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# Task: Macroinvertebrate Niche



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Hi Team,

The Ecological niche of some of the most abundant macroinvertebrates in your stream study can be found in the 6 Resources below.

Part of your report discussion should include some explanation of the abundance (or lack of abundance) of the Mayfly, Caddisfly and Stonefly nymph. Abundance is determined by abiotic factors (Temperature, PH, oxygen saturation) but also by biotic factors like food availability, predation and disease.

Read the resource below to help you propose a reason for each species abundance, by considering biotic factors that may have affected the population.

It is VERY interesting!

HINT:

- Flow. – what was it like?
- Have you looked at Ecan Flow website for Canterbury streams?
- Why did Kelvin tell us we probably won't find Stoneflies at Coes Ford? See
- Why did Kelvin show surprise at the lower number of Mayflies than usual?
- Why could have there been a lot of Caddisfly nymphs?
- What was the temperature like? Is this the kind of temp you would find in a mountain stream?
- Did Kelvin talk about the number of fish and what species they were?
- I never saw birds at Coes Ford during our sampling. In the previous year we saw a White Heron, Duck, Fantail and Kingfisher. Hmm...

The next task will be a simple comparison of your results with the 2016 Bio Class sampling data from Coes Ford.

You are nearly! Keep going! Submission 28<sup>th</sup> April.

Will be in touch,  
Maxine

## Resource 1.

### Mayfly nymph (Genus: Deleatidium) Single gill mayfly nymph

**Kingdom:** Animalia

**Phylum:** Arthropoda

**Class:** Insecta

**Order:** Ephemeroptera

**Family:** Leptophlebiidae

**Genus:** Deleatidium

**Common name:** Single gill mayfly nymphs

Deleatidiums are one of New Zealand's most common and widespread mayfly. They have the three long tails, a feature typical of mayflies. The flying adult's lifespan can vary from just 30 minutes to one or even two days depending on the species. The primary function of the adult is reproduction; the mouthparts are vestigial (non-functional), and the digestive system is filled with air.

Deleatidium aquatic macroinvertebrate nymphs are the most abundant invertebrates in many fast-flowing, stony-bottom streams with cool, well-aerated water, especially in the South Island's mountains and bushy areas. They have a flattened body form that allows them to hold on to stones in fast flowing streams. The nymphs, like most mayflies, have leaf-like gills along the sides of their body. In many mayflies, these gills are arranged in pairs, but in Deleatidium the gills are single. Deleatidium has a wide labrum, this is a flap-like structure that lies immediately in front and top of the mouth.

The nymphs feed by scraping diatom algae and other organic matter from stone surfaces. They are not found in streambeds that are too heavily covered by algae. High numbers of Deleatidium suggest good water quality conditions, especially if other mayfly or stonefly groups are abundant. Deleatidium larvae provide an ideal food source for fish so their abundance can increase the growth rates and size of fish in streams and rivers.



Deleatidium mayfly nymph. Arrow is pointing to the single leaf-like gills

Photo courtesy of Landcare Research



Another mayfly nymph, Genus Deleatidium, Single gill mayfly nymph

<http://www.terrain.net.nz/friends-of-te-henui-group/invertebrates-freshwater-new-zealand/mayfly-nymph-genus-deleatidium.html>

## Resource 2. Mayfly Nymph

Nymphs scrap periphyton (layer of algae and associated fauna and flora).

**Habitat:**

Flathead mayfly nymphs are common in flowing waters of streams and rivers.

**Movement:**

These clingers are perfectly adapted to adhere to solid surface and move around the stones.

**Size:**

Mature nymphs can grow up to sizes around 20 mm (not including antennae and caudal filaments).

**Life cycle:**

Mayflies undergo incomplete metamorphosis. Their life cycle includes four stages – egg, nymph, subimago and adult (imago). Most species produce one or two generations per year.

**Introduction:**

All mayflies are aquatic in the nymphal stage, while adults are terrestrial. Nymphs are found in a variety of freshwater habitats including lakes, ponds, wetlands, streams and rivers. Consequently, form one of the most important food sources for fish.

Flathead nymphs are most abundant and diverse in flowing waters of streams and rivers. They occur on the surface of rocks and submerged logs, where search for food. Nymphs scrap algae and associated microorganisms by using their adapted mouthparts (labial palps possess setae, thereby forming brushes).

