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STUDIES OF EPHEMEROPTERA IN THE AUCKLAND AREA

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I: LIGHT TRAPPING IN CASCADE KAURI PARK

INTRODUCTION

There is no record in the available literature at present of any attempt to obtain mayfly imagos and subimagos by means of light trapping. The following data were recorded from the Waitakere Stream in the region of Cascade Kauri Park during the period 26 October to 8 November 1966.

METHOD

A light trap was set up on a gravel bank just below the junction of the Waitakere and Cascade streams. A 240 volt, 125 watt mercury vapour bulb was run from a portable petrol-driven generator. To provide a large white surface area, the bulb and holder were set in the middle of an inverted hiker's tent. This proved very satisfactory as the large white surface assisted in easy capture of the mayflies. The light trap was run every evening from 6.45 p.m. till 9 p.m. No further species arrived after this time and a fairly representative catch of 100-200 individuals was taken during the time. Identification of species was made from Phillips (1930) and Penniket (1966).

RESULTS

Daily captures varied according to the weather. It was noted that by far the most mayflies were seen at dusk on days when it was overcast and still with light misty rain. The low-flying species such as *Zephlebia cruentata* and *Atalophlebia nodularis* could be caught readily by hand net but higher flying species such as *Coloburiscus humeralis* and *Rallidens mcfarlani* were sampled only by attraction to the light trap. No net collections have been included in the results.

The total number of mayflies sampled over the 14 days was 1,554. For an analysis of the population present see Table 1. This shows that

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the most abundant species were *Coloburiscus humeralis*, *Deleatidium fumosum* and *Zephlebia cruentata*.

Each species had four distinct groupings; these were male and female subimagos and imagos. Overall it can be seen (Fig.1) that far more subimagos (66.5%) than imagos (33.5%) were captured. The proportions for all species are summarised in Figure 1 while an analysis of each species is shown in figure 2.

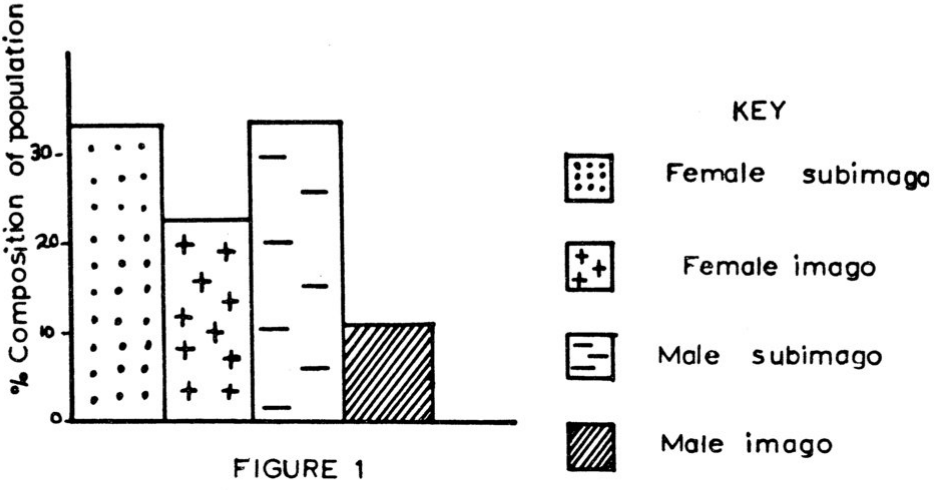

FIGURE 1

Table 1 – Population Analysis

Species	Number in sample	% of total
Coloburiscus humeralis	511	34.3
Deleatidium fumosum	406	26.2
Zephlebia cruentata	228	13.6
Atalophlebia nodularis	117	7.5
Zephlebia versicolor	106	6.8
Rallidens mcfarlani	77	4.5
Ameletopsis perscitus	45	2.9
Deleatidium cerinum	25	1.6
Nesameletus ornatus	20	1.3
Zephlebia dentata	16	1.0
Deleatidium vernale	5	0.3
Total	1556	100.0

