long feeding tube when pulmonary symptoms arise. 3. In disease of the cardiac orifice tubage is so uncertain that gastrostomy should be performed when dysphagia becomes serious.

Portland-place, W.

ON PANCREATIC CALCULUS,
WITH NOTES OF A CASE.

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THE occurrence of stone in the pancreas was first recorded by Graaf in 1667. Morgagni in 1765 and, in England, Cawley in 1788 refer to instances observed by themselves. In 1883 Johnston collected the notes of 35 recorded cases. The fullest account was given in 1896 by Giudiceandrea and was based upon 48 recorded cases and two observed by the author.

The stones are generally white, greyish-white, or yellowish-white in colour, and rounded, ovoid, or elongated like a date stone. They are found in all parts of the duct of the pancreas, though much more frequently in the head; in the tail of the gland they are rarely seen. The calculi may be branched like coral, the trunk of the stone lying in the main duct and its offshoots in the secondary ducts. At times the canal of Wirsung is found packed with a coarse mortar or with sand or fine rounded pellets. The largest stone, measuring two and a half inches by half an inch, was seen by Schupmann. Calculi may be single or multiple; one of the most striking examples of the latter is in the museum of the Royal College of Surgeons of England (specimen 2834: Curnow's case). As many as 300 stones have been found in one case. The stones are chiefly composed of phosphorus and carbon salts. One case of oxalate of limestone is reported by Shattock. Johnston gives two analyses:—

I.	
Phosphorus salts	72.30
Carbon salts	18.90
Organic matter	8.80
II.	
Carbon salts	91.65
Magnesium carbonate	4.15
Organic matter	3.00

It is clear from this analysis that the pancreatic secretion during or before the formation of a stone is altered in quality, for carbon salts are not normally present. Schmidt, quoted in Schäfer's text-book, gives the following as the composition of the ash obtained from the pancreatic juice flowing from temporary and permanent fistulæ:—

	From temporary secretion.	From permanent secretion.
Soda (Na ₂ O)	0.58	3.31
Sodium chloride... ..	7.35	2.50
Potassium chloride	0.02	0.93
Earthy phosphates with traces of iron ...	0.53	0.08
Trisodic phosphate... ..	—	0.01
Lime (CaO) and magnesia (MgO)	0.32	0.01

The antecedent condition necessary for the deposit of stone is probably retention of the secretion. This may be produced by inflammation of the canal of Wirsung extending upwards from the duodenum, or by a chronic interstitial pancreatitis however arising. Many attempts have been made by partial obstruction of the duct by ligature, by the injection of paraffin, and in similar ways, to give rise to an artificial lithiasis. So far as I am aware the only attempt that has succeeded was made by Thierloix. He injected sterilised soot into the duct of Wirsung. At the necropsy the pancreas was found to be atrophied and in the tail a cystic swelling containing clear watery fluid surrounded by chronic inflammatory tissue had developed. In the cyst, and in the duct also, small concretions had formed.

Nimier attributes to micro-organisms a causative influence in the production of calculi. Galippe, on examining a stone, found numerous organisms distributed throughout, and Giudiceandrea discovered an organism very similar to, if not identical with, the bacterium coli commune.

Associated with calculi are found at times certain more or less profound alterations in the pancreas. Of such are acute and chronic interstitial inflammation, atrophy, dilatation of the duct, cyst, abscess, fatty degeneration, and carcinoma. Examples of cyst, dilatations of the canal of Wirsung, are recorded by Gould and Michailow. Acute inflammation dependent upon calculi and subacute inflammation leading to abscess have been observed by Roddick, Körte, and Caparelli, and carcinoma by Cawley, Portal, Schupmann, and others.