Nymphs have substantially flattened bodies. Strong legs are spread to the sides and each ends with the single tarsal claw. Well developed eyes are placed on the back of the flattened head. These adaptations, reducing drag of the current, make the nymphs perfectly adapted to live in flowing waters. They are able to maintain and move even in the fastest sections of mountain streams.

When disturbed, nymphs quickly hide themselves under the stones. This is known behavior of fish turning the stones, in order to find the nymphs.

Abdominal segments possess gills in the form of thin discs. Gills are rounded or leaf-like in shape and may be supplemented with tufts of filaments at the base. Position and shape of the gills are important identification features among the species.

The body of mayfly nymphs terminates in three distinct caudal filaments. Flathead nymphs have these filaments long and covered with very short setae.

Presence of flathead nymphs is often an indicator of good water quality, because they are relatively intolerant to pollution.

<https://lifeinfreshwater.net/mayfly-nymphs-ephemeroptera/>

## Resource 3

### Deleatidium

#### Ingle Gill Mayfly ( Leptophlebiidae : Deleatidium )



Single, leaf-like gills



Wide labrum

#### **Diagnostic features**

Deleatidium mayfly nymphs have a flattened body form, single leaf-like gills and a wide labrum (top “lip”).

#### **Typical habitats**

Deleatidium larvae are the most abundant invertebrates in many fast-flowing, stony-bottom streams with cool and well aerated water, especially in the South Island.

#### **Feeding**

Leptophlebiid mayflies feed by scraping diatom algae and other organic matter from stone surfaces.

#### **Indicator value**

High abundances of Deleatidium suggest good habitat and water quality conditions, especially if other mayfly or stonefly groups are abundant. Deleatidium has tolerance values of 8 (hard bottom sites) and 5.6 (soft bottom sites).

<https://www.landcareresearch.co.nz/resources/identification/animals/freshwater-invertebrates/guide/jointed-legs/insects-and-springtails/mayflies/single-gill-mayfly>

## Resource 4

### Underwater Life

#### Deleatidium - Mayfly



Click picture for larger image

typical  
size  
15mm



[Video of Deleatidium](#)  
[More info on Deleatidium](#)

#### I'm a young mayfly called Deleatidium...

I live under the water until I'm a grown-up mayfly. Then I'll be able to fly away to lay my eggs in another part of the stream. I've got three long tails and I breathe through things called gills that look like leaves on the sides of my body. I live on the rocks in streams. Shady streams are best for me because I like cool water. I wish people would keep my home nice and shady by planting trees by streams that flow through cities and farms.

At night I eat the green stuff growing on the stones under the water. I have to hide during the day because lots of fish like eating young mayflies if they see them.

#### Olinga - Smooth-cased caddisfly



Click picture for larger image

typical  
size  
8mm



[Video of Olinga](#)  
[More info on Olinga](#)

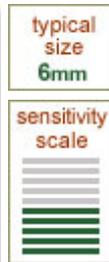
#### I'm a baby insect called a smooth-cased caddis...

I have lots of cousins that live inside houses that look like tubes, but my tube is the smoothest. See how nice and orange my tube is? I hide my soft body inside the tube so no big nasty bugs can eat me.

My favourite food is rotten leaves that have fallen in my stream, but sometimes I also eat the brown slimy stuff called algae growing on the stones in the water. I like to live in streams that flow past lots of trees, because those trees drop yummy leaves into the water. Trees also keep my stream shady and this keeps the water nice and cold, just the

way I like it. You may not find young caddis like me in many city streams because city people sometimes cut all the trees down, leaving us with no shade or food.

## Acroperla - Stonefly



[Video of Acroperla](#)  
[More pics of Acroperla](#)  
[More info on Acroperla](#)

Click picture for larger image

### Hi there, my name is Acroperla...

I'm a young stonefly. You can tell I'm a stonefly by my two tails, and if you look carefully you might see a tuft of gills between my tails. Those gills help me to breathe under the water. I'm prettier than my cousin Zelandobius because I've got a neat pattern of pale markings on my body and legs. Like other stone flies I can run around out of the water, which is a trick that most stream insects can't do.

You might see me running around the beaches of lakes, but my favourite home is stony streams where I can climb out of the water to go exploring. I can't live in streams that are too muddy, especially the ones that get really warm in the sun. I also can't live in streams that have been turned into concrete drains because there's nowhere for me to shelter from the fast water current every time it rains.

