Opportunities for studying the anatomical condition of these cases rarely occur. In the case described by Stephen Mackenzie the renal and peritoneal lymph plexuses were enormously enlarged, extending from the diaphragm to the pelvis. The thoracic duct above the diaphragm was impervious.

(*b*) *Lymph-scrotum* and certain forms of *elephantiasis* are sometimes caused by the filaria. In the former the tissues of the scrotum are enormously thickened and the distended lymph-vessels may be plainly seen. A clear, sometimes a turbid, fluid follows puncture of the skin. The parasites are not always to be found. I have examined two typical cases without finding filaria in the exuded fluids or in the blood at night. So also the majority of cases of elephantiasis which occur in this country are non-parasitic. In China it is stated that the parasites occur in all these cases.*

V. Dracontiasis (*Guinea-worm Disease*).

The *Filaria* or *Dracunculus medinensis* is a widely spread parasite in parts of Africa and the East Indies. In the United States cases occasionally occur. Jarvis reports a case in a post chaplain who had lived at Fortress Monroe, Va., for thirty years. Van Harlingen's patient, a man aged forty-seven, had never lived out of Philadelphia, so that the worm must be included among the parasites of this country. A majority of the cases reported in American journals have been imported.

Only the female is known. It develops in the subcutaneous and intermuscular connective tissues and produces vesicles and abscesses. In the large majority of the cases the parasite is found in the leg. Of 181 cases, in 124 the worm was found in the feet, 33 times in the leg, and 11 times in the thigh. The worm is usually solitary, though there are cases on record in which six or more have been present. It is cylindrical in form, about two millimetres in diameter, and from fifty to eighty centimetres in length.

The worm gains entrance to the system through the stomach, not through the skin, as was formerly supposed. It is probable that both male and female are ingested; but the former dies and is discharged, while the latter after impregnation penetrates the intestine and attains its full development in the subcutaneous tissues, where it may remain quiescent for a long time and can be felt beneath the skin like a bundle of string. Suppuration is after a time excited, and when the abscesses are opened or burst the worm appears and is sometimes discharged entire. The worm contains an enormous number of living embryos, which escape into the water and develop in the cyclops—a small crustacean—and it seems likely that man is infected by drinking the water containing these developed larvæ.

* For full consideration of the subject of congenital occlusion and dilatation of lymph channels, see work on this subject by Samuel C. Busey, New York, 1878.

The *treatment* consists in promoting the suppuration, and when the worm is seen the common procedure is to roll it round a portion of smooth wood, and in this way prevent the retraction, and each day wind a little more until the entire worm is withdrawn. It is stated that special care must be taken to prevent tearing of the worm, as disastrous consequences sometimes follow, probably from the irritation caused by the migration of the embryos. It is stated that the leaves of the plant called *amarpattee* are almost a specific in the disease. Asafœtida in full doses is said to kill the worm.

VI. Other Nematodes.

(*a*) Among less important filarian worms parasitic in man the following may be mentioned: *filaria loa*, which is a cylindrical worm of about three centimetres in length and whose habitat is beneath the conjunctiva. It has been found on the West African coast, in Brazil, and in the West Indies. *Filaria lentis*, which has been found in a cataract. Three specimens have been found together. *Filaria labialis*, which has been found in a pustule in the upper lip *Filaria hominis oris*, which was described by Leidy, from the mouth of a child. *Filaria bronchialis*, which has been found occasionally in the trachea and bronchi. This parasite has been seen in a few cases in the bronchioles and in the lungs. There is no evidence that it ever produces an extensive verminous bronchitis similar to that which I have described in dogs. *Filaria imitis*, of which Bowlby has described two cases. In one case with hæmaturia female worms were found in the portal vein, and the ova were present in the thickened bladder wall and in the ureters.

(*b*) *Trichocephalus Dispar* (*Whip-worm*).—This parasite is not infrequently found in the cæcum and large intestine of man. It measures from four to five centimetres in length, the male being somewhat shorter than the female The worm is readily recognized by the remarkable difference between the anterior and posterior portions. The former, which is at least three fifths of the body, is extremely thin and hair-like in contrast to the thick hinder portion of the body, which in the female is conical and pointed, and in the male more obtuse and usually rolled like a spring. The ova are, oval, lemon-shaped, ·05 millimetre in length, and each is provided with a button-like projection.

The number of the worms found is variable, as many as a thousand having been counted. It is a widely spread parasite. In parts of Europe it occurs in from ten to thirty per cent of all bodies examined, but in this country it is not so common. The trichocephalus rarely causes symptoms. It has been thought by certain physicians in the East to be the cause of beri-beri. Several cases have been reported recently in which profound anæmia has occurred in connection with this parasite, usually with diarrhœa. Enormous numbers may occur, as in Rudolphi's case, without producing any symptoms.

