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VII. *The Tsetse Fly.* By Dr B. F. BRADSHAW.

[Read January 28, 1880.]

The Tsetse is about the size of a large house-fly, a dark brown colour, and rough appearance; it possesses a proboscis which is divided into three parts, namely, the perforator and two sheaths. The after part of the body is barred with yellow, the wings overlap, and it bears a considerable resemblance to our common cowdung fly at home, is very tough and bears a good squeeze without being any the worse for it.

It inhabits the forest country, on the north bank of the Zambesi, in great numbers, and is found in three belts along the Zambesi road. Commencing at the first, is a belt along the Zambesi and Chobe rivers, varying in width from 8 to 12 miles, and is more numerous in some localities than in others, according to the amount of game, being fewer where game is scarce and "vice versa" is much more plentiful during the winter months, namely, from April to end of September. Then during the summer, the next belt of fly is about 50 miles from the river, along the wagon road, in a southerly direction, between it and Panta ma Teuka, is about 6 miles wide and 8 miles from the trading station at Panta ma Teuka. Sometimes you may pass in the daytime and see no fly, at other times you will notice many. This part of the country is one of those sandy ridges covered with forest so common in the country. About 6 inspan, or 45 miles from Panta ma Teuka, is the third belt of tsetse; the wagons generally inspan after sunset, and trek for about three hours, then tie up the oxen and let them sleep for a couple of hours, inspan again for four hours, and we consider ourselves past the region of fly, which must be 12 or 13 miles wide; it is also very uncertain here, one time very numerous, at another none to be seen. The game also is generally very scarce here. The country consists of heavy sand and forest, being a portion of the sandy pool plateau. The Bushmen have told me that the fly breeds in the buffalo

droppings, and it seems as if there was some truth in it, because where the buffalos have been driven away in certain tracts, the fly has almost disappeared. It is not found on the north bank of either the Zambesi or Chobe rivers, close to the water where there are flats. "Wankies" people, the Mashapatans, have informed me that before "Mosilikatze" drove them across the Zambesi, the hilly tract of country between the "Gwai" and Daka rivers had no tsetse, was thickly inhabited by three tribes, namely Mashapatans, Matongas, and Batokas, and that they had plenty of cattle, but since the country became uninhabited and overrun with game, it has become one of the great strongholds of tsetse, extending from the Zambesi river for at least 60 or 70 miles in a southerly direction—one effect produced by the Zulus' love of rapine and slaughter.

It bites throughout the day, except when it rains, and during part of the night if warm; in fact I consider it dangerous to travel at night with cattle or horses, until it begins to grow cold towards the middle of the night, as I have been bitten often until past 11 P.M. It is very cunning, always darting, if watched, behind one's back, and if much persecuted with a fly-duster, darts to the grass or bushes, but soon returns to the attack. It will follow, for miles, fresh meat, or natives, but soon returns within its bounds. Tsetse will not stay long in a camp, after fires are lighted, although numerous all round. The Kaffirs have said to me, when much troubled by the fly in camp, Make a fire and they will go away. I found the experiment to succeed. Its buzz is peculiar and not easily forgotten.

The bite causes a similar sensation to a fine needle driven quickly into the skin, causing pain for about a second. As soon as the puncture is made the fly begins to fill itself rapidly, and if it does not succeed in taking sufficient blood it presses its proboscis a little deeper, producing the same pricking sensation as at first. It generally takes from two to three drops of blood, and when full seems to move its proboscis up and down once or twice in the wound; I have never been able to see it inject anything at that moment; then suddenly withdrawing it, it flies down to the grass and sits there distended with blood. Sometimes the tsetse will settle on the neck or face and cause no pain, the first intimation being a slight buzzing sound heard, and immediately after it is seen flying away, or if the hand is put up to the place quickly, it may perhaps be caught full of blood, but one cannot always tell where the exact spot is, from whence the buzzing sound proceeds. The Kaffirs catch them by slipping the blade of a knife or edge of an assegai on their legs and then, turning it carefully over, crush them beneath it. Occasionally the part bitten may feel irritable and one may be obliged to rub it for a few moments, but I never

noticed any further effect on man. I have heard my Kaffir carriers say, when going into a place where the fly was numerous, "Oh! now we shall get thin; look at all the tsetse!" but I never observed any difference in their appearance, although often months at a time in the fly districts.

All domestic animals perish if bitten, sooner or later, with the exception of the goat; the donkey seems to resist it longest. Dogs are taken into the fly district by the Bushmen when pups, and are allowed to suckle the mother, and at the same time given as much fly to eat as can be captured for them. The mother in this case dies and the pups live and grow up, but are the most miserable looking objects I ever saw belonging to the canine race—emaciated, small, and the hair standing straight up all over them. Goats, like all game, get fat and do not seem to mind it. In fact, the Kaffirs keep large flocks in the fly districts near the "Victoria Falls," on the north bank of the river.

