

## Entomology of the Upper Clutha Valley

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Investigations into the entomology of the Upper Clutha Valley have been made over several years. The information included herewith is based on field work, observations and collections made by myself (JCW), my colleagues and other entomologists, as follows:

- 18-28 Nov 1974. Mr J.S. Dugdale, Dr R.R. Forster (Otago Museum), J.C.W.  
Cromwell flats, Cromwell Gorge, Kawarau Gorge, Pisa Range, Lindis Crossing, Maori Point.
- 10-20 Mar 1975. Mrs B.M. May, J.C.W. Cromwell flats, Cromwell Gorge, Kawarau Gorge,  
Old Man Ra., Remarkables, Luggate area.
- 13-17 Nov 1977. Dr T.K. Crosby, Mr A.C. Harris (Otago Museum), J.C.W.  
Cromwell flats, Kawarau Gorge, Alexandra.
- 6-13 Mar 1979. J.C.W. Cromwell flats, Kawarau Gorge, Manorburn area, Queensbeery, Carrick Ra.
- 24-Oct-1 Nov 1979. Dr R.M. Emberson (Lincoln College), J.C.W. Upper Clutha (Luggate,  
Queensbeery, Maori Point, Lindis Crossing etc.), Cromwell flats, Carrick Ra.
- 22-28 Feb 1980. J.C.W. Upper Clutha, N. Dunstan Ra., Kawarau Gorge.

The Upper Clutha (apart from the Cromwell flats) has been the main area of work during only the last two visits. Earlier visits were concerned primarily with the probable effects of the Clyde dam DG3 and its lake, and conservation of the Cromwell chafer beetle, Prodontria lewisi; although some work was done in the Upper Clutha.

In general, the vegetation of the Upper Clutha has been much modified, mostly by agriculture, and it provides few favourable habitats for native insects at low altitudes. The value of the habitats as measured by the abundance and diversity of the native insect fauna, increases with altitude. The alpine zones of all Central Otago mountains support a very rich insect fauna. However, the valley floors do support a few very localised endemic species, best known of which is the Cromwell chafer.

A small leaf beetle, Allocharis new species, was found about 4 km north of Lindis Crossing on the true left bank of the Clutha (approx. grid ref. 137944), in October 1979, in an area of relatively unmodified native tussock grassland. The beetles and their larvae were feeding on scabweed (Raoulia australis) on cool, wet nights.

A search was made for this species elsewhere in the Upper Clutha and Manuherikia Valleys, including the proposed beetle reserve at Cromwell but no others were found. Although it seems unlikely that this species is confined to this single locality, it has only been found there so far. Related but distinct species occur at high altitudes on Pisa, Dunstan, Old Man and other Central Otago ranges.

The small area of relatively undisturbed native tussock grassland where Allocharis n.sp. occurs is one of the few such habitats remaining in the Upper Clutha. It should be preserved. It is situated close to one of the proposed Queensberry dam sites, and although not endangered by flooding, would probably be destroyed by dam construction works at this site, unless special steps were taken to protect it.

No other invertebrate species are known in the Upper Clutha which would be endangered by any of the proposed works.

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## Observations on the large New Zealand Centipede, Cormocephalus rubriceps (Newport)

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Apart from a study by Bedford & Leader (1975) on the composition of its haemolymph, nothing appears to have been published on the large New Zealand centipede Cormocephalus rubriceps (Newport), since the paper by Archey (1936). The following observations may be of interest. They were made on a captive specimen of C. rubriceps and are listed in chronological order. The captive specimen was kept in a glass terrarium (25 x 15 x 15 cm) with soil, rocks and leaf litter on the bottom and fed wetas and crickets during the period 14 April 1979-23 June 1979, and in a bucket after November 16th when the animal was recaptured (see below). Specimens can be found under logs and rocks on the ground and occasionally inside boots and shoes! The largest specimen I have collected measures approximately 160 mm and came from Great Barrier Island.

## Observations

14 April 1979. The specimen of C. rubriceps was captured on the track from Typhena to Island Bay, Great Barrier Island.

9 June 1979. Food eaten so far includes four Teleogryllus commodus (black field cricket), one Orthodera ministralis (praying mantis). Today it attacked and ate a 16 mm Auckland weta (Hemideina thoracica). Feeding usually follows a pattern - the centipede is prodded from under its shelter and raises the hind part of its body in a defensive posture (fig. 5c); when the prey bumps into this portion it is seized by the hind legs and the head of the centipede curls around to bit and start feeding; the centipede may then crawl off to a sheltered position, dragging with it the subdued prey clasped in its hind legs.

