

they remain in the larva condition until the next season. Shortly before they emerge in the perfect state they turn to pupæ, and a few days afterwards come out as perfect wheat midges. Those that remain in the ears also spin the same thin cocoon and remain in it all the winter. Probably the above is the general rule, the midges not being produced until the following summer; but it would also appear that some of them emerge the same autumn, Prof. Webster, of Purdue University, Indiana, has taken them as late as November, and has also bred them from plants of Volunteer wheat, in which he found them beneath the sheath of the leaf near the ground. From the above it would appear that as yet we do not know the complete history of this species, and it is possible that we may find that this insect has a double life-history similar to those of the "Hessian fly" or "Wheat-stem Maggot" (*Meromyza Americana*), which attack the young wheat plant at the root in the autumn, but in the stem during the summer. It is an important point to find out what its accurate life-history is, because until this is done it is useless for us to experiment for a complete remedy with any hope of success. In this connection the most important points are those which tell us how the wheat midge passes the winter. We have seen that some of the maggots leave the heads of the grain before the crop is cut and pass the winter beneath the ground, and that others remain between the scales of chaff and are carried with it to the barn or stack. By far the larger number are those which leave the heads of wheat before it is cut, and it is possible that if the crop were left standing long enough all would follow this course. It seems to me that this is the natural way for them to hibernate, from the fact that many of those which are carried with the grain dry up and do not come to maturity. Notwithstanding this, however, these little creatures have great powers of endurance, and although many are destroyed, a large proportion withstand this drying up, and, if left where the warmth and spring rains can get at them, will produce the perfect flies in due time. Not only will they endure a long period without moisture, but the opposite conditions of excessive moisture trouble them just as little. Indeed, Dr. Fitch speaks of them as amphibious. A moist, warm season in June is always more productive of midge injuries to wheat than a dry one, and their ravages are always more severe on low lying fields than upon uplands. As the greater number of maggots leave the grain as soon as it is ripe the advantage of cutting it, as soon as it possibly can be done without injury to the crop is manifest, for in this way a great many will be removed from the fields and can be destroyed at the time of threshing. This may be easily done, and is, I think, the remedy most to be relied on to reduce its ravages by artificial means. When the wheat is threshed the grubs are separated from the grain and are thrown down amongst the dust and rubbish which falls beneath the threshing machine, and are sometimes present in such numbers as to give a perceptible colour to this refuse. This should always be carefully swept up and burnt. If swept on one side and left till the following spring it will be merely a hotbed of mischief from which injury will be sown in every direction. In the annual report of the Entomologist and Botanist to the Director of the Dominion Experimental Farms for 1887, I made the following statement when suggesting remedies for this pest:—

"Under this heading I would first of all draw attention to the careless practice of farmers of not destroying the dust and rubbish from the threshing machine when they know their crop to have been infested with this insect. I have over and over again seen the ground beneath the machine coloured quite perceptibly by the pupæ which have remained in the ears when the crop was carried away.

"The greater part of these pupæ, although apparently much dried up, are yet in a condition to mature if left undisturbed on the ground. I would strongly recommend that the wise precaution taken by Nova Scotian farmers should be more widely adopted. Col. Blair, of Truro, N. S., tells me that it is the usual custom in Nova Scotia for good farmers to gather up all the rubbish from the threshing machines and take it out on to a cross-road or other hard ground and burn it. This is a means not only of destroying the larvae of the 'Weevil' and other insects, but also the seeds of pernicious weeds."

With regard to those which leave the ears of wheat before it is cut and pass the winter in the ground, cultivating the stubble directly the wheat is carried is recommended. This disturbs the grubs while they are going through their transformations and exposes them to the effects of the air and weather. It also lays them open to the attacks of