Symptoms.—So few carefully observed cases of pancreatic lithiasis have been recorded that it is impossible to give any accurate portrayal of the symptoms. In the majority of examples pain, or at the least a sense of great discomfort, has been felt in the upper part of the abdomen, generally at or near the middle line, and but rarely, as in Minnich's case, under the left costal margin. The pain frequently comes in sharp colicky attacks, similar to, but less severe than, those due to gall-stones. A sense of soreness or stiffness is noticed for a day or two after the attack. When the pain is at its height vomiting, hiccough, rigors, cold sweats, or collapse may be noticed. After the attack some fragments of stone may be found in the motions (Minnich, Leichtenstern). Diabetes has been often observed. Hansemann in 72 cases of diabetes associated with pancreatic disturbances found that in 12 stone was present. Oser in 70 cases of lithiasis observed that diabetes was recorded 24 times. The probability is that the onset of diabetes is due to the chronic inflammatory changes instituted in the gland by the calculus, but it must be remembered that such inflammatory alterations produce in the gland and its duct precisely those changes which are most likely to cause the deposit of calculous material. Fatty stools have been occasionally observed and in one case Lichtheim saw an abundance of fat-crystals in the fæces. Rarely jaundice may be caused, as related by Giudiceandrea and Pearce Gould, by the pressure of the stone upon the common duct. Lancereaux states that in each attack of pancreatic colic a temporary diabetes is produced by an inhibition of the secretion analogous to the inhibition observed when one ureter is obstructed by a calculus. The cardinal symptoms of pancreatic calculus, then, are: pain, colicky in character, similar to, but of lesser intensity than, gall-stone colic, and generally most intense in the epigastrium; pain or tenderness, and occasionally a feeling of resistance over the pancreas; the passage of fragments of stone; marked bodily wasting; fat diarrhoea; and in the later stages diabetes. It is rarely that all these are seen in association.

Diagnosis.—Claessen in 1842 first suggested the possibility of a correct diagnosis of pancreatic calculus being made. Friedreich, though he considered the occurrence of pancreatic colic not unlikely, wrote: "The diagnosis of pancreatic calculus is impossible." Material for a diagnosis was afforded by the cases of Lichtheim, Minnich, Körte, and others. In Minnich's case the pain began as a heavy pressure in the epigastrium and along the left costal margin; as it increased in intensity it passed round the left side and backwards to the spine. The patient, who had previously suffered from hepatic colic, remarked that the character of the two pains was identical. Körte has related a very interesting and remarkable case. The patient suffered from biliary colic for which the abdomen was opened; a large gall-stone was removed from the gall-bladder, which was drained by a tube. While bile was still being discharged the patient suffered from what he took to be a recurrence of his attacks of biliary colic. The patient died and a tumour in the head of the pancreas, which had been diagnosed as malignant at the time of the operation, was found to be an abscess with large concretions within it. Kümmell records an almost exactly similar case in which cholecystotomy had been performed; pain recurred and at the necropsy a large soft calculus was found in the canal of Wirsung. That pancreatic colic is associated with the passage of stones down the duct seems clearly to be proved by the case observed at different times by Minnich and Holzmann, for it was only after each attack that fragments of stone were found in the motions.

The presence of sugar in the urine may be observed at intervals. Holzmann found it intermittently in his case. While the same patient was under Minnich's observation at

an earlier date, no sugar was found though regularly sought. It is probable that it is only when advanced interstitial inflammation of the interacinar type is present and the islands of Langerhans are therefore affected that glycosuria is present. Caparelli records the case of a woman who developed, after many attacks of acute epigastric colic, an abscess above the umbilicus. The abscess burst and discharged some pus and gritty material. Through the fistula which persisted for six years many small stones, over 100 in all, were expelled. After the spontaneous closure of the fistula diabetes developed and the patient died. Lancereaux's statement that in each attack of colic there is a temporary glycosuria is not borne out by the history of the case now recorded. Very careful and continuous examinations of the urine were made but sugar was never once discovered.

It is probable that the presence of fatty stools may be dependent upon the condition of the gland with regard to its ducts. If two ducts, those of Wirsung and Santorini are both present, as in the normal condition, the pancreatic secretion will not be wholly prevented from entering the duodenum by a calculus blocking the canal of Wirsung. If a single duct is present a stone impacted therein will cause a temporary complete arrest of the outpouring of pancreatic juice.

Treatment.—There is but little to say with regard to treatment. According to the results of the experimental work of Kühne and Lea the subcutaneous injection of pilocarpine incites the flow of the pancreatic juice. A case is reported from Eichhorst's clinic of "undoubted pancreatic lithiasis" in which the subcutaneous injections of pilocarpine were tried. "The attacks of colic disappeared completely and the patient was better than for many months before."