[Underwater Life](#) – Macroinvertebrates  
[Waitakere.govt.nz](http://Waitakere.govt.nz)

## Resource 5

### SMOOTH CASED CADDIS ( CONOESUCIDAE : OLINGA )



Black mark behind hind leg

#### Diagnostic features

Olinga caddis larvae construct smooth mobile cases that lack sand grains (except sometimes in small/young individuals). The aperture of the case is straight (unlike Beraeoptera). The rounded, orange or red head lacks conspicuous hairs (unlike Pycnocentroides). There is a black mark on the side of the body behind the hind leg (unlike Pycnocentria).

#### Typical habitats

Olinga larvae are most common in bush covered, cold water, stony streams.

#### Feeding

They are collector-gatherers (feeding on fine particulate organic matter) and shredders (feeding on leaf litter).

#### Indicator value

An abundance of Olinga larvae indicates good habitat and water quality, particularly if mayfly and stonefly nymphs are also abundant. They have tolerance values of 9 (hard bottom sites) and 7.9 (soft bottom sites).

<https://www.landcareresearch.co.nz/resources/identification/animals/freshwater-invertebrates/guide/jointed-legs/insects-and-springtails/cased-caddisflies/smooth-cased-caddis3>

## Resource 6

Caddisflies pass through a larva-pupa-adult stage, and fall into two types, cased, and uncased. The former protect their soft bodies with tubes — purse or shell-like cases — and are covered with an amazing variety of material. Those of interest to the angler are the tube or horn cased **caddis** which produce a self hardening secretion and form a tapered ring case to which stick minute particles of sand, tiny pebbles, gravel, lignite, coal, leaf particles and any other material handy to its habitat. The curious fact is that particular species seek out material peculiar to themselves.

The value of imitations of cased **caddis** can best be judged from the fact that in his excellent book, *Trout with Nymph*. Tony Orman devoted a separate chapter to the Horn **Nymph**. In summer conditions the Mataura River is noted for its selective trout, but using his imitation of this popular trout food insect, Arthur Gorton, one of Southland's talented **fly** fishermen, occasionally takes (and returns) a limit bag.

Two common **caddis** are *Olinga feredayi* and *Pycnocentroides* spp. The former is recognised by its smooth brown case and the latter by a sandy or grit covered case. Both larva are small, seldom



*Olinga feredayi* (10 mm)



*Pycnocentroides* spp. (5–15 mm)

65

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*Aoteapsyche colonica* (top and bottom).  
*Hydrobiosis* spp. (centre).



*Aoteapsyche colonica* (15 mm)



*Hydrobiosis umbripennis* (15 mm)

66

exceeding 10 millimetres in length. They have no means of swimming but crawl about in search of food, dragging the case along behind. They are quick to retreat into the case if disturbed, and will never voluntarily leave the case until the transformation to the adult stage. The larva itself is usually a lime-green or rich yellow colour, the head black with flattened top, and orange ringed black eyes. The legs are heavily fringed and equipped with strong claws.

Not all **caddis** larva have protective cases. Some, known as free **caddis**, leave the soft body exposed completely during the pre-pupal stage and are vulnerable to predators such as the dobsonfly larva or dragonfly **nymph**. The two types of importance to the angler are *Aoteapsyche colonica* and *Hydrobiosis umbripennis*. Both are approximately 15 millimetres in length but very different in appearance. *Aoteapsyche colonica* larvae are found in all types of water from fast to sluggish. The head is large, predominantly black, and the body a dingy grey. Along the ventral abdomen runs a fringe of fine dingy-white featherlike gills. It has the distinction of joining man and the spider in a rather unique method of catching prey. It uses a net. This the insect forms from a fine sticky filament secretion, and it is positioned across some fine aperture in stones on the streambed to catch fine food particles and other tiny organisms. They are often a primary food source during low water periods when trout actually graze on them especially in mainstream backwaters.

*Hydrobiosis umbripennis*, the other free larva, is a more distinctive looking insect, with a long well marked head, pincer-like fore legs and bright green body. It is a true hunter, searching rapidly for minute stream animals. Despite its movements, it is much less commonly found in trout autopsies. Nevertheless, it does

appear from time to time and is well worth imitating. Fished on a fine cast during difficult summer days when trout can be seen on the bottom, the green caddis pattern will, in nearly all cases, bring a response from dour trout. As with all caddis imitations it should be fished with the dead-drift method, as caddis cannot swim in the true sense.

Trout Stream insects of NZ – How to Imitate and Use Them. Norman Marsh. 1983 Pub Millwood Press Ltd