I have at present no experiments to publish on the nature of the secretion, but it seems a justifiable conclusion to attribute the acute pain and inflammatory oedema, the result of the prick by the spine, to some venom produced by this remarkable glandular structure lying in the groove.

As far as I am aware there is no previous description, in the literature of fish with poison organs, of a poison gland in *Acanthias*. Dr. Tate Regan, of the British Museum of

FIG. 3.—Section of gland stained with haemalum and counter-stained by van Gieson method. A. Vacuoles. B. Vacuoles bursting into commencement of duct. C. Duct.

Natural History, kindly* referred to such sources of reference as were unavailable to me, and to him my thanks are due for always extending ready help and advice to those engaged in research.

Description of the Gland.

The histological appearances of the gland lying in the grooved spine of the spur-dog are as follows: The two low-power microphotographs show the general structure, and the high-power the changes in the cells which take place during secretion. That portion of the gland lying deepest in the groove consists of cylindrical cells on a basement membrane. Superficial to these cells are several layers of round cells the nuclei of which stain

FIG. 4.—Section showing root of fin where it joins the base of spine (semi-diagrammatic). A. Gland dipping into recesses formed by (B) chitinous processes at base of fin. (The spine is not shown as the base of the fin is cut off where it joins the groove.) C. Large pigment cells. D. Connective tissue joining chitinous processes to (E) cartilage of the fin.

readily with haemalum, and in some areas the nuclei show marked evidence of activity, as exemplified by the presence of mitotic figures. Well-marked ducts dip into the substance of the gland, around which the cells become definitely flattened. These three types of cell are obviously transition forms of the same cell. In the neighbourhood of the duct areas are seen in which the cells are breaking down or disintegrating so as to give rise to a sponge-like appearance, and in these areas are also seen round lacunae in which phantoms of pale cells may be distinguished, and in one section one can see one of these lacunae bursting into the apex of a duct into which it is apparently discharging its contents.

If my observations are confirmed, the dog-fish adds one more to the examples of fish with poison organs, in the ranks of which the sting-ray has so recently found a place after centuries of scientific doubt.³

REFERENCES.

¹ Cunningham: *Marketable Marine Fishes*. ² Couch: *Fishes of British Islands*, vol. i. ³ Evans: *Transactions of Zoological Society of London*, 1916.

METASTATIC STAPHYLOCOCCAL INFECTION OF THE KIDNEY.

BY

H. R. SOUPER, M.A., M.B., CH.B. ABERD.,

TEMPORARY CAPTAIN R.A.M.C.,

SPECIAL MILITARY SURGICAL HOSPITAL, NEWCASTLE-UPON-TYNE.

AN account of the following case may be of interest as illustrating infection of the kidney following upon operative interference with an infected wound of the forearm, the difficulty of making an early and accurate diagnosis of the condition, and the success of treatment by an autogenous vaccine.

A pensioner, aged 32, had undergone amputation through the lower third of the right thigh, and had an old gunshot wound of the left forearm, with an ununited fracture of the ulna in its upper third. He was wounded in both these situations on November 10th, 1917, in France, and the leg had been amputated at the casualty clearing station within a day or two of his wound; the forearm was cleaned and splinted. The subsequent history of the thigh is that it was reamputated and sutured at a general hospital in France on December 8th, 1917, and an abscess of the stump drained in January, 1918. An artificial limb was supplied in May, 1918, and the stump had not given any further trouble.

The fractured left forearm was put in good position, and the wound sutured in January, 1918, at a hospital in England; though the wound apparently healed at this time, the ulna remained ununited, and for this disability he was admitted as a pensioner to the Special Military Surgical Section of the 1st Northern General Hospital on December 19th, 1918.

On February 5th, 1919, the ends of the ulna were freshened and the bone plated; the wound subsequently became septic. In the beginning of May the patient came under my care, and, as a sinus was still present in the forearm leading down to the site of operation, and x-ray examination showed that union of the bone was apparently proceeding satisfactorily, I operated on May 6th, excised the sinus completely, removed the screws and plate, applied bipp to the wound, and closed it completely without drainage.

The wound healed by first intention, and has given no trouble since; but on the evening of May 19th the temperature, which had been normal since the third day after operation, rose to 100° and continued to rise in "step-ladder" fashion till, on the evening of May 23rd, it reached 104.4°. This pyrexia was accompanied by malaise, slight vomiting, vague pain in the bladder region, frequency of micturition, and strangury; the patient stated that on May 19th he had "passed a few drops of blood with the urine," but, as this specimen was not saved, the statement could not be confirmed. Though he felt "shivery" there was never any actual rigor. No abnormal physical signs could be detected in any system, and he was put on light diet and a simple diaphoretic mixture.