So far as I can ascertain there has been only one case of pancreatic calculus treated by operation. The case is related by Mr. Pearce Gould. The patient was a man, aged 46 years, whose only previous illness was an attack of influenza four years before. In September, 1895, he noticed some failure in health and in November he suffered for a few days from severe pain which he referred to the umbilicus, chiefly felt on walking up hill. He became jaundiced and this persisted until February, 1896, when he came under observation. The liver was then enlarged nearly down to the umbilicus, the gall-bladder could be felt distended as a cylindrical swelling in the right lumbar region, and there was no ascites. The motions were clay-coloured. On Feb. 14th the abdomen was explored. Through the vertical incision to the right of the rectus muscle half a pint of fluid was withdrawn from the gall-bladder by aspiration. A lump was felt at the back of the small omentum which proved to be a coral-like stone in the dilated duct of Wirsung, and other smaller calculi were found and removed. The operation did not relieve the obstruction to the flow of bile and on March 3rd he had an attack of agonising pain in the right hypochondrium. Mr. Pearce Gould reopened the abdomen and with some difficulty was able to feel a stone in the head of the pancreas close to the duodenum, which he removed by incising the pancreas from the front and he was then able to pass a probe through the duct into the duodenum. Soon after the operation the patient vomited bile, the stools became coloured, and bile ceased to flow from the incision in the gall-bladder. Notwithstanding this, vomiting persisted and he died from exhaustion on the twelfth day after the second operation. At the post-mortem examination a little pus was found underneath the gall-bladder and also behind the ascending colon. The pancreatic duct was found to be dilated and ulcerated. There was a hydatid cyst at the liver. The calculus was composed of phosphate and carbonate of lime.

In the discussion which followed the reading of Mr. Pearce Gould's paper at the Clinical Society of London Mr. T. H. Kellock mentioned the case of a man, aged 56 years, who was seized with acute abdominal pain followed at once by jaundice. Two weeks later he had a second attack. When admitted to hospital under the care of Dr. W. M. Ord he was extremely jaundiced and the liver reached from the third rib to below the costal margin. On the tenth day he had a rigor followed by severe pain in the right hypochondrium and three days later he passed a small concretion, and then the jaundice became less marked but he became exhausted and gradually sank. At the necropsy the liver was found to be enlarged and the gall-bladder to be dilated. Embedded in the head of the pancreas in a dilated portion of the duct was another calculus of the size of a cherry stone.

The following case has recently been under my care, and as the condition of pancreatic calculus was diagnosed and

successfully treated, a full account of the history may be given. I saw the patient with Dr. H. M. Robertson of Roundhay.

NOTES BY DR. ROBERTSON.

The patient was a married woman, aged 57 years. She had had no children. She was first seen on Sept. 12th, 1901, in an acute hysterical attack. The attack subsiding careful research disclosed a multitude of symptoms chiefly of a neurasthenic type; prominent among these were the gradual and steady loss of health, the loss of weight, and the development of bronzing or pigmentation very similar to that in Addison's disease which was mainly confined to the external surfaces of the forearms, the back and sides of the neck, and slightly round the nipples. A varying but slight amount of this pigmentation dates back 10 years. The patient also complained that for a long time her motions were never properly formed; either she had loose frothy stools with the occasional passing of white membranous pieces like skin, or constipation with the stools in the form of hard pellets; the colour was natural in both cases. Pruritus, both anal and vaginal, was a distressing symptom and the urine, though usually "thick" and small in quantity, was occasionally clear and excessive in amount. By physical examination nothing abnormal could at the time be detected. The patient was a well-nourished woman with a fair amount of fatty tissue, despite the fact that she was seven pounds under her average weight of nine stones and four pounds and that the loss of seven pounds had occurred since the beginning of the year. The heart and lungs were normal. There was no enlargement of the liver or of the spleen. The general average of urine passed was small in quantity, under 30 ounces in 24 hours; it was of relatively high specific gravity and concentration, acid reaction, free from albumin or sugar, but loaded with mixed urates and some crystals of calcium oxalate. Clinical examination of the blood and the blood count gave red cells 96 per cent., or 4,750,000; hæmoglobin 94 per cent.; no leucocytosis, the percentage varying within the normal limits, the leucocyte count being 7000. The blood cells were free from degenerative changes.

