall, J.	
	Brook, Charles	
	Brown, F. W.	
	Clarke, Edward G.	
	Cocker, W. Henry	
	Colquhoun, A. G.	
	Cooper, Alfred	
	Dawson, R. H.	
	Edwards, Walter	
	Ellis, H. D.	
	Ellis, Thomas S.	
	Evans, Thomas M.	
	Fenn, Edwin	
	Gardner, Sebastian	
	Griffiths, W. H.	
	Hartill, W. H.	
	Haslam, G. H.	
	Hine, W. C.	
	Hollis, William P.	
	Hughes, David	
	Hunter, R. H.	
	Jenkyns, Charles	
	Jones, Morris	
	Jones, R. Owen	
	Kough, O'Brien	

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1861	Langworthy, W. F.
	Leeds, Thomas
	Lewis, David W.
	Lowne, B. T.
	Macaulay, F. Edwin
	Mallet, Stanley E.
	Marsh, F. Howard
	Mayo, Charles
	Michell, Samuel V. P.
	Morrish, T. F.
	Murrell, William
	Oliver, Richard
	Owen, R. J.
	Patten, Charles A.
	Pennington, Abel
	Peel, Robert
	Potts, W. J.
	Robinson, Haynes
	Rolls, T.
	Russell, Thomas
	Scott, Nathaniel G.
	Stephenson, William
	Strutt, George H.
	Sutton, Frederick J.
	Swales, Peter
	Tanner, Richard C.
	Thomason, W. F.
	Thorne, Thomas H.
	Walker, Bernard
	Waylen, Charles W.
	Willett, C. V.
	Williams, Edward H.
1862	Addison, Charles E.
	Birt, Ambrose W.
	Bletchley, William
	Brown, John W.
	Bruce, James
	Coathupe, Charles
	Daniel, Woodruffe
	Drosier, Frederick
	Dunn, Alfred
	Eccles, G. H.
	Eccles, William S.
	Edlin, Edward
	Elliott, George
	Elliott, John R.
	Elliott, Richard
	Evans, W. L.
	Farwell, Arthur
	Gabb, Frederick E.
	Harris, Alfred
	Haycock, George
	Hedges, G. A.
	Humphry, C. H.
	Hughes, John E.
	James, John
	Jeaffreson, James
	Jenner, William
	Jones, Owen
	Jones, John
	Lawrence, R.
	Lemon, Henry
	Lindop, John C.
	Low, Alexander J.

	M.R.C.S.
	Ludlow, E.
1862	Mitton, M. J.
	Nelson, Samuel
	North, Walter D.
	Pettifer, Edmund H.
	Randell, E. B.
	Robinson, S. Haynes
	Sharpe, H. F.
	Simpson, Charles M.
	Southam, George T. M.
	Stewart, Charles
	Strickland, Edmund
	Waghorn, Henry
	Worboys, T. S.
1863	Ashton, J. H.
	Best, F. A.
	Blunt, Thomas
	Brewer, Thomas
	Brown, Edward
	Bruce, James
	Bryan, Edward
	Butlin, C. H.
	Covey, C. E.
	Currie, John L.
	Elliott, George H.
	Folliott, James
	Fowler, Oliver
	Garlike, E. W. B.
	Geoghegan, R. T.
	Glynn, T. R.
	Griffin, F. C. G.
	Hall, Samuel
	Henderson, G. H.
	Harris, J. Smith
	Houseman, Edward
	Hughes, W. F.
	Jeaffreson, C.
	Jones, William
	McCandlish, William
	Moon, Robert
	Mudge, B.
	Nash, Walter L.
	May, W. M.
	Orton, G. H.
	Osmond, Thomas
	Pearce, Francis D.
	Pilkington, T.
	Power, William H.
	Peatfield, T.
	Quarrell, W.
	Randell, E. B.
	Rees, H.
	Reynalds, John
	Ruddock, E. H.
	Shaw, C. E. M.
	Simpson, W.
	Spurway, Charles
	Stone, R. S.
	Stott, T. S.
	Taylor, Hugh
	Thomas, David H.
	Thorne, Richard
	Trevan, Matthew
	Vallance, E.

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1863 Walker, Bernard
Webber, H. J.
Whipple, Connell
Wicksteed, F. W. S.
Wilcox, William
Williams, Thomas E.
Wolferstan, Sedley
Woolley, T. S.
Worges, Thomas H.
Wright, Morden
Yarrow, George E.

1864 Arnold, J.
Bailey, F. C.
Battye, William
Beckett, F. M.
Bennett, F. G.
Bostock, E. J.
Brewer, C. C.
Brewer, H. A.
Brewer, H. M.
Bryant, W. H.
Coats, G. A. A.
Compton, T. A.
Cooke, A. S.
Covey, G.
Cropp, T.
Curtis, C. E.
Dalley, C. T.
Dangworthy, G. V.
Davies, T. H. W.
Eck, V. F.
Edwards, H. Nelson
Evans, J. T.
Fairles, N. W.
Fall, J.
Garlick, W.
Grellet, C. J.
Griffin, F. C. P.
Harvey, W.
Hope, Henry
Jones, R. A.
Kiernander, W.
Kinsey, R. H.
Knapp, F. W.
Langworthy, G. V.
Lush, W. G. V.
Maturin, C.
May, A. S.
Pearless, C. D.
Powdrell, T.
Powell, L.
Power, W. H.
Powne, B. L.
Price, J. L.
Raven, T. F.
Reade, A. C.
Richards, F. W.
Roper, R. G.
Royds, W. A.
Ruddock, E. H.
Shaw, G.
Simpson, S. H.
Smith, E. R.