If the centipede is hungry, feeding is complete, and wings (tegmena) and hard chitinous parts of the prey are all that are left uneaten.

17 June 1979. An adult male H. thoracica was captured and eaten (feeding being completed in approx. 2 ½ hours). The weta was seized ventrally by the fangs.

23 June 1979. The specimen escaped from the glass terrarium. This was caused by a loose fitting perspex lid held down by weighted blocks. These blocks were not replaced after feeding - on 23 June and the animal escaped. The terrarium was kept inside an aluminium shack (interior lined with soft band) behind our house - an immediate search of this (not a trivial task in view of the quantity of stuff stored therein) revealed nothing. As there were several small gaps at the door and windows the shack was by no means escape proof.

One spring afternoon (16 Nov. 1979) the animal was recaptured just behind the shack from which it had escaped, in an excavated gap under a ceramic tile embedded in soil. Since then it has been kept alive in a bucket (truncated plastic cone, rim diameter = 23 cm, base diameter = 17 cm, height = 24 cm) with 1.8 cm of soil on the bottom, as well as a few heavy brick and tile fragments.

16 November 1979. Centipede recaptured and fed a 30 mm caterpillar.

2 December 1979. The centipede ate a fat caterpillar (length 20 mm, near pupation). Rocks and leaves were lifted to expose the (unmoving) animal and the caterpillar was placed next to the head and gently nudged so that it brushed against the antennae. After the third nudge it was seized and eaten [fig. 2]. As usual, while feeding the head capsule showed a rocking motion (approx. 1 oscillation/second) [fig. 60]. Feeding was completed and followed by approx. 1 minute of cleaning movements of the mouthparts.

10 Dec. 1979. Fed an adult male H. thoracica.

23 Dec. 1979. Fed an adult male H. thoracica. This was seized by the entire body and the fangs attacked the weta ventrally [fig. 3]. Feeding was completed in less than 3 hours. The remains consisted of a hollow head capsule with antennae and mouthparts, all pairs of legs, and the tip of the abdomen with cerci.

5 Jan. 1980. Fed an adult female H. thoracica.

1 Feb. 1980. Fed an adult Caedicia simplex (katydid).

This was taken after several induced encounters. The centipede seized the prey with the legs of the anterior part of its body and then curled around and bit the dorsal part of the katydid thorax, the fangs repeatedly piercing the thorax laterally.

8 Feb. 1980. Fed a C. simplex. It was a warm evening and the centipede was very active, rushing out as soon as its rock shelter was lifted and snatching the katydid immediately.

16 Feb. 1980. Fed a last instar T. commodus nymph.

17 Feb. 1980. Fed an adult C. simplex.

24 Feb. 1980. Fed an adult C. simplex (seized but not immediately eaten).

27 Feb. 1980. Fed an adult female T. commodus.

6 Mar. 1980. Fed an adult male C. simplex.

16 Mar. 1980. Fed an adult T. commodus.

29 Mar. 1980. Fed an adult male T. commodus.

30 Mar. 1980. Fed an adult C. simplex.

20 Apr. 1980. Fed an adult male T. commodus which was introduced and ran around inside the bucket. It was guided towards the centipede using a glass rod and, after 5 encounters it was finally seized by the back legs. It was then necessary to prod the cricket, stimulating it to struggle, before the centipede bent its head around to bite and begin feeding [fig. 4a]. After 5 minutes the position had changed, the prey having been released by the hind legs and grasped by forelegs [fig. 4b]. Crackling sounds made by mouthparts chewing the cricket exoskeleton were audible. Although a slab of concrete beneath which the animal shelter accidentally fell over the centipede, the cricket was not released and feeding resumed again soon afterwards. When disturbed initially the centipede emerged with the rear legs held up in the usual defense posture.