With these data a provisional diagnosis was given that all the digestive, urinary, and nervous symptoms could be accounted for by the apparent lithæmia *plus* the unstable nervous equilibrium, and treatment was directed by dietetic and medicinal means towards improving the disturbed chemical and cellular metabolism that appeared to account for her condition. At the same time her husband was advised that one had an uncomfortable suspicion that some serious abdominal disease, probably in connexion with the pancreas, might be present. For six weeks treatment on the above broad lines was carried out with indefinite results. The pruritus was relieved, the condition of the stools and the regular action of the bowels were materially improved, but the old flatulence, indigestion, and slight attacks of colic were more frequent and the amount and condition of urine remained *in statu quo*. She continued to lose weight and strength and the pigmentation increased in area and depth of colour.

On Nov. 4th she had a severe attack of colic, with excessive pain, sickness, collapse, &c., requiring one-third of a grain of morphia hypodermically to obtain relief. The colic was so acute that it might have been either hepatic or renal, but as she had foolishly partaken freely of goose the evening before accuracy of diagnosis was not easy. Dr. T. Churton of Leeds, who saw her with me in consultation on that day, preferred to blame the goose, and after a careful historical survey, physical examination, and mutual discussion, he was of opinion that neurasthenia with hysteria were the more apparent causes of her condition, with the cautious reservation that while no growth or unusual condition could be detected by manual examination of her abdomen; yet there was good reason for being suspicious and careful in one's prognosis. Special measures to meet the nervous exhaustion and general debility were adopted. Rest, feeding, and massage alternated with the faradic current and the intramuscular injections of glycerophosphate of sodium (Jacquemaire's preparation). This treatment was continued for a month also with indefinite result. In some things there was improvement, but there was still a steady loss of weight, an average of three or four pounds a month, her weight at this time being seven stones and 12 pounds, and persistence, if not increase, of pigmentation. Blood counts and examinations were made fortnightly with special reference to the leucocyte count and qualitative changes in the cells as indicative of malignant disease, always, however, with negative

results, and throughout the whole illness the blood count did not vary outside a 10 per cent. limit.

The urine was tested and microscopically examined each week. During the last three weeks of December there was improvement; the appetite and the digestion became better, abdominal uneasiness became less, the sleep was better and less disturbed, the strength was slowly coming back, and the pigmentation was slightly clearing. But profuse night perspirations ensued which were best controlled by a five-grain tabloid of suprarenal extract, and under its influence the total quantity of urine increased to almost normal. The patient was able to go downstairs and to get outside occasionally, and continued improving till the first week of January, 1902, when she unaccountably began to fall back. A slight attack of colic occurred on Jan. 9th and 24 hours later there was a distinct trace of bile in the urine and a yellow tinge began to appear in the conjunctivæ.

The stools, which had been watched daily for months and frequently examined for meat fibre, &c., still kept well coloured and the jaundice, which was never extreme, varied from day to day and at times disappeared so far as colouring the urine was concerned. Despite the negative results of blood and manual examination I could not but fear from the patient's condition the strong possibility of some malignant development in the region of the head of the pancreas, and wishing the case to be considered from its surgical aspect Mr. B. G. A. Moynihan kindly saw the patient on Feb. 2nd, 1902.

Chloroform was administered as an aid to more efficient examination. After discussing the possible causes Mr. Moynihan gave a diagnosis in favour of chronic pancreatitis, probably non-malignant and possibly due to a pancreatic calculus either in the pancreatic duct or now in, or approaching, the ampulla of Vater. He advised operation as at least a means of clearing up the condition, but did not feel enthusiastic about the result. As the patient and her relatives were at the time averse to surgical interference it was decided to give by the mouth pancreatin and salol and then in four weeks to reconsider the case. On Mr. Moynihan's suggestion a sample of urine was sent to Mr. P. J. Cammidge at Wakefield for special examination relative to the presence of pancreatic disease, and his report was, "Not a typical sample, but affords ample ground to justify a diagnosis of chronic pancreatitis." During the four weeks the patient lost four pounds in weight—being reduced now to nearly six stones—and in view of the steady progress to the bad operation was again urged and arrangements were accordingly made but in the end abandoned. A former medical attendant at this time saw her in consultation and he also advised surgical interference.

