

ON THE EPIDEMIC CAUSED BY ANKYLOSTOMUM AMONG THE WORKMEN IN THE ST. GOTHARD TUNNEL.

By E. BUGNION, M.D., Geneva.

THE little worm known by the name of *Ankylostomum duodenale*, or *Dochmius*, or *Strongylus duodenalis*, has acquired a bad reputation lately, from having been the principal cause of the serious epidemic which prevailed last year, and still prevails, among the workmen of St. Gothard.

This parasite had been hitherto entirely unknown in Switzerland; it is not unknown in Italy, but is more common in hot countries, such as India, the Antilles, and Brazil; and especially in Egypt, where it causes the disease denominated the Egyptian chlorosis. This latter fact was brought to light in the year 1854 by Griesinger, a distinguished German physician, who passed many years in Egypt; and to whom we owe, as well as to his countryman Bilharz, important researches as to the parasitical diseases of that country.

The ankylostomum is a nematoid worm, and consequently belong, to the same order as the trichina, the oxyuris, the ascaris lumbricoides or children's worm; but that which renders it much more prejudicial than the latter, is the fact that, instead of feeding on the contents of the bowels, it attaches itself like a little leech to the mucous membrane of the duodenum, of which it sucks the blood. Its mouth is armed for this purpose with a cup-like sucker, on the edge of which are fixed three pairs of hooks, with which it fastens itself to its victim. At the entrance of the œsophagus are found, besides, three movable blades, which work like little lancets, and probably serve to make incisions in the portion of the mucous membrane seized by the sucking organ.

Large ecchymoses owing to the bite of the ankylostomum are often found in the mucous or submucous lining of the intestines; and the repeated intestinal hæmorrhages produced by its attacks may be considered as the principal cause of the aggravated anæmia and increasing weakness which are generally observed in such patients.

The largest of these worms are always females; they measure about half an inch in length (126.18 millimètres); the male is about half the size. The smallness of these parasites is compensated for by their number, for they are often found by hundreds in the intestines of the individuals who have died of this disease. Dr. Tarona, at Varese, counted as many as 1,250 specimens of ankylostomum in the evacuations of a single patient, after the administration of ethereal extract of male fern.

The external symptoms of the complaint are an increasing paleness of the skin, lips, etc.; and it is accompanied in serious cases by swelling of the feet, and a puffiness of the face, caused by the excessive fluidity of the blood. The pulse is quick and feeble; the patient suffers from palpitation and giddiness; he feels a great lassitude, and soon becomes unable to work. With these symptoms, which are those of an aggravated anæmia, are generally connected a derangement of the digestion, and cutting pains in the abdomen. This condition may last for years, and is too often terminated by death. The patient finally sinks under dropsy and exhaustion.

The ankylostomum is extremely prolific; each female produces thousands of eggs. Happily for the patient, the development of these does not take place in the bowels, otherwise he would certainly lose his life. The eggs must be evacuated; the embryo continues its evolution externally, and is hatched in water. It is in drinking this water containing the germs of ankylostomum, that the man introduces this dangerous visitor into his body. It is easy to understand that, owing to the want of cleanliness on the part of the St. Gothard workmen, the epidemic has extended so rapidly.

The first of these cases was recognised by Professor Bozzolo last spring. It was that of a workman who had been employed in the great tunnel, and died soon afterwards in the hospital at Turin, with symptoms of aggravated anæmia. The *post mortem* examination revealed the presence of numerous specimens of ankylostomum in the small intestine. Three other cases, observed in the same town by Drs. Concato and Perroncito, were the subject of a communication to the Académie des Sciences in Paris, in the sitting of March 15th, 1880 (see *Comptes Rendus*, p. 619). The parasite was also identified, but in no great numbers, on March 10th, 1880, at Airolo, at a *post mortem* examination, by Dr. Giaccone, one of the physicians of the St. Gothard Company.

Notwithstanding these important discoveries, hesitation was at first felt in attributing to the presence of this noxious worm the cases of anæmia which were constantly increasing among the workmen. In consequence of the ankylostomum having been rarely observed up to this time in that part of Europe, it seemed more natural to refer the

complaint to vitiated air, want of light, unsuitable food—in short, to the defective sanitary conditions in which the workmen lived.

