of tonsillar tissue can be removed. The operation gives the most satisfactory results; we have examined a number of cases at varying periods after the operation and after removal of the tonsil in one or more pieces. The raw surface left rapidly granulates up and is assisted in closing by the approximation of the anterior and posterior pillars. There has been no selection of cases.

FIG. 8.

Two tonsils removed three weeks after previous operation of tonsillotomy. Total removal by the guillotine.

FIG. 9.

Pair of medium-size tonsils, enucleated entire. Lateral view to show projection of tonsillar tissue from the capsule. Natural size.

We append an analysis of 150 cases which were operated on during the past three months.

150 Cases; 208 Tonsils Present in Collection.

Large.—1. Enucleated complete in capsule, 45, or 36 per cent. 2. Not quite complete capsule, 25, or 20 per cent. 3. Enucleated in two pieces, 42, or 35 per cent. 4. Removed in three pieces, 6. 5. Removed in four pieces, 1. 6. Removed in five pieces, 1. Total, 120.

Medium.—1. Enucleated complete in capsule, 55, or 44 per cent. 2. Not quite complete capsule, 36, or 23 per cent. 3. Enucleated in two pieces, 29, or 23 per cent. 4. Removed in three pieces, 1. Total, 121.

Small.—1. Enucleated complete in capsule, 27, or 50 per cent. 2. Not quite complete capsule, 20, or 27 per cent. 3. Enucleated in two pieces, 8, or 14 per cent. Total, 55.

Complete enucleation.—Large, 45; medium, 55; and small, 27. Total, 127, or 42.3 per cent.

Complete removal but not quite all capsule.—Large, 42; medium, 36; and small, 20. Total 81, or 27 per cent.

Enucleation in two pieces.—Large, 42; medium, 29; and small, 8. Total 79, or 26.3 per cent.

Incomplete.—Three cases.

The above analysis of the cases operated on shows that in 42 per cent. the tonsils with their capsule were enucleated entirely. In the remaining cases the entire tonsils with capsule were removed in one or more pieces. In three cases only was the removal incomplete. We have exhibited

specimens on several occasions at the meetings of the Newcastle-on-Tyne Clinical Society, Northumberland and Durham Medical Society, and the North of England Branch of the British Medical Association.

VERMINOUS APPENDICITIS.

By H. A. LEDIARD, M.D. EDIN., F.R.C.S. ENG.,
SURGEON TO THE CUMBERLAND INFIRMARY.

AMONGST the objects found in the appendix are things from the mineral, vegetable, and animal kingdoms; we have pins and shot, seeds and worms. The appendix may catch, keep, and play with anything small enough to enter the only door it possesses, but it frequently adds to the size of the object caught by a coating of faecal matter and lime salts. Worms probably find, now and then, a secluded spot for breeding in an undisturbed manner in the appendix.

The case of threadworms in the appendix now recorded is by no means exceptional when the literature of what has been found in the appendix is looked up. I have only twice met with worms in the appendix in hospital or private practice, but it is very possible that in some instances sufficient care was not taken to minutely examine all the contents of an excised appendix.

The case in point occurred in a girl, aged 7 years, who was sent into the Cumberland Infirmary on Feb. 4th, 1910, by Dr. Charles W. Graham of Carlisle for operation on account of abdominal pain and distension, fever, vomiting, and tenderness in the appendix region. The appendix region was more tender, and persistently tender, than any other part of the abdomen, but the pain was diffused over the abdomen and the distension was suggestive of general peritoneal infection.

A few hours after admission the child was submitted to operation. The cæcum was found to be inflamed, but no lymph was present. The appendix, when brought to the surface, was swollen and redder than normal. I removed it, thinking to find a mucocele. The abdomen was closed. It was not until the appendix was slit up that a nest of actively moving threadworms was seen, some of which escaped. They were the *oxyuris vermicularis*. The child's cæcum was soft and velvety, and I felt sure after finding the parasites that there were worms in the cæcum also.

After the operation the usual remedies were given, and a careful search was maintained for a week or more, but no sign of a worm was visible in the motions, which were washed, strained, and examined with a lens. Films of blood taken showed a marked polymorphonuclear leucocytosis, but the eosinophile cells were not increased in number, being rather fewer than usual. The child left the hospital recovered on March 12th.

I have merely glanced at the clinical side of the case because there is no sign at present known peculiar to verminous appendicitis, and, even if there was, operation would be called for in much the same way as in any other appendicitis.

