

2. *The Bladder-worm.*

A comparatively small proportion of the rabbits examined by me in the Wairarapa were affected by the bladder-worm—not more than 5 per cent. The rabbiters, however, state that it is no uncommon thing to find 20 per cent. of the rabbits with one or more bladder-worms. The men would only notice the advanced stages of the disease, so that a larger percentage of the rabbits may really be affected. But it is important to notice that this does not apply simultaneously to the whole of the Wairarapa district. There is a great deal of difference in the prevalence of the disease in different localities, and even in the same locality the disease may be common at one time and scarce at another. In one instance during my visit four out of six rabbits shot in one day were found to contain bladder-worms. It should be observed, however, that the time of my visit—shortly after the close of some months of dry summer weather—was not the time at which we should expect to find the greatest number of rabbits affected with the disease. The rabbiters, too, at the Dry River Run and elsewhere, I found, were in the habit of giving their dogs medicine to expel their tape-worms—a measure calculated to reduce the prevalence of the disease.

I could not obtain any positive evidence that rabbits are ever found lying dead on the ground, or in a dying condition, from the disease. The rabbiters state that they sometimes find rabbits lying dead on the ground, but the hawks have always been at them, so that it is too late to find out what the cause of death may have been. I was able to observe for myself the great number of hawks in the district, and their activity in attacking rabbits caught in traps or lying on the ground. We must remember further that many of the rabbits would probably die in their burrows.

Most of the affected rabbits obtained by me in the Wairarapa contained only a single bladder; some had two, and in one instance I found three. The rabbits were for the most part still in moderately good condition, but not equal in this respect to their brethren free from the bladder-worm. When we remember that the parasite frequently attains the size of a fowl's egg, weighing, with the included fluid, $1\frac{1}{2}$ oz. to 2 oz., and occasionally reaches double the size, we can see that even a single specimen must, to some extent at least, act as a drain on the strength of its host, whilst two or three or more will have a still greater effect. The parasite of course draws its nourishment from the system of its host, whilst the addition of some ounces of weight to a rabbit means a tax on its powers, and must hinder it in escaping from its enemies, especially if the parasites are in a position in which their bulk interferes with the rabbit's power of locomotion. That even a single bladder-worm weakens a rabbit is shown by the fact that I have not been able to have any infested rabbits brought alive from the Wairarapa to Auckland, all having died on the voyage, though other rabbits, free from the parasite and sent at the same time, have arrived safely. Still, though a single bladder-worm weakens a rabbit, it is clear that the rabbit may live a very long time notwithstanding the presence of a bladder-worm, and even of two or more.

We may now with advantage consider the results obtained with rabbits artificially infected with the bladder-worm. It may be well for me to state that, in order that my results may more fairly be taken as a basis in estimating the effects of the disease on rabbits in a state of nature, I endeavoured to keep the rabbits under conditions approaching the natural ones.

I have found that when the rabbits are fed with large quantities of eggs some of them may die within the first two or three weeks. These are the rabbits in which the largest proportion of the eggs develop. But the number of bladder-worms developed is by no means simply proportional to the number of eggs which a rabbit swallows, but depends far more on its constitutional power of resistance. Even in cases where the greatest number of bladder-worms have appeared, and the rabbits have died at an early stage of the disease, the number of parasites present did not correspond to more than about 1 per cent. of the eggs administered. Usually the percentage of eggs which developed was far lower, and over 30 per cent. of the rabbits failed to take the disease at all, though some of them were fed several times with the tape-worm eggs.

The development of the bladder-worm is, as we have seen, slow; so that if a rabbit contains only a small number of bladder-worms it may live a considerable time. But as the bladder-worms grow older they become larger and larger, and so, of course, the ill effects of their presence become more marked. One of my experimental rabbits died at a date which was 104 days after the first infection with one proglottis, and forty days after a second infection with two proglottides. It was found to contain twenty bladder-worms. Most of these dated from the first infection, three from the second infection. The largest bladder-worm was $1\frac{1}{2}$ in. long by 1 in. in width; most of the others were about 1 in. in length. Another rabbit died at the same stage of the disease from the presence of seven bladder-worms. A third died forty-eight days after infection, and contained seventeen bladder-worms, the largest being $\frac{3}{4}$ in. in length.

Avoiding unnecessary details, we may say that the effect of a single bladder-worm will, as a rule, hardly be shown during the first three or four months, but that afterwards, as it continues to increase in size, it may be a source of weakness to the rabbit; but I have not been able to find any evidence that a rabbit affected with a single bladder-worm only might not live till death came to it from some other natural cause. But with the increase of the number of parasites the tax on the strength of the rabbit becomes greater than it can bear, and it succumbs to the burden, sometimes directly, sometimes indirectly, being brought into a low and weak condition, in which it readily falls a victim to other adverse influences, such as weather, scarcity of food, or enemies.

We must add, however, that the bladder-worm sometimes settles in a position in which its mere presence is more than an inconvenience, and interferes with some of the essential functions of life. The bladder-worms, as commonly found in the muscles of the limbs or trunk, are in a position in which they do not interfere with other organs; but I have seen them in a good number of instances in positions where they must have been distinctly hurtful. Thus, I have several times found them in the muscles moving the eyeball, producing displacement of the eye. In one case a bladder-worm was growing in the tongue, and by producing a swelling at its base had rendered it