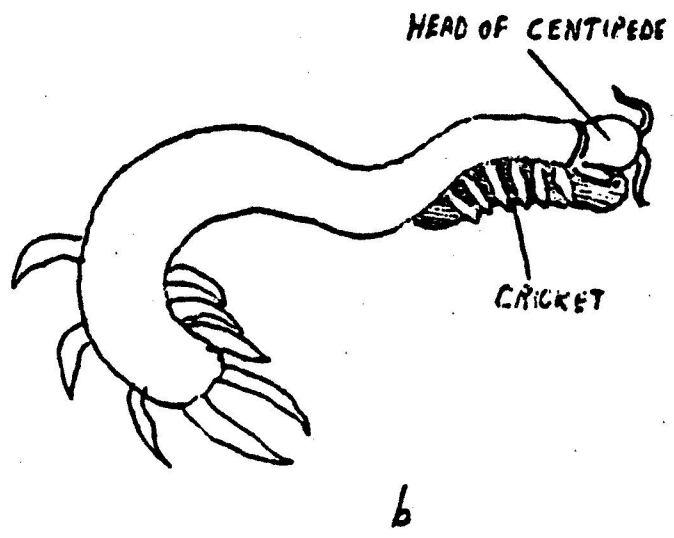
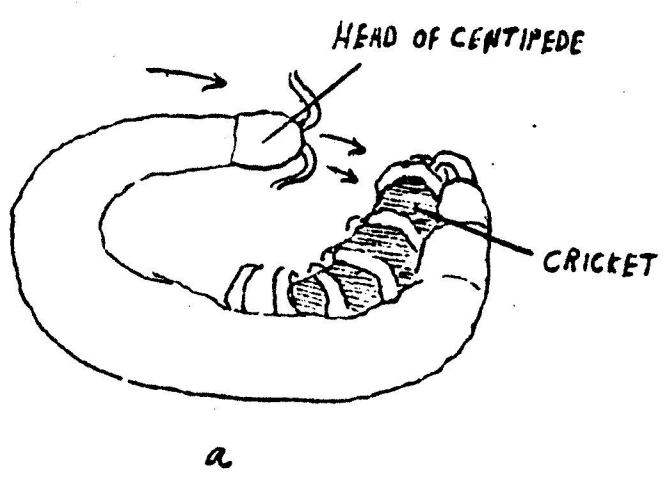
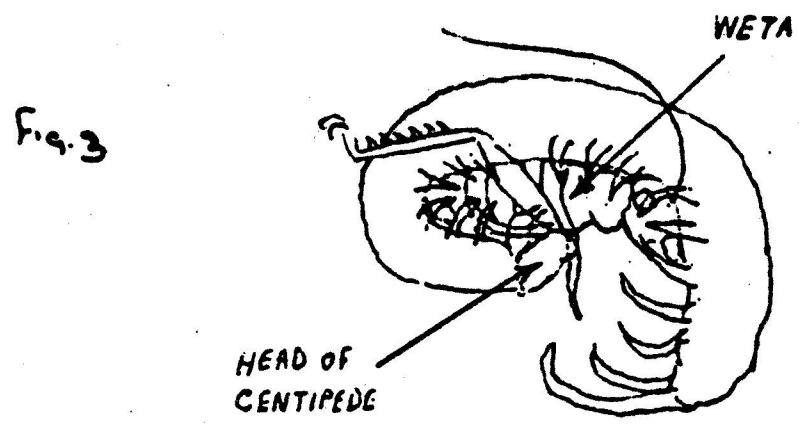
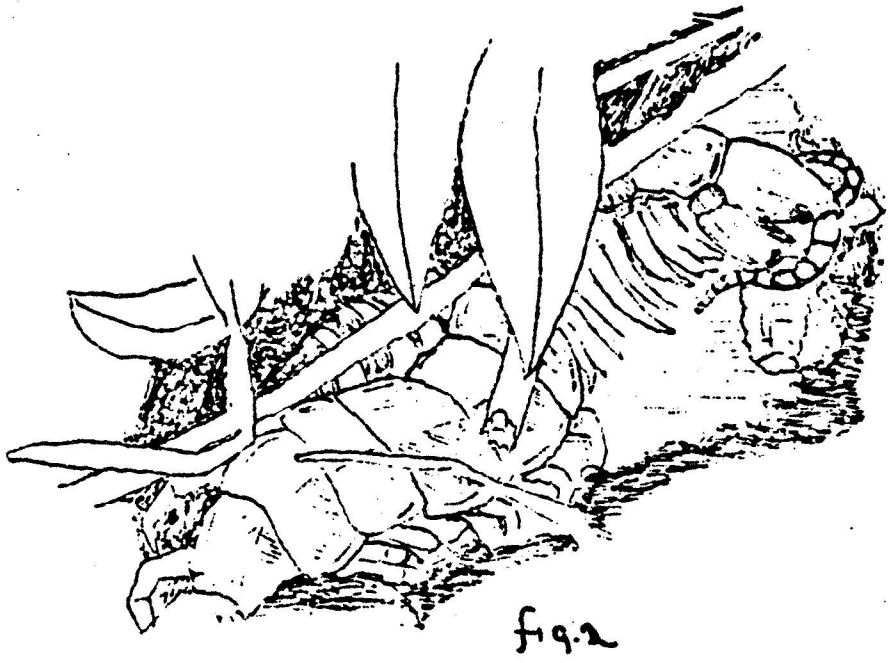