The part played by worms in the production of appendicitis is discussed by Howard A. Kelly,¹ who alludes to the perforation of the appendix by worms and their escape into the abdominal cavity, and it would seem probable that the threadworm is less likely to perforate than the lumbricus. Again, threadworms are more likely to be met with in the case of children as a cause of appendicitis, and if they formed a sort of colony or nest in the terminal portion of the appendix, as they did in the present example, it is not easy to see how they would escape, unless by causing ulceration of the mucous and other coats of the appendix.

That worms—i.e., the *oxyuris*—can cause considerable pain to a child, local tenderness, and even peritonitis, seems to be agreed upon by all who have written on the subject or who have recorded cases. Lockwood,² for example, gives a case where the appendix contained pus, faecal matter, and threadworms.

Since operating upon the girl in hospital I have met with threadworms within concretions in the appendix of a male patient aged 30 years. In his case there were discomfort on pressure over the appendix and symptoms of colitis. On

¹ Appendicitis and other Diseases of the Vermiform Appendix, second edition, 1909.

² Appendicitis, second edition, 1906.

removal of the appendix hard concretions were felt and seen in the tube; the tube was slit up, showing the terminal portion of the mucosa swollen and congested, but not ulcerated. This was the bed occupied by the larger concretion. The concretion was of a bright yellow colour, was composed of semi-soft faecal matter, and was of the size of a small lemon pip. When the concretion was cut into a thread-like object was seen at once and declared by Dr. A. I. Shephard-Walwyn of Wetheral, near Carlisle, to be an oxyuris. Examination with a lens confirmed this.

The appendix removed was sent to a laboratory for report, and in a concretion sent with the slit-up tube two more worms (oxyuris vermicularis) were found, both being immature females. No ova were found in the concretion nor on the mucous surface of the appendix.

I mention this case especially because the discovery of threadworms within concretions in the appendix has been verified, first by Dr. Shephard-Walwyn, and in the second place, in another concretion from the same case, by Mr. Richard Muir, assistant pathologist to the pathological department in the University of Edinburgh. It looks rather as if threadworms may have formed the centre upon which faecal matter collected, a mode of action quite different from the first case, where the worms formed a nest without any faecal matter whatever.

Worms in the appendix have been dealt with at length by Aimé Guinard,³ and under "Parasites Filiformes" the oxyuris and trichocephalus are stated to have been met with frequently in the appendix in a greater number of cases than is noted in this country. Out of 200 cases of removal of the appendix Guinard found the trichocephalus in 15 and the oxyuris in 3 cases. There can be but little doubt that the oxyuris is occasionally overlooked, especially when it occurs mixed up with faecal concretions, for it was only when the concretions were cut into that the worms were found in my second case. Guinard sums up by saying, "I am absolutely convinced that the parasites can play an important rôle in the pathology of appendicitis." With regard to the habitat of the oxyuris, Guinard states that it is in the ileum, and that the females fecundate and pass into the caecum and appendix until the maturity of their eggs, and they then fix themselves into the rectum, where they excite "les démangeaisons anales bien connues."

It is not simply in children that the oxyuris is met with apart from appendicitis, but in the cases recorded now it will be seen that one occurred in a girl, aged 7 years, and the other in an adult of 30 years of age.

That a worm could enter the appendix is noted by Dr. James Milman Coley,⁴ who stated of the ascaris lumbricoides or common round worm that "their migrations sometimes extend to the biliary or pancreatic ducts or the vermiform appendage of the caecum." No mention is made of the entry of threadworms.

In Kelly's "Appendicitis and Other Diseases of the Vermiform Appendix,"⁵ the author states that it has been long known that enterozoa are not uncommon occupants of the appendix, and in numerous cases they have escaped through a perforation into the abdominal cavity. Perforation is denied by Dupallier,⁶ but they can act as foreign bodies and determine an ulcerative appendicitis. Kelly remarks that the oxyuris is sometimes found in the normal appendix in large numbers, and may cause attacks of severe spasmodic pain. Aschoff⁷ of Freiburg has come into touch in the course of examinations with cases of trichocephalus (2) and oxyuris (2).

It will be seen that the occurrence of parasites in the appendix is probably world-wide, and may in reality be more frequent than it is considered to be if the concretions removed from the appendix were always examined with minute care. In the appendices examined by Aschoff were found the common objects so frequently met with in this country—viz., bristle, hard seeds, sand, and lead, as well as the worms already spoken of.