Early in April the patient was moved to a hydropathic establishment in the Matlock district to see if change would effect improvement. On the night of her arrival she had a bad attack of colic lasting several hours, with increase of the jaundice and for the first time during her illness the stools were slaty in colour. During her stay of four weeks there she made decided improvement. She gained three and three-quarter pounds in weight; the appetite returned and she began to feel stronger; the jaundice in great part cleared up but the pigmentation remained. The consulting physician in charge wrote "that he was strongly inclined to fear malignant disease, but that beyond some feeling of resistance in the epigastrium he could detect nothing definite, certainly nothing inconsistent with pancreatitis." Two days after her return home she had another attack of colic and at last consented to seek surgical relief, and on May 22nd Mr. Moynihan operated with the interesting result of removing from the duodenum a concretion or calculus of about the size of a French bean.

Several factors stand out as of special interest. 1. The long illness of itself but specially the length of time ere jaundice appeared as proving the real origin of the condition. 2. The value of routine blood examination as an aid to diagnosis in this case as negative of malignant disease, a differential method in obscure conditions hardly appreciated by surgeons. (See Cabot, p. 350. The leucocyte count of three cases of cancer of the pancreas averaged over 17,000.) 3. The peculiar bronzing which might have led one to consider the case as one of Addison's disease, the patient having many other symptoms in common, and later the pigmentation plus the progressive emaciation gave the patient the appearance of suffering from some obscure abdominal malignant disease. 4. The origin of the stone.

NOTES BY MR. MOYNIHAN.

I saw the patient on Feb. 2nd, 1902, with Dr. Robertson. To the full and lucid statement which he has given of her condition up to the time I saw her I have nothing to add. The symptoms I had to discuss, the relative value and significance of which I had to determine, were briefly these: steady loss of health, gradual wasting, irregular pigmentation of the skin in patches of the colour of *café-au-lait* (very closely resembling the pigmentation of *molluscum fibrosum*), persisting attacks of epigastric pain and uneasiness of the type of hepatic colic though less severe and unattended until very late in the history by jaundice which was then always trivial though unmistakeable, and pain passing through from the front of the abdomen to the middle of the back. There was no rigor or any complaint of sensations of heat or cold. The stools were occasionally "frothy" and "greasy." On examination under chloroform some indefinite swelling could be felt above the umbilicus and a little to both sides of the median line, though chiefly to the right.

I considered that the evidence warranted a diagnosis of chronic pancreatitis. To explain the onset of this condition I suggested that a pancreatic calculus was present, that its transit down the canal of Wirsung had been attended by the attacks of epigastric colic, and that as it approached the ampulla an inflammatory condition had been started in the common duct and a slight jaundice had thereby resulted. Upon this diagnosis I felt justified in basing my suggestion for operative treatment. If chronic pancreatitis were found and no cause was discoverable the condition could be relieved by drainage of the gall-bladder; if a pancreatic calculus were found it could be removed either from the pancreatic duct or from the ampulla of Vater, if it had travelled so far. I was bound to admit the difficulties of the case and though I pressed the question of operation I felt that I could give no definite undertaking as to its result. When I saw the patient a second time, after her visit to Matlock, I felt convinced of the approximate accuracy of my former diagnosis and operation was at once accepted. I should like to bear tribute to the support I derived from Mr. Cammidge. His examination of the urine made me feel secure in the diagnosis that I had given of chronic pancreatitis. In other cases before this one, and since, I have derived considerable help from Mr. Cammidge's test. One feature of the case which may, perhaps, be accidental is the invariable slowness of the pulse. The rate was almost always less than 60 and never higher than 64: its character was good.

Dr. Churton tells me that on referring to his notes he finds that the stools were described as being at times "oily," but that he had no opportunity of verifying this observation. The husband of the patient described them to me as "greasy," but the motions that I saw showed nothing unusual.

