The Moasic Situation in Natal.

Uba" and the confusion between India and Egypt was presumably obvious. The Manager of that Station had explained to him that the reason why he called it Indian Uba was because it was similar to our Uba.

Mr. Staniland asked to what extent the present explanation would affect the Proclamation, if all canes had to be eradicated by January 1925.

The Chairman replied that the Proclamation was only being brought before the Association for its approval and had not yet been promulgated.

Mr. Edwards stated that with regard to the analysis of Agaul and Uba cane, he did not know whether Mr. Storey was quite conversant with the many analyses that had been made in the country. Widely differing analyses of Uba had been obtained. In one case they had had a Uba with 16 per cent sucrose. The general feeling among one section was that the Uba was deteriorating. New plants had not been brought in from Natal to Zululand and the Planters had only their old plants to rely on, and in that way they were really in-breeding their own cane, so that it was not the same as it was say 14 years ago. That was borne out by the yields that the Uba would give under very good conditions to-day compared to what it gave twelve years ago. Taking that all into account he wanted to emphasise that the analysis of Agaul cane at Umhlali did not necessarily mean that it was Agaul and not a Uba. He felt perfectly certain that the whole industry was behind Mr. Storey in his endeavour to take the most practical means of getting rid of mosaic disease.

THE MYSTERY ARMY WORM

(Paper by C. P. Van Der MERWE, Government Entomologist.)

Last year in a paper read before the Sugar Congress, I made mention of the Mystery Army Worm as one of the insect pests which is of lesser importance to the sugar grower. This year the pest made its appearance again, causing considerable damage to cane in some fields on the North Coast, and owing to the interest the invasion has aroused, I have selected it as the subject of my paper.

Instances of the sudden appearance of insects in large numbers are not rare and everybody can recall cases to mind. To the layman these invasions are often a mystery and it is possible to find persons not so well informed who will insist that spontaneous generation is the only possible explanation! The entomologist, though he knows something about insects and their ways and especially about their fecundity (quick growth) and the rapidity with which some of them can multiply, often has to admit that there are certain features about these outbreaks which he too cannot explain without careful investigation. That, too, was the case with the invasion of the caterpillar under discussion, and it was named by an entomologist "The Mystery Army Worm." The term "Army Worm" is applied to caterpillars which appear in such large numbers that they destroy the food supply on the ground where they were bred and have to march off to find new supplies.

Army worms are not infrequently mentioned in entomological literature. In Australian, Canadian and United States publications, e.g. they are frequently discussed. All the information available about foreign army worms, however, did not explain every puzzle in connection with our army worm. The insect was first brought prominently to the notice of South African entomologists by the outbreaks of five years ago. What then led to its being given the name mentioned above was the circumstance that outbreaks might occur long distances—perhaps a hundred miles or more—from a previous outbreak. The explanation seemed to be that the moths fly that distance, probably at night, from the place where they were bred before depositing their eggs. I have myself observed in Durban the presence of swarms of moths where before no caterpillars were seen and shortly after there was an outbreak of the pest. The sudden appearance of numerous moths was also reported from Reunion. Both at Durban and Reunion the moths were seen in the day-time. They were not flying, but resting or in hiding. There were no means of knowing whether they came from a shorter or longer distance, but that the moths may appear suddenly in places where the caterpillars were not observed strengthens the theory that they do migrate. It is evident that it is a great advantage to the insect to be able to migrate a long distance from the place of origin and so escape the natural enemies which may have gathered to prey on it. Eleven different species of parasites have been bred from the caterpillars in Durban, and many birds, monkeys, etc., prey upon the caterpillars,

and the moths too have their enemies. Natural enemies will be attracted to the places where the insects are abundant and the migration of the moths may be considered a provision of nature to enable them to escape their enemies. Nothwithstanding this advantage the species does not appear to prosper unduly. Many years may pass without any outbreaks being reported. Some parts of the country have not known the pest for fifty years or more.