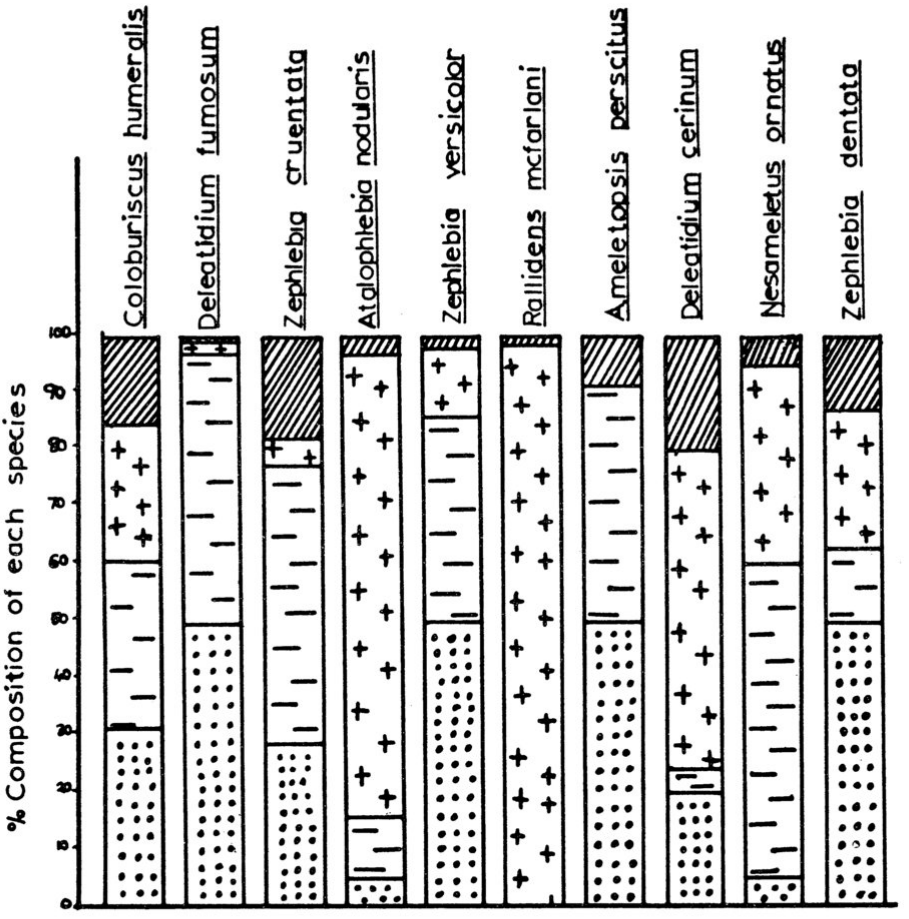

FIGURE 2

DISCUSSION

It would appear that subimagos are more attracted to the light than the imagos, even though more imagos were seen in flight. Figure 1 shows that nearly equal proportions of male and female subimagos were attracted to the light. The detailed analysis of each species as in figure 2 shows that in 4 species nearly 50% of all adults caught were female subimagos. These 4 species were *Deleatidium fumosum, Zephlebia versicolor, Ameletopsis perscitus* and *Zephlebia dentata.*

In the most abundant species, *Coloburiscus humeralis,* the proportion of both female subimagos and male subimagos was 30%.

Fewer male imagos were attracted to the light than any other winged stage even though swarms of *Zephlebia cruentata* and *Deleatidium fumosum* males were observed in the area of the light trap late in the afternoons.

Some species of mayflies, commonly found in the Waitakere stream in larval stages, were not collected with the light. Two such species were *Oniscigaster wakefieldi* and *Ichthybotus hudsoni*.

During the 14 days of observation, some 11 species of mayflies were captured at the light trap.

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II: OBSERVATIONS ON FLIGHT ACTIVITY IN THE WAITAKERE STREAM

INTRODUCTION

Mayflies are amongst the more graceful insects and the dancing swarms of adults have been mentioned often in the literature, (see Needham, Traver and Hsu, 1935). Recorded observations on New Zealand species are few and those recorded here supplement existing data. During a 14 day field trip to the Cascade Kauri Park area of the Waitakere Stream, from the 26th October to the 6th November 1966, several species of mayflies were observed. This is an account of flight activities seen during this period.