Operation—Operation was performed on May 22nd, 1902. The abdomen was opened two inches to the right of the median line by an incision about seven inches in length and the fibres of the rectus were split. On opening the abdomen the gall-bladder at once presented; it was tense, well filled, and free from any adhesion; the cystic duct, hepatic ducts, and common duct were all thoroughly examined, the liver being rotated for that purpose. The ducts were all free from adhesion and nothing abnormal was felt. The head of the pancreas was very much enlarged and hard, the body less so, but still larger and denser than the normal. The chronic pancreatitis affected the whole gland but chiefly the head and in least degree the tail. The duodenum and the head of the pancreas were carefully examined and a small lump was then felt, as it seemed, between the two. The swelling did not feel like a stone and I expressed a suspicion that it might prove to be a growth deep in the ampulla of Vater. I therefore opened the duodenum and exposed the papilla Vateri; this was quite normal in appearance. The lump, however, was felt to be only a short distance beneath the mucous membrane. The papilla was therefore laid open and the cut edges were seized with a small French vulsellum and held apart. At the bottom of the ampulla a small object could be seen and the knife touching it could be felt to be impinging upon soft stone. A small scoop was therefore passed into the ampulla, pressure was made upon the head of the pancreas close to the duodenum, and the stone was lifted out. So far as I could judge—and the ampulla was well opened—the stone lay in the termination of the pancreatic duct with its end projecting into the ampulla.

It was certainly not wholly in the ampulla, for it was not at once exposed on slitting up the papilla; equally certain it was not in the end of the common duct. The duodenum was stitched up with continuous sutures. The gall-bladder was aspirated and drained, and the wound was closed in the usual way. The tube was removed on the seventh day and the wound then slowly healed. The condition of the liver was normal. There were no adhesions around it or any trace of pigmentation.

The pigmentation of the skin is one of the most interesting, and certainly the most obscure, feature of the case. Interstitial pancreatitis and pigmentation of the skin are found associated in the condition described by Hanot as "diabète bronzé," but in addition a deep pigmentation of the liver with hypertrophic cirrhosis and pigmentation of the pancreas and other viscera are seen. In this disease Hanot and Schachmann consider that the primary etiological factor is the diabetes, that a certain alteration in the blood, due to the diabetes, results in a disturbed nutrition of the hepatic cells in which pigment as a result becomes deposited. The carrying of the pigment to the other parts of the body, to the skin and the viscera, is supposed to be in the nature of embolism. Many other theories, carefully enumerated and epitomised by Opie, have been broached, but our acquaintance with the subject is at present vague and distant. The recorded cases of hæmochromatosis do not show an instance of the disease occurring in the female. Within a month of the operation upon this patient the bronzed patches had shown evidence of fading, especially the stained areas upon the wrists and thigh.

Description of the stone removed.—The stone in shape very closely resembles a French bean. It is exactly half an inch in length and about three-sixteenths of an inch in diameter. It is bile-stained on the surface. The stone was cut in two for me by Mr. Cammidge and the pieces were subsequently glued together after the kernel had been removed. Mr. Cammidge reported that the surface layers of the stone "for about one-eighth inch are of a homogeneous consistency and light brown in colour. They leave but little ash on ignition and seem to consist chiefly of cholesterin and bile-pigment with some calcium salts. The central portion is quite different and consists chiefly of hard granules of irregular shape. On ignition they leave a large quantity of ash which seems to be chiefly calcium."

I sent a small portion of the centre of the stone to Dr. J. A. Milroy of Edinburgh who reported as follows: "The stone contains nearly 50 per cent. of calcium carbonate. A small portion of the solution in which the magnesium was estimated was unfortunately used for qualitative testing so that I cannot state the exact quantity of magnesium present. These were the only inorganic substances found. I was somewhat surprised to find phosphates absent. The organic substances consisted almost entirely of proteid. Traces of organic substance soluble in alcohol and ether were present. In the residue from the alcoholic and ethereal solutions cholesterin and fat were the only bodies identified. Purin bases and uric acid were absent. The quantity of the original powder was rather too small to allow of an accurate estimation of the constituents."

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Leeds.

HYPOPLASIA OF THE AORTA AS A CAUSE OF ANEURYSM.