The reason why invasions are not more common is no doubt that there is one enemy they cannot escape. When the weather conditions become favourable the caterpillars are attacked by a bacterial disease, known as Polyhedral disease on account of the presence in affected specimens of polyhedral bodies which are characteristic of the disease. The germs of this deadly disease appear to be present everywhere only waiting for a favourable opportunity to develop. The affected insect becomes limp, its body contents turn into a dark coloured liquid and the caterpillar looks like a sack filled with fluid. In a few days' time under suitable weather conditions a whole army may disappear as rapidly as it came. It may attack the caterpillars, while they are still small and destroy them before they are noticed by anybody. The same disease attacks other species of caterpillars and renders useful service to the farmer in destroying destructive kinds. Moist weather conditions favour the disease, while dry hot weather like we had this season is favourable to the pest. Still it is not every dry year that brings along an invasion of the Army Worm.

Life History and Habits.

The eggs are laid in clusters of various sizes up to about the size of a shilling. They are light coloured but are covered with dark coloured fluff from the body of the moth. They are not necessarily laid on the food-plant but may apparently be deposited on any object. Numerous egg-clusters have for instance been found on washing allowed to hang out at night. The eggs are laid during the night time.

In about three days small caterpillars about 2 millimetres long hatch from the eggs. Being so tiny they require very little food and they can be present in millions without they or their work being observed; but they grow rapidly and their appetites increase in proportion. They are twice as long in three days and after another three days are again double in length. When the skin gets too small for further growth, they moult and are provided with a new and larger skin allowing more growth. These moults take place at intervals of two to three days. At the 10th to 13th day the little caterpillar has passed through the 4th and last moult and is 8 times or more the size it was originally. Now, their increase is, if anything, more rapid than at first. In about five to seven days more they reach a length twenty times as great as when first hatched. They require so much food that the vegetation where they were bred, is not sufficient to supply them and they have to migrate to adjoining ground.

Where for more than half the time spent as a caterpillar they may have been quite unnoticed, they now require so much food and are so destructive that the damage they cause is often quite alarming. Only grasses of various kinds and crops belonging to the grass family (cane, grain, etc.,) are attacked. Some grasses and crops are much less favoured than others. Maize, e.g. is not so badly attacked as cane. No damage need be feared to crops belonging to other plant families e.g. cotton, beans, etc. It has been observed that when pressed by hunger the worms will nibble at other plants, but no serious damage was done. When fully fed the insect burrows into the soil, turns into a pupa in about two days and in about 10 to 12 days more into a moth. The moth is the usual size and shape of cutworm moths. It is grayish in colour, but the pattern on the upper wings varies considerably. Eggs have been found laid four days after emergence of the moth.

Remedies.

As mentioned above the caterpillars are not usually noticed till they are of considerable size and very destructive. When an outbreak is noticed it is therefore necessary to tackle it at once. Every day's delay means further loss. The first thing to do is to prevent the caterpillars from spreading to new ground. This may be effected by drawing one or more furrows between the infested area and the crop it is desired to protect. The steep side of the furrow should be on the side of the field from which the caterpillars are to be kept. If the ground is too dry to get furrows with sides steep enough to stop them from crawling out, a log can be dragged up and down the furrow to pulverise the soil and get a "dusty-sided" furrow which will just as effectively stop them.

Holes may be dug in the furrows and as the insects drop into them they may be filled in and others dug. The sides of the holes should be steep so that the caterpillars cannot creep out again.

Instead of making holes, poison bait may be distributed thinly in the furrows. This will be devoured by the hungry caterpillars and will kill them. Afterwards the furrows can be harrowed and the poison covered up to prevent loss to stock which may otherwise pick it up. Poison bait can be used too without furrows by scattering it amongst and in front of the advancing army. A great quantity, however, will be required and there will be more danger to stock. When an outbreak is discovered the portion affected will be usually so badly damaged that there will not be much left worth saving and the insects will probably be leaving the ground on their own account. If it is thought worth applying remedial measures the poison bait can be scattered on the ground and the insects dislodged from the plants they are feeding on. This is not a difficult matter as they drop to the

ground at the slightest disturbance. Dragging a bag or a light brush harrow e.g. over the plants will serve the purpose. The worms that drop to the ground will feed on the bait provided for them before ascending again and be destroyed.