METHODS

Identification was effected after capturing males from dancing swarms using a long-handled net. The net was 70 cm long and had an

aperture 40cm in diameter. The handle of the net was 1.5 metres long with four extensions of 1 metre so that the greatest height that could be sampled was 5.5 metres. The net was made of fine terylene which was light enough not to damage the imagos.

RESULTS

The subimago that emerges from the final larval instar is a dull-winged fly which after a varying length of time flies into the protective cover of the vegetation bordering the stream and is not seen again until transformed into the clear-winged imago. In the evening imagos of many species of mayfly were seen on the wing above the Waitakere Stream. The behaviour of the dancing swarms of male imagos and the ovipositional behaviour of the female imago varies from species to species and observations have been recorded for individual species.

1. *Coloburiscus humeralis*:-

Female imagos of this species were captured at dusk as they flew up from vegetation near the stream towards the males which swarmed over riffles at heights from 10-20 metres. Capture of these male imagos was impossible by net but many were recorded using light trapping techniques (see part 1 of this article).

The male imagos were observed to fly slowly upstream rising and falling as they went and after progressing about 60 metres they darted swiftly downstream to approximately the point where they had begun their dance and started again. Females were observed to leave the vegetation at the side of the stream and join the dancing swarms of males. The nuptial dance of this species has been recorded by Wisely (1965). Some female imagos that came to rest shortly after copulation were seen to be carrying a large orange egg mass under their hooked abdomens. After resting for a while one of the female imagos took to the wing and was seen to oviposit in a nearby riffle. An egg mass was detached from a female imago and placed in a beaker of water. The egg mass settled quickly to the bottom and remained intact. Presumably the oviposited egg mass wedges between stones in the riffles. It is worthy of note that larvae of this species are found only in riffles.

During a wet afternoon the author crossed a road near the stream and observed a group of male imagos hovering over a ditch at the side of the road. The torrent of water flowing down the ditch probably acted as a stimulus for the male imago to swarm. The height of this swarm was

only 2-6 metres and after the rain ceased they dispersed.

2. *Zephlebia cruentata:*

The subimago of this species is orange-red in colour and is perhaps one of the more distinctive mayflies that are found in the Waitakere Stream. It is rivalled only by the bright yellow subimago of *Ameletopsis perscitus*.

At 3.30 p.m. on Saturday 5th November, this species was noted to be swarming throughout the whole length of the Waitakere Stream that was under observation – a full 500 metres of stream bed. The weather was overcast and still with a light misty rain falling. The height of the swarms was 0-3 metres and they were more abundant over the quieter pool areas of the stream. This species has caudal filaments approximately twice as long as the body and the males trailed these filaments in their graceful flight.

Ovipositing females were observed at the side of the pools. Here they rose and fell about 2 metres. At the surface of the water, the female touched her abdomen on the surface film presumably washing off a few eggs each time. The tipping of her abdomen on the surface film could be seen because of the ripple pattern she created at every dip. Swarms of *Zephlebia cruentata* were seen most frequently in overcast drizzle conditions.

3. *Atalophlebia nodularis:*

Above the dancing swarms of *Zephlebia cruentata* this smaller species of mayfly could be observed at a height of 5-10 metres. The lower levels of the swarm were sampled by means of the long-handled collecting net. These dancing swarms congregated mostly above pools.

4. *Rallidens mcfarlani:*

Females of this species were captured as they flew up from the vegetation at the side of the stream at dusk. Mating was not observed but a female imago was seen ovipositing. On a quiet pool section of the stream the female imago made repeated low flights over the surface of the water, leaving a trail of surface disturbance. Many such flights were made across the pool and after a short time the female imago had criss-crossed the whole area. It is worthy of note that larvae of this species are found most abundantly in areas such as these.

DISCUSSION

Macan (1963) says of Ephemeroptera oviposition behaviour that "some appear to select a site to lay their eggs, but others lay them in a haphazard way and many nymphs must die in unsuitable places".

These recorded observations seem to indicate definite preference of oviposition site by the female imago of the above species, coupled with a definite correlation between oviposition regions and areas of highest larval density.

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