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SOME years ago it fell to my lot as curator of the museum at St. George's Hospital to perform two post-mortem examinations in rapid succession on cases of ruptured abdominal aneurysm, in both of which the most careful inspection failed to find any ordinary explanation of

the aneurysm, such as syphilis, atheroma, or strain, but the aorta and large arteries were in a state of hypoplasia—that is to say, constructed upon a small and delicate scale, narrow in calibre and thin in the walls, though in all other respects practically healthy. These two cases put me on the look-out for arterial hypoplasia in general and as a cause of aneurysm in particular, but among upwards of 2500 post-mortem examinations that have been performed at St. George's Hospital since that time, only some three or four cases of hypoplasia have been noticed by myself or succeeding pathologists. One happened to be that of a patient of my own who died from the external rupture of a thoracic aneurysm; another—also a case of thoracic aneurysm—was under the care of Dr. Cyril Ogle, who kindly allows me to publish it. The first three cases have been fully described in the Transactions of the Pathological Society, vols. xlv. and xlix. and need only be briefly recapitulated.

CASE 1.—The patient was a well-built man, aged 29 years, who gave no history of great exertion or strain. The aneurysm, of the size of an orange, occupied the lowest two and a half inches of the aorta and the whole of the right common iliac artery; it proved fatal by rupturing into the peritoneal cavity. The rest of the aorta was almost entirely free from atheroma but unusually thin and narrow, as were also all the large arteries.

CASE 2.—A woman, aged 30 years, died from the retro-peritoneal rupture of an aneurysm which consisted of a fusiform dilatation of the lowest two inches of the aorta and the greater part of the left common iliac artery. Immediately below the origin of the renal arteries the aorta presented a saccular aneurysm of the size of a walnut. A third, of smaller size, was found upon the left renal artery and a fourth upon the superior mesenteric. The aorta was almost papery in its thinness. In the recent state it was fully elastic and faultlessly smooth but so narrow that the thoracic portion would hardly admit the little finger.

In both of the above cases the large arteries were examined microscopically with the result that no fatty or other degeneration was found.

CASE 3.—The patient was a coachman, aged 39 years, who had lived temperately and quietly. There was no history or suspicion of syphilis. The aneurysm proper was larger than a cocoanut and of true saccular form, springing from the first part of the aorta. It had caused absorption of the overlying bones and cartilages and had given rise to a secondary sac immediately beneath the integuments. The fatal hæmorrhage occurred externally from the secondary sac. The aorta was remarkably free from atheroma, of which, indeed, there was no trace except a little roughening near the mouth of the aneurysm. The vessel was somewhat small in calibre and conspicuously thin-walled. It was estimated that at the end of the arch the wall was not more than three-fifths of the ordinary thickness. The various coats were present in normal proportion and no degeneration could be detected under the microscope.

CASE 4.—This case, which I owe to Dr. Cyril Ogle, is of essentially the same kind as Case 3 and need only be briefly related. The patient was an omnibus conductor, aged 31 years, who had been a soldier; he died in September, 1901, from the rupture of a large saccular aneurysm of the first part of the aorta into the right auricle. The post-mortem examination was performed by Dr. R. Salusbury Trevor, who remarked an unusual thinness of the aorta and used the expression "aortic hypoplasia" in the pathological record. Dr. Trevor was under no suggestion from the previous cases and his record fairly stands as the independent observation of a skilled pathologist. Certain cutaneous scars were found which raised a suspicion of syphilis, but of alcoholism or undue strain there was no evidence, clinical or pathological, and the aorta was perfectly free from atheroma. The case, in short, was one of aortic aneurysm in which the initial lesion was possibly syphilitic, but hypoplasia was the dominating influence.

It goes without saying that congenital delicacy of the arteries, when it exists, must predispose to the formation of aneurysm and favour its development, though the influence of this factor has hitherto been almost entirely overlooked. Virchow, indeed, remarks upon the liability of the hypoplastic aorta to fatty degeneration of its middle coat and so to spontaneous rupture and dissecting aneurysm, but he appears not to have met with fusiform or saccular aneurysms of a chronic type in this connexion, nor is there any consideration of the subject in the formal treatises upon aneurysm of the aorta. However, the four cases given above, occurring within ten years in the experience