The evidence, however, became irresistible after Dr. Sonderegger had treated a young engineer of the works. The patient showed all the symptoms of Egyptian chlorosis; and, after having taken santonin (two decigrammes) with calomel (five decigrammes), evacuated the ankylostomum in large numbers.

Similar cases were not long in appearing. Thus, in the month of November, Professor Bäumler discovered the parasite in the case of a Tyrolese workman, who had left the Gothard, and who had been admitted into the hospital of Freiburg in Breisgau.

In December, six instances of the same thing were observed by Dr. Schönbachler, in the Schwyz Hospital, among the workmen who had been employed in the tunnel. One of them soon sank, and about 300 specimens of ankylostomum were found attached to the mucous lining of the duodenum and jejunum.

During that time, twelve new cases were reported at Turin, by Dr. Perroncito and others; but none of them had a fatal result, in consequence of the successful administration of 15 to 30 grains of ethereal extract of male fern with $2\frac{1}{2}$ to $3\frac{1}{2}$ drachms of tincture of male fern, during two or three days successively.

Finally, we can add a last case, that of an Italian workman, who had been at Göschenen up to October last, and who, after having worked for some months in another part of Switzerland, was obliged, in consequence of increasing anæmia and weakness, to seek medical aid in the Infirmary of Rolle, during the month of January. Dr. Dumur, the director of this institution has had the kindness to send eight specimens of ankylostomum (three males and five females) evacuated by this patient. The presence of the parasite was first placed beyond doubt by microscopic examination of the eggs, which had been expelled. These little bodies, which measure hardly more than one six-hundredth of an inch (one-twentieth of a millimètre), nevertheless offer to the physician an important aid to diagnosis, by their being easily distinguished from those of the other hæmatoid worms infesting the human body.

The eggs of the *Oxyuris vermicularis*, which might otherwise be confounded with those of the ankylostomum, as being about the same size, are distinguished by the greater elongation of the shell, which is more convex on one side than on the other, and is furnished with an operculum. The embryo ready formed may be perceived within, while the eggs of the ankylostomum are generally expelled at an earlier stage of development.

In fact, we remarked, in the last-mentioned case, that all the freshly evacuated eggs included either an undivided vitellus, or only two, four, six, or eight cells; but, three days after, the segmentation of the vitellus was concluded in all the eggs, and even three embryos were found swimming about in the liquid, about $\frac{1}{2}$ millimètre long (exactly 0.35 millimètre), and quite similar to those of *Dochmius trigonocephalus*, described by Professor Leuckart in his excellent work *Die Menschlichen Parasiten*, II, p. 435.

It is well to add that, if the cause of the epidemic of St. Gothard was not immediately recognised, it was partly caused by the impossibility of having *post mortem* examinations, the authorities of Airolo having refused the necessary permission.

We are informed, in fact, in the report published in June 1880 by Dr. Sonderegger, who was retained by the Federal Government, that, in 117 deaths which took place up to that time, only a single examination was made.

Now that the cause of the disease is known, it will certainly be subdued in a short time by the use of suitable remedies, and its return will be prevented by appropriate sanitary measures.

BEQUESTS AND DONATIONS.—The Newport (Mon.) Infirmary and Dispensary has received £500 under the will of Mr. R. P. Jones.—Mrs. Mackintosh has given £100 to the Glamorganshire and Monmouthshire Infirmary, Cardiff.—Lady Harriet Bentinck has given £100 to the Home for Incurable Children.—The Rev. Sir Brook C. Bridges, Bart., has given fifty guineas to the Kent and Canterbury Hospital.—Mr. William Dent has given £50 additional to the Royal Free Hospital.—“J. W.” has given £50 to the Royal Hospital for Children and Women.—Mr. Howard Gilliat has given fifty guineas to the Charing Cross Hospital. Mr. Charles Pearce has given fifty guineas to the Sussex County Hospital, Brighton. The Ladies' Association of the Great Northern Hospital have subscribed £40 to it.—The late Mrs. Abigail Mazon has bequeathed £200 to St. Patrick's Hospital for Incurables, and £50 to North Infirmary, Cork.—Mr. John M'Dowall has bequeathed to the Royal Infirmary and to the Western Infirmary, Glasgow, the sum of £1,000 each.