Naked-eye and chemical examination of the urine revealed no abnormality; but on May 23rd a trace of albumin and some pus were present, and on the following day a specimen was taken for bacteriological examination. Hexamine, gr. x thrice a day, with large quantities of fluid, was then prescribed. No abnormal physical sign was detected till, on May 26th, he complained of pain in the left loin, and bimanual palpation of the left kidney region elicited marked tenderness, though no tumour could be made out. The laboratory report received on May 27th stated: "Few red corpuscles and a fair number of pus cells present; no tubercle bacilli or *B. coli* detected; *Staphylococcus pyogenes aureus* present."

The diagnosis of acute metastatic pyelonephritis could now be made. A second specimen of urine was sent to the bacteriologist for the preparation of an autogenous vaccine.

Meantime the temperature had been gradually falling since May 26th, reaching 99° or 100° in the morning, but rising to 102° to 103° in the evening; and on May 29th the daily range settled down to between 99° and 100°. The second laboratory report was identical with the first, except that pus was present in greater quantity; and, pending the preparation of the autogenous vaccine, I gave 125 million of a stock staphylococcal vaccine on June 3rd; this produced a slight general reaction; no reaction followed 250 million given on June 7th and 500 million on June 11th.

The patient's general condition meantime was still unsatisfactory; he was anaemic and very weak, suffered from profuse sweats, loss of appetite, and vomiting after practically every meal. The hexamine was discontinued on June 11th, as it was thought that it might be the cause of the vomiting. Kidney tenderness was still present, but no tumour or enlargement of the organ could be made out.

The sickness improved, but recurred on June 16th, when a mixture containing bismuth and soda with nux vomica was ordered. On this day also the administration of the autogenous vaccine was started, 250 million being given; only a slight general reaction followed (evening rise of temperature to 100°). The pyrexia had altogether subsided by June 20th, but culture of the urine still revealed the presence of staphylococci; the general condition showed signs of slow improvement. The autogenous vaccine was continued at weekly intervals, in gradually increasing doses, till a dose of 1,000 million was reached on July 28th, and repeated on August 2nd; the vaccine treatment was then discontinued.

As on June 28th patient still complained of left lumbar pain, and the sickness had disappeared, he was again ordered hexamine gr. x, with acid sodium phosphate gr. xv. This was continued till the end of July, when the patient had completely recovered, and was able on August 6th to begin work in the curative workshops of the hospital.

Since that date the renal symptoms have not recurred; the urine has remained free from pus. The left ulna has firmly united and the patient has full use of the forearm.

Although the diagnosis of this condition was for some days very difficult, I think there can be no doubt, in view of the laboratory findings and the few physical signs which eventually developed, that the diagnosis finally reached was correct. During the later period of the patient's illness it was of interest to note the correspondence which started in the *Lancet* of June 7th, 1919, and continued for the three following weeks, on "Epidemic perinephric suppuration"; and in some ways this case resembled cases instanced in that correspondence. But, as in the cases of perinephric abscess, it was stated that it is rare to find pus in the urine, and as in my case there was no evidence of any abscess in the loin, that diagnosis could almost certainly be ruled out; and the symptoms and signs of my case were practically identical with those of acute haematogenous pyelonephritis described by Thomson Walker in Choyce's *System of Surgery*. The primary focus of infection was undoubtedly the sepsis in the forearm, and the metastasis followed operation on this site. But it is remarkable that the pyelonephritis should have followed only after the second operation, and that, by the time the pyelonephritis developed, the primary focus, never clinically of great intensity, had cleared up. Horder, in the correspondence referred to, states that "the point of primary infection may be easily overlooked" (apparently owing to its slight character) in cases of perinephric abscess, so that staphylococcal metastasis in or around the kidney is known to arise from a primary focus so slight that its discovery may require careful investigation. Pasteur, in the same correspondence, states that "staphylococcal infection of this type (*S. aureus*) never seems to give rise to staphylococcal septicaemia." Though there was no evidence of septicaemia in my case, it is unfortunate that cultural examination of the blood was not made when the pyelonephritis developed, nor of the pus from the forearm at the time of operation. A blood count might also have been of assistance in the diagnosis.

Finally, it is interesting to note how well the condition cleared up on treatment with an autogenous vaccine. Thomson Walker (*loc. cit.*) states that such treatment is suitable only for chronic cases, but in this acute case it answered remarkably well. Herringham (*Kidney Diseases*, p. 302) describes a case of acute pyelonephritis due to a coliform bacillus (which, he states, is the commonest causal organism of such conditions) treated by an autogenous vaccine which produced gradual improvement; but three months after the onset there was still a slight amount of pus in the urine, and a considerable number of bacilli; so that the patient could not be considered cured. The cases, however, are scarcely analogous, and there is no doubt that in this staphylococcal case the vaccine treatment produced a complete cure.