fig. 4

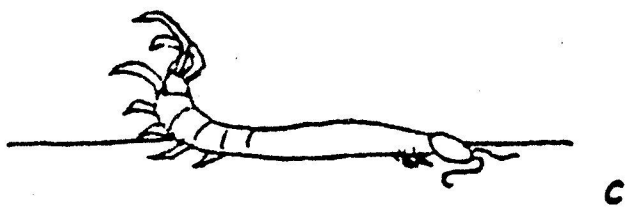
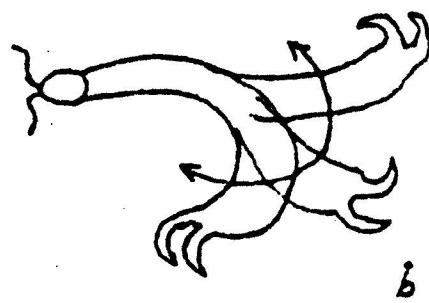
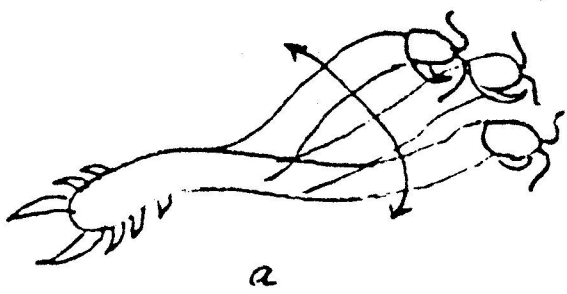


fig. 5

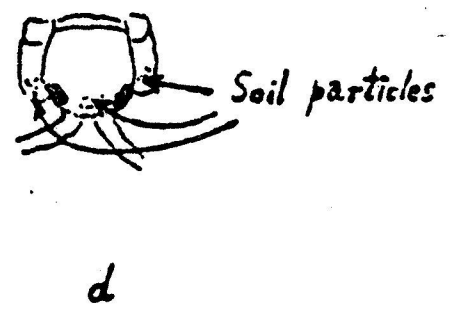
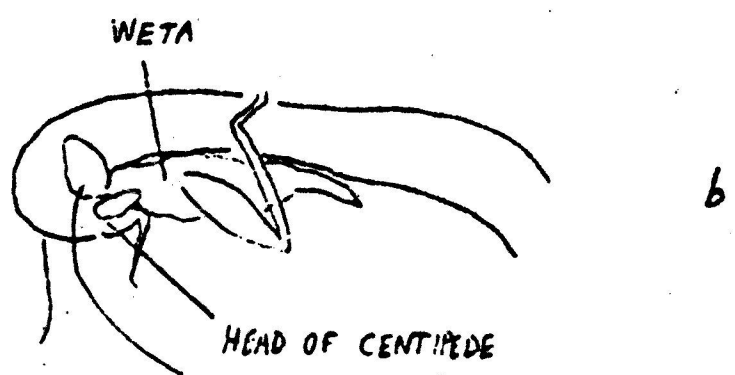
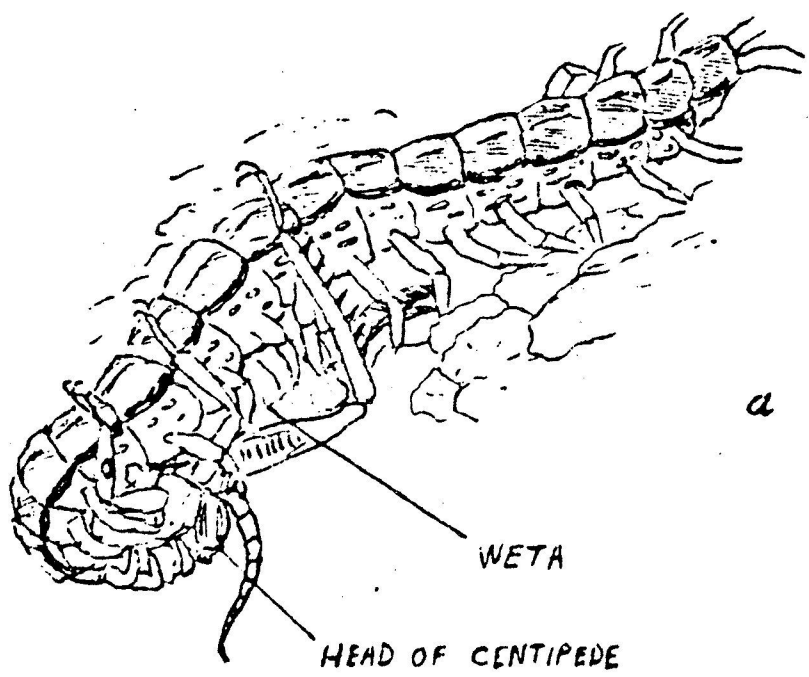


