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## Notes on Plague of Locusts in North Queensland and its Relation to Sugar Cane\*).

Byo A. A. Girault, Nelson. Cairns.

The following notes are fragmentary and were gathered by me at odd hours. Unless otherwise stated they refer to the Yellow-winged Locust (*Locusta danica* Linnaeus). I confine myself entirely to my own notes without consulting the literature.

While residing at a field station at Nelson, North Queensland in the summer of 1911—1912, on about January 5, 1912 my attention was drawn to the sudden appearance of this species at the lights about the town shortly after nightfall. All of the individuals were adult. In stores and hotels they were the cause of considerable annoyance and I remember distinctly sitting at a table in a small refreshment place drinking tea while these locusts were flying from wall to wall in the room, keeping one constantly on the alert lest he should be struck in the face or else his tea spoiled by one dropping into it. This appearance was sudden. I had heard nothing of the insects before this night. It should be especially noted that all the individuals were adult. Also that they appeared to be attracted into the buildings by the lights (acetylene gas and kerosene lamps). This continued for several nights.

On January 8, I left Nelson for Innisfail arriving there on the tenth; two days later I noticed the adults there in large numbers but could observe them but casually. However, on the morning of January 13, while standing on the east bank of the Johnstone River at Darradgee, quite a large progressive flight of them was witnessed. At the point where I was standing, the river curved from a southerly direction

to an easterly one; across it, opposite to my position, was a sloping ridge whose summit was not more than forty feet above the river; on each side of this hill the land was practically level and full of growing sugar cane. The insects were flying directly toward me from the distance, that is in a northeasterly direction; when they reached the opposite bank of the river, the flight divided (some distance from the river bank, as if instinctively), one portion of it going north along the west bank of the river beside the fields of cane, the other going southeast, over the summit of the grassy hill and following the west bank of the river in that direction. Still another and third, minor division of the main flight continued straight on over the river, having not the slightest difficulty in crossing it and alighting in a grassy border along a cane field (about fifteen feet from the edge of the river) as soon as the crossing had been accomplished; some, however, continued on without alighting. This third portion, which as I have intimated, was coming straight toward me, comprised but a small fraction of the individuals of the main flight, yet they were in sufficient numbers to allow of the arrival of an individual at any point within range of observation, about every second of time. None were observed to fall into the river. The flight of an individual was rapid and direct, very much like that of a bird. The main flock or flight could not be determined visually excepting as a confused haze in the near distance, low down near the ground. The two branches, however, seen from the side were plainly enough defined, especially that along the opposite hill summit where the flight was projected against the sky. Here, one was reminded of the leaps of a school of porpoises, done in miniature with a much larger number of units; or of a heavy snow storm rolling over the hilltop before a gale of wind. But as concerns the latter, with this difference; the progressively rolling mass of locusts was near the ground, apparently only about two feet in depth, more in places. At the point where the

\*) Contribution No. 6, Entomological Laboratory, Sugar Experiment Stations, Mackay, Queensland.

insects were crossing the river, the latter was at least two hundred feet wide. At the time of this flight which continued passing fully for fifteen minutes, the wind was from the northeast, that is, against the general movement of the insects but light, certainly not exceeding eight miles the hour. I should judge that the rate of flight with this flock was about ten to fifteen miles an hour or even more. Later on, during the day, I crossed the river and the locusts were occasionally met with in large numbers, occupying small patches of grass covered strips of land surrounding cane fields; they were so dense in these patches as literally to cover the ground, flying up in a continuous cloud as one advanced through them, flying away from the walker and alighting again some feet ahead and facing toward him in preparation for another retreat should it become necessary. Here, they were cutting of the grass down close to the soil; the grass looked as though it had been cut off in bunches but of course it was eaten blade by blade. Only here and there had cane been fed upon; so far, in this immediate vicinity, the sugar cane has not been injured nor eaten to any extent. But the next day, at Mundoo, a portion of a cane field, noticed because all of the plants appeared to be withered, had been badly injured, most of the plants having one or more of their leaves stripped to the midrib. Direct evidence of this having been done by the locusts was not present but the injury appeared to be characteristic of them and they were present in numbers in the neighbourhood; besides this, their conspicuous excrement was present and later I saw considerable injury of the same kind in cane fields about which there was no doubt concerning the agent. Thus, at Babinda on January 27, the locusts were present in numbers, still adult, in places feeding extensively on the foliage of sugar cane, in such places their excrement conspicuous on the ground at the base of the plants along a row.

It was not until February 10 that young were noticed; the adults had thus lived about a month in the vicinity of Nelson, at least, before laying eggs. The young were encountered while walking along a tramway leading from the Mulgrave Central Mill, about half a mile north of Nelson. I suddenly heard what I thought was rain falling but soon perceived that the noise was caused by the hopping of thousands of these young insects which were gathered in dense masses along the track between the rails and upon the footpath on each side. Looking north along the track just before me, the young locusts could be seen travelling by very short leaps toward me, a definite movement of the whole hinder portion of the mass toward the extreme front end, the individuals composing the latter having stopped to feed upon the grass. The whole mass was about two hundred and fifty yards long by about three yards wide, its width limited by the outside boundaries of the footpaths on each side of the tramway. The density of the mass was considerably less behind than in front where the individuals were concentrating. All of the individuals were of about the same stage of development which was perhaps the second larval stadium;

one considerably older individual was observed, I should say about one stage more advanced. The insects were feeding entirely upon grass and had already denuded for a considerable distance behind them, all of a narrow strip of ground immediately bordering the outer side of each footpath. At this same time, an occasional adult was encountered; thus I noticed when looking into the distance across cane fields that every now and then one would be seen flying across them and reminding one of some diminutive bird.

Again on February 13, across the Mulgrave River, along the railway to Babinda, another smaller mass of the young was encountered, likewise confined to the roadbed. Soon afterward, many living but old adults were met with and in some places many of these were lying dead upon the ground between the ties of the railway. These dead adults were found to be females which had died while ovipositing; their abdomens were found buried within the soil (including all the segments beyond the third), the buried parts in various stages of decomposition, often infested with carnivorous maggots. The dead insects were bleached and brittle. Beneath the buried abdomens were found the eggmasses, normally deposited. In other instances, the female was found dead or dying, with her abdomen buried into the soil, enormously stretched out and at the surface of the ground twisted into a slender cord as if the female had made some frightful struggle to escape from some approaching danger or had undergone some excessive agony and had struggled to relieve it. The twisted part was often a quarter of an inch long. Many buried abdomens with the twisted slender part projecting from the ground, but the body of the female missing, were found, so that many probably escaped from whatever the danger was. That the female does not normally die in this manner after oviposition was nearly certain and finally I was led to the conclusion that these cases were all caused by frantic attempts to escape upon the approach of a train; subsequently, a large number of eggmasses were found in other situations where there were no buried abdomens nor any dead bodies in the immediate vicinity. In the place where these buried abdomens and dead bodies were found, an examination of the soil disclosed many eggmasses which had been deposited in the usual manner about three inches straight down within the soil; beneath the end of the buried abdomen (for very few eggmasses were found here without the accompanying buried part of the body), was usually a pinkish frothy mass (dry) about three-eighths of an inch deep, followed by the pod-like mass of eggs. Twenty of the latter taken at random gave a mean of fifty-three eggs per mass, ranging from thirty to eighty-one. The soil containing these was evidently a made one, being part of the bed of the railway; it was a dark, moist loam heavily infiltrated with coarse sand and gravel. There is no doubt but that the adults encountered at this time were the last ones of the original migrating ones first noticed in January. to be continued.

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