The diagnosis is readily made by the examination of the fæces, which contain, sometimes in great abundance, the characteristic lemon-shaped, hard, dark-brown eggs.

(*c*) *Eustrongylus Gigas*.—This enormous nematode, the male of which measures about a foot in length and the female about three feet, occurs in very many animals and has occasionally been met with in man. It is usually found in the renal region and may entirely destroy the kidney.

(*d*) *Rhabdonema Intestinale*.—Under this name are now included the small nematode worms found in the fæces and formerly described as *anguillula stercoralis* and *anguillula intestinalis*. This parasite occurs abundantly in the stools of the endemic diarrhœa of hot countries, and has been specially described by the French in the diarrhœa of Cochin-China. It occurs also in Brazil, and has been found in Italy in connection with the anchylostoma in cases of miner's anæmia. It is stated that the worms occupy all parts of the intestines, and have even been found in the biliary and pancreatic ducts. It is only when they are in very large numbers that they produce severe diarrhœa and anæmia.

Acanthocephala (*Thorn-headed Worms*).—The *echinorhynchus gigas* is a common parasite in the intestine of the hog and attains a large size. The larvæ develop in cockchafer grubs. Lambl found a small *echinorhynchus* in the intestine of a boy. Welch's specimen, which was found encysted in the intestine of a soldier at Netley, is stated by Cobbold probably not to have been an *echinorhynchus*. Recently a case of *echinorhynchus moniliformis* has been described in Italy by Grassi and Calandruccio.

IV. DISEASES CAUSED BY CESTODES

(*Tape-worms; Hydatid Disease*).

Man harbors the adult parasites in the small intestine, the larval forms in the muscles and solid organs.

I. Intestinal Cestodes; Tape-worms.

(*a*) *Tænia solium*, or pork tape-worm. This is not a common form in this country. It is much more frequent in parts of Europe and Asia. When mature it is from six to twelve feet in length. The head is small, round, not so large as the head of a pin, and provided with four sucking disks and a double row of hooklets; hence it is called, in contradistinction to the other form in man, the armed tape-worm. To the head succeeds a narrow, thread-like neck, then the segments, or proglottides, as they are called. The segments possess both male and female generative organs, and about the four hundred and fiftieth become mature and contain ripe ova. The worm attains its full growth in from three to three and a half months, after which time the segments are continuously shed and appear

in the stools. The segments are about one centimetre in length and from seven to eight millimetres in breadth. Pressed between glass plates the ovarian rosette is seen as a central stem with about twelve or fifteen lateral branches. There are many thousands of ova in each ripe segment, and each ovum consists of a firm shell, inside of which is a little embryo, provided with six hooklets. The segments are continuously passed, and if the ova are to attain further development they must be taken into the stomach, either of a pig, or of man himself. The egg-shells are digested, the six-hooked embryos become free, and passing from the stomach reach various parts of the body (the liver, muscles, brain, or eye), where they develop into the larvæ or cysticerci. A hog under these circumstances is said to be *measled*, and the cysticerci are spoken of as measles or bladder worms.

The *tænia solium* received its name because it was thought to exist as a solitary parasite in the bowel, but two or three, or even more worms may occur.

(*b*) *Tænia saginata* or *mediocanellata*—the unarmed or beef tape-worm. This is a longer and larger parasite than the *tænia solium*. It is certainly the common tape-worm of this country. Of scores of specimens which I have examined, almost all were of this variety. According to Bérenger-Féraud it has spread rapidly in western Europe, owing probably to the importation of beef and live stock from the Mediterranean basin. It may attain a length of fifteen or twenty feet, or more. The head is large in comparison to the *tænia solium*, and measures over two millimetres in breadth. It is square-shaped and provided with four large sucking disks, but there are no hooklets. The ripe segments are from seventeen to eighteen millimetres in length, and from eight to ten millimetres in breadth. The ovarian rosette consists of a central stem with from seventeen to eighteen lateral branches, which are given off more dichotomously than in the *tænia solium*. The ova are somewhat larger, and the shell is thicker, but the two forms can scarcely be distinguished by their ova. The ripe segments are passed as in the tænia solium, and are ingested by cattle, in the flesh or organs of which the eggs develop into the bladder worms or cysticerci. Whether they develop in man or not is uncertain. No instance of the cysticercus of the *tænia saginata* has, so far as I know, been reported in man.

Of other forms of tape-worm may be mentioned:

(*c*) *Tænia elliptica* (*tænia cucumerina*). A small parasite very common in the dog and occasionally found in man, and the larvæ of which develop in the louse of the dog.

(*d*) *Tænia flavo-punctata*. A small cestode was found in the intestine of a child in Boston, and has since been met with in one or two cases.

(*e*) *Tænia nana* and the *tænia Madagascariensis* have been found only once or twice.