fig. 6

25 April 1980. Fed an adult female H. thoracica.

3 Jun. 1980. Fed an adult male T. commodus. The prey was seized after a short while. The centipede was very active, and when it was touched with a glass probe or by the cricket, violent thrashing (single, double, occasionally triple) movements of the body resulted [fig. 5a, b].

7-8 Jun. 1980. Fed an adult female H. thoracica (length 35 mm, excluding ovipositor). 10.30 pm: stone was lifted and centipede prodded; it moved out rapidly. The air temperature 12 13½°C. The weta was introduced and encountered the centipede, which bit the weta and thus retreated under cover. The weta regurgitated black fluid from its mouth and light accumulated at the puncture sites on its body. The weta moved sluggishly and its legs jerked. After 6 minutes it was motionless but alive and moved its legs when prodded. 10.34 pm: the centipede was driven out from under its rock again and this time when it encountered the weta, seized it and started feeding. The prey was bitten and devoured on the dorsal surface of its thorax while being held upside down [fig. 6a, b]. 10.56 pm: the position was unchanged but the CR had worked its jaws around to the lateral thoracic region. The weta was subdued, but gave an occasional kick with its middle legs (a characteristic kicking reflex when disturbed). 11.07 pm: the feeding movement of the head capsule was timed at 18 oscillations/32 seconds. The hind legs of the weta still gave sporadic kicks. 11.08 pm: feeding stopped and the centipede rubbed its fangs and mouthparts in the surrounding dry soils; after this soil particles were visible dorsally on the head and fangs. The weta was still being held by legs just anterior to the middle of the centipede's body. 11.12 1/3 pm: feeding recommenced in same position. 11.15 pm: the centipede was now feeding on the dorsal surface of the abdomen, with the weta still held upside down. The abdomen was held by 4 pairs of legs. 11.22 pm: abdomen was visibly deflated.

During these observations a 100w tungsten bulb was suspended, approx. 1 m above the surface of the soil. Feeding took place in the open and the centipede showed a slight almost continual twitching movement of the antennae during feeding.

11.45 pm: the bucket was moved to a place where the air temperature was approx. 15°C. 12.33 am: the abdomen of the weta was completely devoured at this stage, and the centipede commenced feeding on the thoracic region again. 01.10 am: the head of the weta was being eaten. The thoracic sterna with attached legs were still intact and the head was attached to them. 01.53 am: flesh was being eaten off the thoracic sterna. 02.40 am: feeding stopped and the centipede retreated under a concrete slab. Some uneaten flesh remained on the thoracic sterna. 09.00 am: this morning the weta remains were found to be further dismantled and eaten clean. The only remains were: 3 separated thoracic terga, each with a pair of legs attached, the hollow head capsule with antennae and mouthparts, and the ovipositor blades. These were being cleaned up by Symphyla and Hypogastrurus (Collembola).

12 Jul. 1980. The centipede was brought out from under bricks to be photographed. It moved very sluggishly, and clung to a glass rod with the posterior portion of its body.

#### Locality Records

Nine specimens of this species collected from the following localities have been deposited in the New Zealand Arthropod Collection at the DSIR Entomology Division, Auckland - Typhena, Gooseberry Flat, Island Bay, Rosaline Bay Road, and Station Rock, all on Great Barrier Island, Fitzgerald's Glade, Rotorua, and Don Bucks Rd, Massey, Auckland.

#### References

- Archey, G. 1936. "A revision of the New Zealand Chilopoda. Part 1." Records of the Auckland Institute and Museum 2: 43-70.
- Bedford, J.J. & Leader, J.P. 1975. "The composition of the haemolymph of the New Zealand centipede, Cormocephalus rubriceps". Comparative Biochem. Physiol. A.50, 3: 561-4.

