Microscopic pond life of Motu Kaikoura: observations in December 2025

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Abstract
In December 2025 I examined six water samples to make an initial investigation of microscopic life in Farm Pond, Motu Kaikoura. Eleven taxa could be identified, at least to higher groupings, including three kinds of ciliate protozoa and four kinds of photosynthetic algae. The euglenoid flagellate *Lepocinclis* was multiplying to form a major element in the phytoplankton at the time of observation. Nine records (photographs) were uploaded to iNaturalist generally and also linked to the project "Flora & Fauna of Motu Kaikoura".

Introduction
Motu Kaikoura (Selwyn Island), at the entrance to Port Fitzroy, north-west Great Barrier Island, is a rugged island of about 564 ha with a highest point (Mitre Peak) at 185 m a.s.l. The island passed into public ownership, as a Scenic Reserve, in 2004 and is managed by the Motu Kaikoura Trust Board. One aim of the Trust is to make an inventory of the biodiversity of the island that may form a base-line against which future changes in the flora and fauna can be measured. To that end I used a compound microscope to observe organisms too small to be seen with the naked eye in water samples from Farm Pond.

Study site
Farm Pond was created many decades ago by piling up a ridge of soil to dam a stream. The pond is about 25 m wide at the dam (at the west end), but narrows quickly and tapers to the east where it transitions to the stream. The length of the pond is about 90 m (measured with a 30-m tape), with a surface area of about 500 m^2 (Galbraith & Jones 2010). Farm Pond is about 1 km north-west of the Lodge at about 36.186ºS and 175.325ºE.

Farm Pond was originally in open country, one assumes, but is now surrounded by kanuka forest (*Kunzea ericoides*, Myrtaceae) down to its banks. This has a canopy of 10–12 m, and much of the surface water is partly shaded for part of the day. The pond edge has vigorous growth of low aquatic vegetation.

Methods
On both 13 and 14 December 2025, I took three water samples in small plastic containers. Two were open-water samples, within arm's reach of the bank, at different sites near the dam. The third was a sediment sample taken by probing under decaying reeds with an eye-dropper at a site near the dam. I was not able to collect any samples from algal mats.

I used a compound microscope (LOMO Biolam MBD-1) to examine water drops placed between a microscope slide and coverslip. I used objective lenses of 9x and 20x, which, with a 10x eyepiece, gave magnifications of 90x and 200x. When I found a micro-organism that was clear of debris I attempted to get a photograph using a cell-phone camera, with the cell-phone attached to the eyepiece and held at right-angles via a clamping device (Carson HookUpz 2.0). Many organisms (such as rotifers, gastrotrichs and various protozoa) were too fast-moving to be photographed.

I could identify most of the micro-organisms to higher-level groupings, and a few down to genus, using references like Entwisle *et al*. (1997) and Seamer (n.d.). Where I obtained reasonable photographs, I uploaded the records (n = 9) to iNaturalist. This made a permanent, public record of the findings and solicited feedback that helped to improve the identifications. Records were also linked to the iNaturalist project "Flora & Fauna of Motu Kaikoura".

Results

From the six water samples I identified 11 taxa, at least to higher-level groupings (Appendix 1), including four kinds of photosynthetic algae (Fig. 1) and three kinds of ciliate protozoa (Fig. 2).

The open water in Farm Pond appeared to be pale brown at a distance. Under the microscope there was much pale brown debris, that seemed to be a mixture of microbial cells and mucilage (see Figs 1C, 2A, 2C). This may have caused the brown coloration. The euglenoid flagellate *Lepocinclis fusca* (Fig. 1D) was abundant in open-water samples, with both full-sized and smaller cells present, suggesting that it was multiplying to form a major element in the phytoplankton at the time of observation.

Discussion

Freshwater microscopic algae and protozoa tend to be largely cosmopolitan, based on their ease of spread in dirt on the feet of aquatic birds, and perhaps via wind. This means that ponds throughout New Zealand (and, indeed, further afield) will have similar microscopic organisms. In line with this, the abundance of *Spirostomum*, *Closterium*, vorticellids and copepods at Farm Pond was similar to what I have observed at Western Springs Lake, Auckland.

The present records are a small beginning in characterizing the pond life of Motu Kaikoura. Further observations are needed, and future work should include sampling from algal mats and open water away from the bank.

Acknowledgements

I thank Rosemary Barraclough for inviting me to join the December 2025 survey trip that she organised, and other members of the team for their companionship and support. Rosemary helped me to measure the size of the pond on the ground.

References

Entwisle, T.J.; Sonneman, J.A.; Lewis, S.H. 1997. *Freshwater Algae in Australia: A Guide to Conspicuous Genera (2nd ed.)*. Potts Point (Sydney), Sainty & Associates.

Galbraith, M.; Jones, G. 2010. Bird fauna of Motu Kaikoura, New Zealand. *Notornis* 57: 1–7.

Seamer, D.G. (no date). *A Beginner's Guide to Freshwater Microscopic Life*. Victoria (Australia), The Author.

Figure 1. Some photosynthetic microscopic organisms observed in water samples, Farm Pond, Motu Kaikoura, in December 2025. Viewed with 20x objective; 1 scale division = 5 μm.