The bait may be prepared from bran or finely cut green grass. One pound of arsenite of soda and 5 to 10 lbs. of cheap sugar or treacle are dissolved in 15 gallons of water and this is thoroughly mixed with enough bran or green stuff to make a moist but not sloppy mash so that it will scatter easily. If bran is used the liquid can be sprinkled over it while it is being stirred. If green stuff is used it is considered better to dip it into the solution and allow it to drain.

Importance as a Pest.

The green leaves of the cane only are eaten and the plants are therefore not killed, but receive a setback, the severity of which depends largely on the soil and weather conditions. Invasions, as stated above, occur in dry seasons when a setback is likely to be more serious than in favourable weather. Enquiries were made from one of the sugar estates where the outbreak this year was severe and where strenuous efforts were made to combat the pest, and in reply it was stated that:

"The cane eaten by these worms has recovered, but does not look as healthy as the cane which has not been touched. There is no doubt that the damage done to this young plant-cane by these caterpillars has been a serious setback to it, and I consider them to be a very serious cane pest when they are in such large numbers as we had them here. The damage done to our cane fully warrants the expenditure which will be necessary to control them . . . . We had altogether about 80 acres of young cane damaged by them. Some of the plants, which were badly eaten off, did not recover but died out. So had we not done anything to destroy them the cane would have been so badly eaten that a large part of the field would have been completely destroyed."

It is evident that the damage done by an invasion of this army worm cannot be regarded as negligible; but fortunately it does not appear frequently, and on the whole the loss it has caused to the sugar industry has not been great. By prompt measures moreover its depredations can be largely reduced. Its visitations, however, cannot be foretold and they therefore always come more or less as a surprise. In Durban for example we have had outbreaks at intervals of about seven weeks, one year and four years, while other places have been free for 50 years.

These irregular outbreaks are most likely to catch the grower unprepared and probably unprovided with information as to which remedial measures to apply, and before steps can be taken to control them, they may have done all the damage they are capable of.

DISCUSSION ON THE PAPER

Capt. Greig asked if stable manure was a carrier of this particular army worm. The reason he asked this was that about eight years ago a neighbour of his had bought 40 to 60 tons of stable manure from a military camp. He planted a small area and heavily dressed it with this stable manure. Some months afterwards it was attacked by millions of little black caterpillars which practically ate the whole field down. Nobody else in the district got these caterpillars. The cane afterwards grew again and was quite good to-day. It had occurred to him (the speaker) that other planters had bought stable manure from parts of the Union this year, and by so doing might carry these caterpillars in with it. He therefore wished to know if it was possible that stable manure was a carrier.

Mr. Van Der Merwe replied that he did not think it was likely at all. As he had stated in his paper the moths apparently flew long distances and laid eggs which only took about two days to hatch. They did not lay their eggs in stable manure for preference; they might lay them anywhere. It was just chance.

Mr. Staniland spoke in regard to the control of the army worm and referred to an experience of his five years ago when the worms travelled about six miles and finally reached his farm. At that time he had some very good mealie fields and also some fields of teff, which they demolished. He was at a loss to know what to do to check them, but as he had some old grass he had burnt a break of about 15 feet along the entire length that the worms had spread themselves over, with the result that every worm perished and no further damage was done to his crops. He wished to know whether, as the worms fell into the burnt section it had the effect of destroying any germs or eggs on them as it certainly killed the living worms. He thought that may be a good method of preventing the advance of the worms.

Mr. Van Der Merwe replied that he thought the chances were that by the time the caterpillars came to the burnt portion they were fully fed and ready to transform. If they had gone through a field of teff and mealies they were fully fed. When they were fully fed they seemed to disappear into the soil. He did not think that a break of 15 feet would stop them. He had seen them crossing streets which were quite hard and much more than 15 feet wide. With regard to the recovery of crops after being eaten it was quite possible for them to do so, but it depended on the weather.

The Chairman thanked Mr. Van Der Merwe for his interesting paper.