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Smith, H. 1864
Snook, J. W.
Tayler, C.
Thibou, J. W.
Thomas, E.
Thomas, J. B.
Wearing, A.
Williams, E.
Wills, C. J.

L.S.A.

Parry, Peter 1809
Williams, Nicholas
Hawkes, Richard 1810
Owen, David
Hewes, Francis 1811
Eyles, Richard 1812
Vise, Edward B. 1813
Williams, John
Billet, James 1814
Davis, E.
Gowar, Frederick R.
Ridout, Thomas
Atherley, Joseph 1815
Farr, Joseph
Webster, W. H. B. 1816
Bond, W. S. 1817
Edginton, George W. 1818
Gaye, William
Dickinson, Thomas 1819
Trevan, Matthew
Hall, William 1820
Hole, John C. 1822
Watts, George
Whitfield, R. Gullett
Ackland, William 1823
Brunskill, William
Dalley, W. C.
Pinder, William
Young, Peter
George, Henry 1824
Rowcliffe, James H.
Swift, George
Beaston, John 1825
Bell, John
Bodington, George
Booth, Edwin
Lee, John
Tylecote, Edward 1826
Williams, William
Coates, George 1827
Kipling, William
Lawton, Richard
Rogerson, John
Sargant, Joseph
Shackleford, George
Terry, John J.
Baker, James 1828
Deane, Robert
Fullerton, John
Horton, Fitzwilliam
Millington, Richard

L.S.A.

1829 Davy, John W.
1830 Hooper, George D.
Hunt, Ezra
Lee, H.
1831 Morris, Henry
Searle, G. Clive
1832 Batten, William
Browne, Bernard
Franco, Massey R. F.
1833 Long, Thomas
Waring, T. W.
1834 Bodman, Joseph B.
Proudlove, Thomas J.
Walker, Thomas
1835 Simpson, George T.
1836 Carter, John
Fowke, F.

L.S.A.

Rendall, C. 1836
Slaytor, John C.
Goodwin, Joseph H. 1837
World, Robert R.
Hall, Thomas W. 1839
Day, John 1841
Ireland, James 1853
Mullings, Samuel E. 1854
Druce, William 1857
Roberts, Roger 1858
Williams, Richard P.
Rummin, George 1859

L.F.P.S., Glasgow.

Currie, J. T. 1838
Valpy, W. H. 1858
Myers, H. R. 1859

EXAMINATIONS, 1865.

Senior Scholarship in Medicine, Surgery, and Materia Medica—

1. W. L. Shepard
2. T. Cuddeford
3. J. O. Adams

Wix Prize—

H. Rundle

Hitchens Prize—

E. W. Berridge

PRACTICAL ANATOMY, SEN.

Foster Prize—H. C. Upton

{F. H. Haynes
{R. B. Moore
{J. A. J. Timmins
{J. Quick
{W. B. Burn
{F. H. Lovell
{W. Square
9. W. H. Tattersall

Senior Scholarship in Anatomy, Physiology, and Chemistry—

1. W. J. Garrett
2. W. Square
3. F. H. Haynes

JUNIOR STUDENTS.

1. E. B. Crowfoot
2. W. F. Thurston
3. L. Newton

PRACTICAL ANATOMY, JUN.

Treasurer's Prize—L. Newton

2nd Prize—C. Wade

3. J. Kirkman
{E. B. Crowfoot
{W. F. Thurston
6. E. Angove
7. H. J. Butlin
8. L. Clapham

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LECTURES.

Medicine—Dr. Black.
Clinical Medicine—Dr. Farre, Dr. Black, Dr. Martin.
Surgery—Mr. Paget, Mr. Coote.
Clinical Surgery—Mr. Skey, Mr. Paget, Mr. Coote, Mr. Holden.
Descriptive Anatomy—Mr. Holden, Mr. Callender.
Physiology and General Anatomy—Mr. Savory.
Chemistry—Dr. Odling.
Demonstrator of Morbid Anatomy—Dr. Andrew.
Demonstrators of Anatomy—Mr. Smith, Mr. Baker.
Assistant-Demonstrators—Mr. Vernon, Mr. Langton.
Tutors—Dr. Duckworth, Mr. Baker, Mr. Shepard.

SUMMER SESSION, commencing May 1866.

Materia Medica—Dr. Farre.
Botany—Dr. Harris.
Forensic Medicine—Dr. Edwards.
Midwifery—Dr. Greenhalgh.
Comparative Anatomy—Mr. Callender.
Practical Chemistry—Dr. Odling.
Microscopic Demonstrations—Mr. Savory.

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Warden—Mr. Willett.

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SEPTEMBER 1, 1865.

WORKS ON

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