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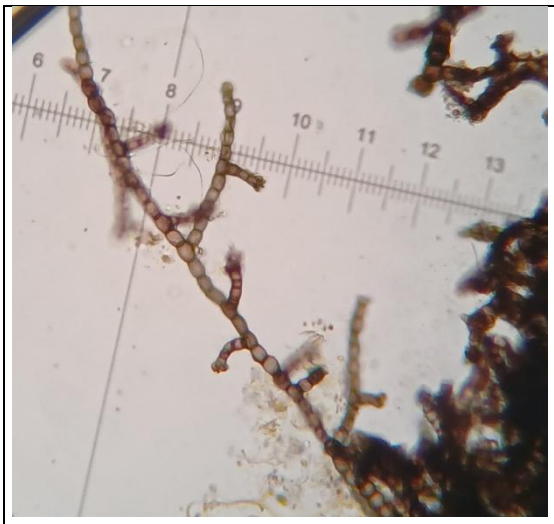
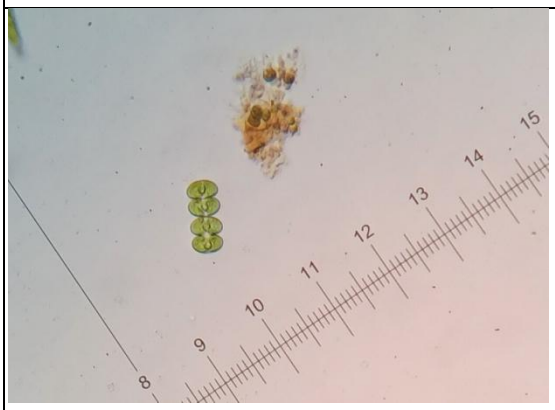
<tr><td>  </td><td>  </td></tr>
<tr><td>A. Possible blue-green alga with branched filaments.</td><td>B. The desmid Closterium.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>C. The desmid Cosmarium.</td><td>D. The euglenoid flagellate Lepocinclus fusca.</td></tr>
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Figure 2. Some microscopic animals observed in water samples, Farm Pond, Motu Kaikoura, in December 2025. *Spirostomum* and copepod viewed with 9x objective; 1 scale division = 11 µm. Others viewed with 20x objective; 1 scale division = 5 µm.

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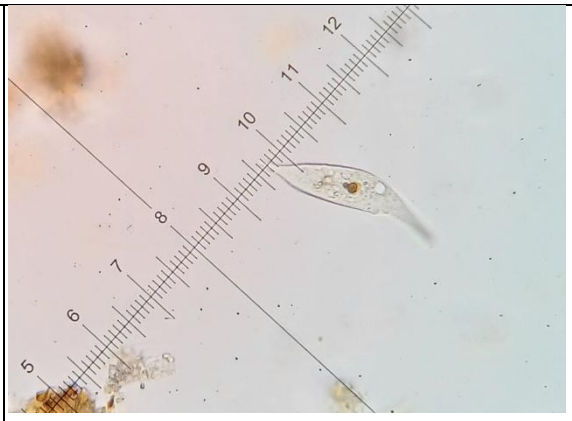
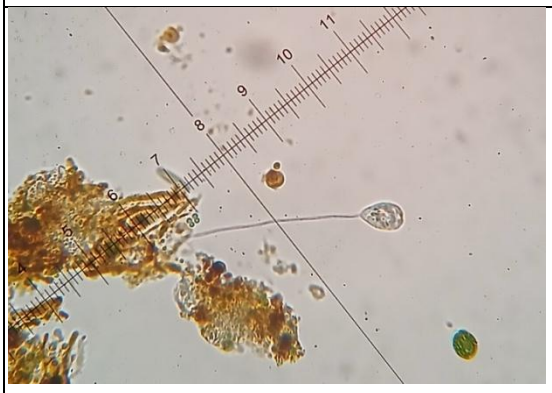
<tr><td>  </td><td>  </td></tr>
<tr><td>A. The giant ciliate Spirostomum. Length c.1.8 mm.</td><td>B. A dileptid ciliate, possibly Pseudo-monilicaryon.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>C. A vorticellid peritrich ciliate.</td><td>D. A cyclopid copepod.</td></tr>
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Appendix 1. Taxonomic list of microscopic organisms observed in water samples, Farm Pond, Motu Kaikoura, in December 2025.

Division Cyanobacteria

- Possible blue-green alga; branched filaments; grey-brown; cells 5–8 μm wide; forming clumps in open water. Fig. 1A.

Division Chlorophyta; O. Zygnematales (desmids); F. Desmidiaceae

- *Closterium*. Seen in both open-water and sediment samples. Fig. 1B.
- *Cosmarium*. From open-water sample. Fig. 1C.

Division Euglenophyta; F. Phacaceae

- *Lepocinclis fusca*. Common in open water samples. Fig. 1D.

Phylum Ciliophora (ciliates); F. Spirostomidae

- *Spirostomum*. Giant ciliates; one was c. 1.8 mm long. Common in sediment samples. Fig. 2A.

Phylum Ciliophora (ciliates); O. Dileptida

- *Dileptus*-type ciliates observed in sediment sample; possibly *Pseudomonilicaryon*. Fig. 2B.

Phylum Ciliophora (ciliates); O. Sessilida; F. Vorticellidae

- Vorticellid peritrichs; stalked; solitary. From both open-water- and sediment-samples. Small cell body (c. 40 μm long x 25 μm wide) with long contractile stalk (up to 170 μm long). Fig. 2C.

Phylum Rotifera

- Mobile and sessile rotifers observed in sediment samples; too fast-moving for photography, or partly obscured by sediment.

Phylum Gastrotricha

- Gastrotrichs ("hairy backs") seen in both open-water- and sediment-samples; too fast-moving for photography.

Phylum Nematoda

- Nematode worms seen in sediment samples.

Phylum Arthropoda; Cl. Crustacea; Subcl. Copepoda, F. Cyclopidae

- Copepods (adults and nauplius larvae) seen in both sediment- and open-water-samples. Fig. 2D.