Unless bitten by several tsetse, animals do not shew any symptoms in particular until the rains fall. Then oxen especially get emaciated and weak rapidly, much weaker than they would be if in the same condition from poverty alone. The hair stands, the eyes water and have a dull fishy look, the nose also waters, occasionally the feet swell, also the jaw and sometimes under the belly, and the skin has a wrinkled appearance about the hind quarters. If inspanned they soon knock up and lie down in the yoke, and even if, as seldom happens, an ox recovers, he is never good for anything for at least three years, and then cannot do much work in a hot sun.

On skinning an ox if fly-stuck and on examining the skin, you will perceive one or more dark spots, having a slightly bruised look, on the fleshy side. The body presents a wasted appearance, the muscles are flabby, and all the cellular tissues appear at first to be filled with fat, but on closer inspection it is seen to consist of yellow watery particles; there is very little blood in the body, the flesh generally having a bloodless look.

I have seen a great number of animals die from tsetse, especially oxen and donkeys; I have not the slightest doubt that tsetse was the cause of death. For instance, I have passed through the third belt of fly already mentioned, with an ox wagon three times, and allowed the oxen each time to feed. At that time the fly was known to be not far from the north-east side of the road, and nothing happened to the oxen. About a year after a trader came and took three wagon loads of ivory out of the country to 'Tati. The oxen he had I knew well; they were perfectly healthy, and he was warned about the fly and told not to let the cattle graze on that side of the road. At that time we did not require to go through at night, but he did not regard the advice given.

About two months afterwards I went out to Tati and found several of his oxen dead, others dying, and several died while I was there. I examined those I saw die, and they all presented the same appearance that has been already mentioned. In the end all died, forty-eight in number, and I went on to the Diamond fields and did not lose a single ox, although I had been a whole day standing at the same Pan, where his were bitten, and we both travelled out in the rainy season, but I kept the oxen to the side of the road that had no fly. Now it could not have been a poisonous plant, or it is probable some of the oxen I had with me would have eaten it, as the country for many miles round had the same features, heavy sand, timber, and coarse grass, and in many other places where the soil and vegetation were exactly the same and no fly had ever been seen by any one, no accident ever happened to cattle, although running for months there. Also all cattle that I have seen die in the Zambesi presenting the appearance before and after death just mentioned, had been in one or other of the fly districts shortly before. A coloured hunter had outspanned in the third belt where the forty-eight oxen were bitten, saw fly there and immediately inspanned and trekked, but some time afterwards, three of his oxen died with all the symptoms of fly-bite. He had seen many animals killed by the fly. I saw ten donkeys die from it, but for a long time was under the impression that fly had no effect on them and mentioned that circumstance to Capt. McLeod who was hunting in the Zambesi in 1875—76. But shortly after he left, the donkeys began to get thin and weak, although doing no work for some time, and died quickly, one after another; they had been a great deal in the fly districts, and presented on being skinned the same appearance as fly-stuck oxen. They had not been in the fly since September 1875, and were all dead by the end of May 1876. All that time they had been running on the same belt with several horses, and nothing was ever the matter with any of the horses; as both animals feed much alike, I think it very improbable that a poisonous plant could have been the cause of death. Donkeys certainly resist the effects of fly longer than any animals I know. I went to hunt in 1877 and leaving the wagon outside the Zambesi belt of fly, started with a friend on foot for the river "Chobe" on Feb. 27th. My friend had two dogs about six months old, and one had taken our spoor and come up with us late in the day, where tsetse were in hundreds. We shot some game on the 28th, and on the 29th sent boys to the wagon with meat, and the dog, which latter I had seen bitten several times by the fly during the day previous. We hunted for some time, the weather was very wet, and returned on the 14th March. The dog was looking very dull about the eyes, and not nearly so lively as usual; he gradually wasted away, and was dead in less than a month. The sister

that escaped being bitten lived in good health until taken by a lion in December, 1877. A hunter told me if he suspected his horse had been bitten during the dry season, he used to throw a few buckets of water over him, and if bitten, the symptoms would develop themselves in a few days.

In conclusion, I may state that having observed the Tsetse and its effects more or less for a period of six years, I am fully convinced that it causes death to all domestic animals, except the goat, by its bite. Many traders have told me they believe one fly is sufficient to kill an ox, and natives say that if an animal is bitten slightly at one time, it is not a preventative against death if bitten at a future period.