About eight years ago the occurrence of threadworms in the appendix was the subject of several contributions to THE LANCET, and surgeons who had met with cases recorded

their experiences. Mr. J. Lionel Stretton⁸ of Kidderminster met with two threadworms, both females. Dr. G. F. Still⁹ of London, in a letter drew attention to a case of a boy, aged 9 years, having 111 threadworms in a swollen and thickened appendix, and he seems to favour the view that threadworms may set up appendicitis. Professor Begouin,¹⁰ in the *Gazette Hebdomadaire des Sciences Médicales de Bordeaux*, contributed a paper on threadworms and appendicitis, and related a case of a woman, aged 24 years, whose appendix contained 15 threadworms, with ulceration of the mucous membrane. Mr. J. Hutchinson, jun.,¹¹ found an appendix full of lively threadworms, but the occurrence was exceptional in his practice at the date his letter appeared. Von Motz,¹² in the *Écho Médical du Nord*, 1902, p. 217, stated that he had met with the oxyuris in the appendix, and considered that chronic appendicitis might be induced by the trichocephalus or the oxyuris.

With regard to the pathology of these cases, I do not think any doubt rested in the minds of those who were present at the operation in my first case (that of the girl aged 7 years) that the acute abdominal symptoms (temperature 103° F., vomiting, pain, distension) and the reddened and inflamed appendix were conditions due to the presence of the worms, but whether one or two worms would produce the same effect may be open to doubt.

In my second case there were no loose worms, because they were enclosed in concretions of somewhat soft faecal matter, and the inflamed portions of the mucous coat of the appendix were due in all probability to the irritation of the concretions and not to the worms.

Carlisle.

A NOTE ON THE TOXICOLOGY OF CARBON MONOXIDE.

BY W. JAMES WILSON, M.D. R.U.I., D.P.H.,
LECTURER IN HYGIENE, QUEEN'S UNIVERSITY, BELFAST.

AS a consequence of the increase in the use for heating and illuminating purposes of mixtures of coal-gas and carburetted water-gas, the profession and public have become familiar with the toxic and often lethal effects of carbon monoxide. However, the two cases which I describe below seemed worthy of reporting on account of the circumstances which led to the formation and escape of the poisonous gas into the air of the rooms. In one the carbon monoxide was a product of imperfect combustion in a gas-stove which was unprovided with a flue, whilst in the other its escape was due to the fusion of a lead gas-pipe by a leaky electric wire.

CASE 1.—On Dec. 22nd, 1909, at 7.30 A.M., the bodies of a man and woman, aged 35 and 30 years respectively, were found in a small office in Belfast. The room, which measured 15 feet in length, 10 feet in width, and 10 feet in height, was unprovided with a fireplace, and had a tightly-fitting door and windows, which were found closed. The man was dead when admitted to the hospital, and the woman died a week later. A post-mortem examination of the body of the man revealed the usual appearances presented by carbon monoxide poisoning, and the blood was found to be saturated to the extent of 60 per cent. with this gas.

At the inquest the jury found in both cases that death was due to carbon monoxide poisoning, resulting from imperfect combustion of the gas in a gas-stove, and recommended that the gas authorities should not supply gas-stoves unless a proper flue for carrying away the fumes was also installed. The imperfect combustion resulted from the fact that owing to the clogging of the burners the stove had "struck back." The evidence showed that the deceased had probably been 10 hours in the office. It may seem remarkable that the victims did not discover that the stove was at fault, but I find it is no uncommon thing to see a gas-stove or grate in use in this condition, the owner being unaware that it is not burning properly.

The results of a few experiments I made with regard to the production of carbon monoxide in gas-stoves are as follows. An examination of a gas fire (i.e., a fireplace

³ Nouveau Traité de Chirurgie Clinique et Opératoire, A. Le Dentu, Pierre Delbet, xxiv., Affections Chirurgicales de l'Abdomen, 1910.

⁴ Practical Treatise on the Diseases of Children, 1846, p. 229.

⁵ Second edition, 1909.

⁶ Thèse de Paris.

⁷ Die Wurmfortsatz Entzündung, 1908, pp. 6-7.

⁸ THE LANCET, Sept. 27th, 1902, p. 895.

⁹ THE LANCET, July 12th, 1902, p. 125.

¹⁰ THE LANCET, Sept. 8th, 1902, pp. 687-688.

¹¹ THE LANCET, Sept. 30th, 1902, p. 837.

¹² THE LANCET, Nov. 1st, 1902, p. 1211.