I have to thank my Commanding Officer, Lieut.-Colonel D. Wells Patterson, O.B.E., R.A.M.C.(T.), for permission to publish this case; and Dr. P. C. W. Laws, bacteriologist to this hospital, for the bacteriological investigations, and the preparation of the vaccine.

PROFESSOR AUGUST BIER has addressed a memorandum to the Prussian authorities pointing out that as the abolition of compulsory military service robs the growing generation of beneficial physical training, compulsory physical training for all young men should be enforced, beginning, if possible, in early boyhood. He advocates the inclusion of physical exercises by the University of Berlin as a compulsory subject.

VOLVULUS OF THE CAECUM: DOUBLE OBSTRUCTION.

BY

R. ECCLES SMITH, O.B.E., M.B., F.R.C.S.,
SURGEON TO THE BARRY HOSPITAL.

IN view of the recent article by Sir Arbuthnot Lane¹ on the evolution of disease, I think the following case worthy of note by reason of its rarity, the unusual way in which it was produced (only fully recognized at autopsy), the surprising condition of obstruction of the small and large bowel at two distinct sites, and the associated atypical gastric symptoms over a period of years.

Lieutenant R.N.R., aged 33, gave a history which was a little meagre owing to his general condition. For a period of some years he had had attacks of "indigestion," never sufficient to cause him to report sick. Associated with this was a marked intestinal stasis and obstinacy of the bowels; pain and discomfort after meals, with occasional vomiting, were quite common features. One night he was suddenly seized with acute abdominal pain, at first spasmodic and later continuous, with vomiting of everything taken. He was transferred to me twenty hours after the onset of the attack.

Condition on Admission.

He was in extreme pain, with all the symptoms and signs of an acute abdominal catastrophe. The abdomen was full, rigid, distended, and tender. Fluid in the flanks and the complete absence of liver dullness suggested, in view of the prior gastric symptoms, perforation of a viscus. The bowels had been relaxed prior to the sudden onset of the acute pain.

The vomit on arrival was not faecal, but consisted of stagnant stomach contents. The temperature was 100°, the pulse 120 to 130, feeble and thready.

Operation.

A right paramedian incision was made in the epigastrium. The stomach and duodenum were found to be normal. The incision was enlarged downwards, and a large black balloon emerged from the abdomen. This consisted of the much distended caecum and ascending colon, which were turned over towards the middle line as on a hinge at the inner border, forming a definite volvulus. The transverse colon was empty, the small gut was moderately distended. The hepatic flexure, being obviously the seat of obstruction, was explored. There was an acute "kink," and on the inner side of the "kink" a mass, first thought to be malignant, but on section found to be a calcareous gland outside the lumen of the gut. Further exploration and interference being impossible, a Paul's tube was tied into the caecum, the contents of the colon drained, and the abdomen closed.

After-Treatment and Result.

The colon drained freely, and the patient's general condition improved for the first twenty-four hours. The liver dullness returned immediately. Then symptoms of further obstruction came on, the abdomen became distended, vomiting returned and became faecal. In spite of all treatment the patient died forty-eight hours after operation.

Post-mortem Examination.

The caecum and ascending colon were completely deflated. The caecum was very mobile, and had a definite mesentery. The small gut was distended in its entirety, a condition not present at the operation.

The hepatic flexure was a potential tube by virtue of the pull from outside at the site of the gland noted, rather than by any organic obstruction. From the calcareous gland there stretched a thick, organized adhesion passing across and adherent to the anterior leaf of the mesentery, and fixed firmly to the ileum about two inches from the ileo-caecal valve. At this point the small gut was acutely kinked in a similar manner to that at the hepatic flexure. All other organs were apparently normal.

There is no doubt that the original lesion in this case was a tuberculous affection of the mesenteric glands leading to a strong adhesion between the hepatic flexure and the last two inches of the ileum. The early stages of this were noted in the atypical gastric symptoms due to an ileal "kink" and obstruction to the ileal efflux, so often mentioned in the literature. Some indiscretion of diet, followed by decomposition of the contents of the caecum produced a "balloon" of this viscus, which, being mobile, rose up, turned on a hinge and became a volvulus, producing further obstruction at the already kinked hepatic flexure.

Relief of this obstruction and the replacing of the caecum away from the ileum brought into force the second kink—that in the ileum from which ensued the intestinal obstruction. I think that this was not a paralytic distension of gut, but originated from the ileal obstruction.

¹ *Lancet*, December, 1919.