

nominal expense, could be extirpated; and thus we should save an immense amount of capital and wipe out a disgrace to all who neglect their cattle."

#### PREVENTIVE DRESSING

From experiments and information sent in during this year it appears to me that the attack might be put an end to, and any damage to the hide (save what would soon heal durably and reliably) might be escaped by the simple plan of dressing each of these maggot-infested swellings, known as Warbles, with a little mercurial ointment *as soon as ever it is perceptible to touch and the opening has formed*, thus destroying the maggot within whilst the sore is *beginning*, instead of after it has been established several months; but it will be desirable to consider the whole of the attack, and especially the reason why the maggot-cavity does not unite thoroughly (even though it apparently heals) if left till February or March.

#### DESCRIPTION OF FLY AND HABITS.

This Ox Bot Fly is about the same size, or rather larger than, the previously-mentioned Bot Fly of the horse. It has a hairy body and large head, with yellow face. The fore body has four raised lines along it, and the abdomen is white or yellowish towards the base, black in the middle, and orange at the end. The legs are black, with red feet, and the wings are brownish and unspotted, and with two large alulets.

The duration of the attack is from one summer to another. It may begin in May or June, or later, according to whether the cattle are in low ground or on hills, and according to other circumstances of weather, &c., but from one summer to another gives the best general idea of its whole duration.

The egg is of an oval shape and white, with a small brownish lump-like appendage at one end. There has been much scientific discussion whether the egg is laid on the cattle or inserted into the skin; it does not seem proved either way; but the most recent observations point to it being placed externally either on the skin or on the hair, and, in the case of the nearly-allied Warble Fly of the reindeer, the female fly has been distinctly seen with the egg at the end of the ovipositor in the act of placing it on the animal. The common idea that the wild gallop of the herd when attack is going on is caused by the intense pain of the hide being pierced is not well founded, for various reasons to be referred to presently.

The warble-maggot, in the early part of its life, is white and transparent and smooth. It makes its way into the lowest part of the skin, and lie there harmlessly until its first moult, when the injurious part of its life begins. Then it gains a skin beset with groups or small bands of excessively minute prickles, and by the pressure of this rough surface irritation and ulceration are caused, and swelling, and the bursting of an orifice in the warble, follows. This is the stage to which I wish more than all others to direct your attention, for, whatever we may do before or after, if we could destroy the maggot at the *first bursting* of the warble, we should save, I believe I may say all, further trouble and loss.

The grub is then to be found in the state in which it is best known; it lies with the tail-end, which is furnished with two dark horny spiracles or breathing-pores (sometimes mistaken for the head), nearest the opening, so as to enable it to draw in supplies of air. The mouth end, which cannot be called the head, lies towards the bottom of the cell, and when I have held one of these maggots in my hand a regular contraction and expansion of the tubercles by the mouth opening was very noticeable, and as this movement also kept the bunches of prickles near in constant motion, it must have acted as a perpetual irritant in the cavity.

With the growth of the maggot it gains a deeper colour, until it is dark grey or almost black, with the patches of shagreening of minute prickles showing fairly plainly; the sac or cavity enlarges, and towards the May or early summer of the year after the egg was laid, when the maggot is come to its full growth, it presses itself through the opening of the warble, and, falling to the ground, finds some place, as beneath a stone or in the turf, suitable for it to turn to chrysalis in, and there it changes to the perfect fly. Occasionally (though I am not aware the exception has been brought forward before) the change to the chrysalis state takes place in the warble.

#### THE CHRYSALIS.

The chrysalis is dark brown or black, and very much like the maggot in appearance; and, like that of many other kinds of flies, it consists externally merely of the maggot-skin, which has contracted and hardened so as to form a case for the developing fly within. But it differs a little in form from the maggot in being almost flat below.



Chrysalis of Ox Warble Fly, side view, and showing contained Fly

The chrysalis state lasts in common circumstances from 20 to 30 days, but is very much lengthened by cold weather, especially severe night-chills.

#### The Principles of Underdraining.

We give the following brief and condensed hints on underdraining, in answer to frequent inquiries, or to correct erroneous published statements:

1. The first thing is to ascertain the natural descent of the ground, and this the owner who has occupied the farm for some years, knows tolerably well by the flow of surface streams. The use of a simple level, made by carefully fixing

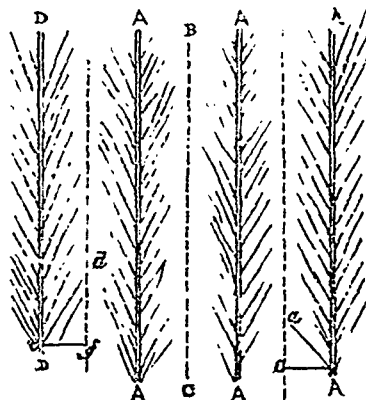


Fig 1

a carpenter's spirit level to a straight five-foot rod, will assist him.

2. If the land slopes evenly, the drains, about two rods