Notes on Behaviour and Parasitism in *Macropathus filifer* Walker, 1869

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Behaviour

While carrying out field and laboratory studies of *M. filifer*, the common New Zealand cave-weta, observations were made on the functions of the hind legs and on each individual insect's habit of regularly cleaning its body and appendages.

The long hind legs are used in walking, climbing trees in search of food and are of great importance to enable the weta to escape from its enemies. In daytime cave-wetas are immobile and are usually found on the walls or ceilings of caves, hanging head downwards. When a bright light is directed onto a group of *M. filifer* the insects may remain stationary waving their long antennae, or they quickly scuttle away. If, however, they are touched or feel the slightest movement of air, such as may be caused by breathing or the approaching hand of an investigator, they jump wildly away, sometimes covering distances of three or four feet. After a few such hops they remain motionless and the investigator's approach may be made over again. Such tactics are often successful in effecting escape, and if water lies on the floor of the cave, they use their hind legs to propel them through it. In proportion to their size, wetas can jump long distances; but I have never seen them do so for preference. Jumping seems to be used as a means of quick escape from an enemy or from an enclosed space such as a trough in a laboratory. The mouth parts of cave-wetas are small and are not used for defence. The bite of a cave-weta is harmless, and they very seldom attempt to bite. Thus, unlike the Hemicidae which stand and fight, the cave-weta, to escape from danger, has to rely entirely on its speed or on its cryptic colour pattern when stationary. When held in the hand *M. filifer* kicks and thrusts with its hind legs in an endeavour to free itself because, although it possesses numerous spines, they are too small to inflict a painful scratch. Sometimes it may secrete a brown or white fluid from the mouth or anus, or both, as a defence mechanism. Examination of the white fluid showed it to be full of actively swimming flagellates. This ability to secrete a fluid is evidently not universal throughout the Gryllacridoidea, although it has been observed in both the Rhaphidophoridae and the Hemicidae. Davis (1927) says, "Some grasshoppers when caught, secrete a dark, thick fluid (the 'molasses' of children) which pours from the mouth. *Stenopelmatus* will occasionally regurgitate when roughly handled, but I have never seen the dark 'molasses' although the animal will when captured chew straw, forceps, or fingers ferociously." Once the insects escape it is very difficult to recapture them. It is because of their ability to escape quickly that the hind legs are often removed when one weta attacks and eats another.

In captivity specimens of *M. filifer* are frequently observed "cleaning" themselves, sometimes as often as once a day. They go through a long and complicated process of nibbling along their legs, body and antennae. The fore leg is bent anteriorly and the tarsus is held in place in the mouth by the maxillary and labial palps, while the mandibles nibble along it. Then the head is turned ventro-laterally while first the tibia and then the femur is cleaned. Next the middle leg is passed ventrally under the abdomen and proximally towards the head, which is still turned ventro-laterally, and that leg also is cleaned. Then the hind leg is passed ventrally under the abdomen and anterior to the other legs and cleaned. This shows the great agility of the insect and its ability to twist itself into unnatural positions. Next the antennae are bent antero-ventrally by the fore legs and slowly passed through the mandibles till they have been cleaned along their whole length. Finally the head is bent postero-ventrally and the abdominal sternites cleaned. If the animal is a female, the ovipositor is thrust antero-ventrally beneath the body and the head is bent postero-ventrally so that the animal

is curled into a circle, in which position the ovipositor is cleaned along its length. Frequently, while cleaning itself, a weta will bend back its hind leg and scratch its tergal plates. The object of the "cleaning" process is evidently to remove dust particles so as to keep the antennae and setae on the legs in a state of sensitivity to environmental conditions.

Parasitism

Very few parasites have been found in *Macropathus filifer* although a large number of specimens have been examined. Maskell (1927) records mites on the softer parts of the exoskeleton and nematodes and gregarines from the mesenteron of *Hemideina*, but makes no mention of gordian worms. With *Macropathus* very soon after an insect dies mites have been observed to spread over the exoskeleton. They rapidly increase in number; but four or five hours after the death of the weta they also die. Although they have never been observed on any living wetas it is possible they inhabit the intersegmental membranes, where they receive a certain nourishment and, when the weta dies they are forced to emerge, but are unable to survive under fresh conditions. Nematodes and gregarines have never been seen. Only in one specimen has a gordian worm been recorded. The host was an immature male collected from the Karori Cave, and the whole of its abdomen and thorax was filled by the worm which had evidently been living on the fat body and reproductive organs of the host. On discovery of *Gordius* in the weta it was carefully removed from the body and measured. Comparison of the length and width of the worm with the weta showed:—

Length of host,	2.1 cm.
Width of host,	0.6 cm.
Length of parasite.	21.3 cm.
Width of parasite,	0.1 cm.

From this it can be seen the worm was approximately ten times the length of the host. Death of the weta must have been due to lack of nourishment and pressure on the internal organs due to the large size of the worm.

References

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