

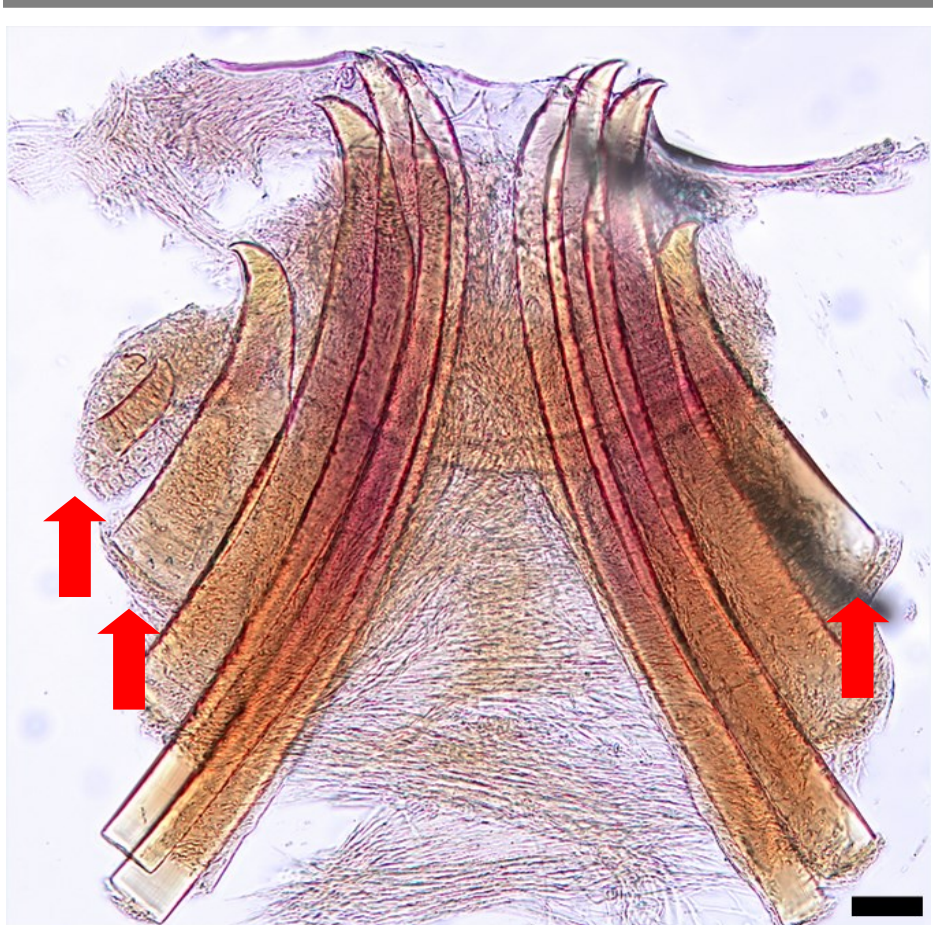
## Uncovered diversity amongst indicator species.

Species of the genus *Capitella* (Blainville, 1828) are often referred to as environmental indicators. The tolerance level to environmental stressors is documented to vary between species<sup>1,2</sup>. Taxonomic descriptions for these species will provide valuable information for ecology, biomonitoring as well as evolutionary biology studies. *Capitella capitata* (Fabricius, 1780) was originally considered cosmopolitan in distribution. However, studies have confirmed that the *Capitella* genus consists of several, cryptic species<sup>3,4</sup>. This study aimed to investigate morphological features within the *Capitella* genus. I found individuals potentially belonging to species *C. cf. giardi* (Mesnil, 1897), *C. cf. capitata*, *C. cf. minima* (Langerhans, 1880), *C. cf. aberranta* (Hartman & Fauchald, 1971). However here I describe potentially two new species and compare them to their closest match *C. giardi*.

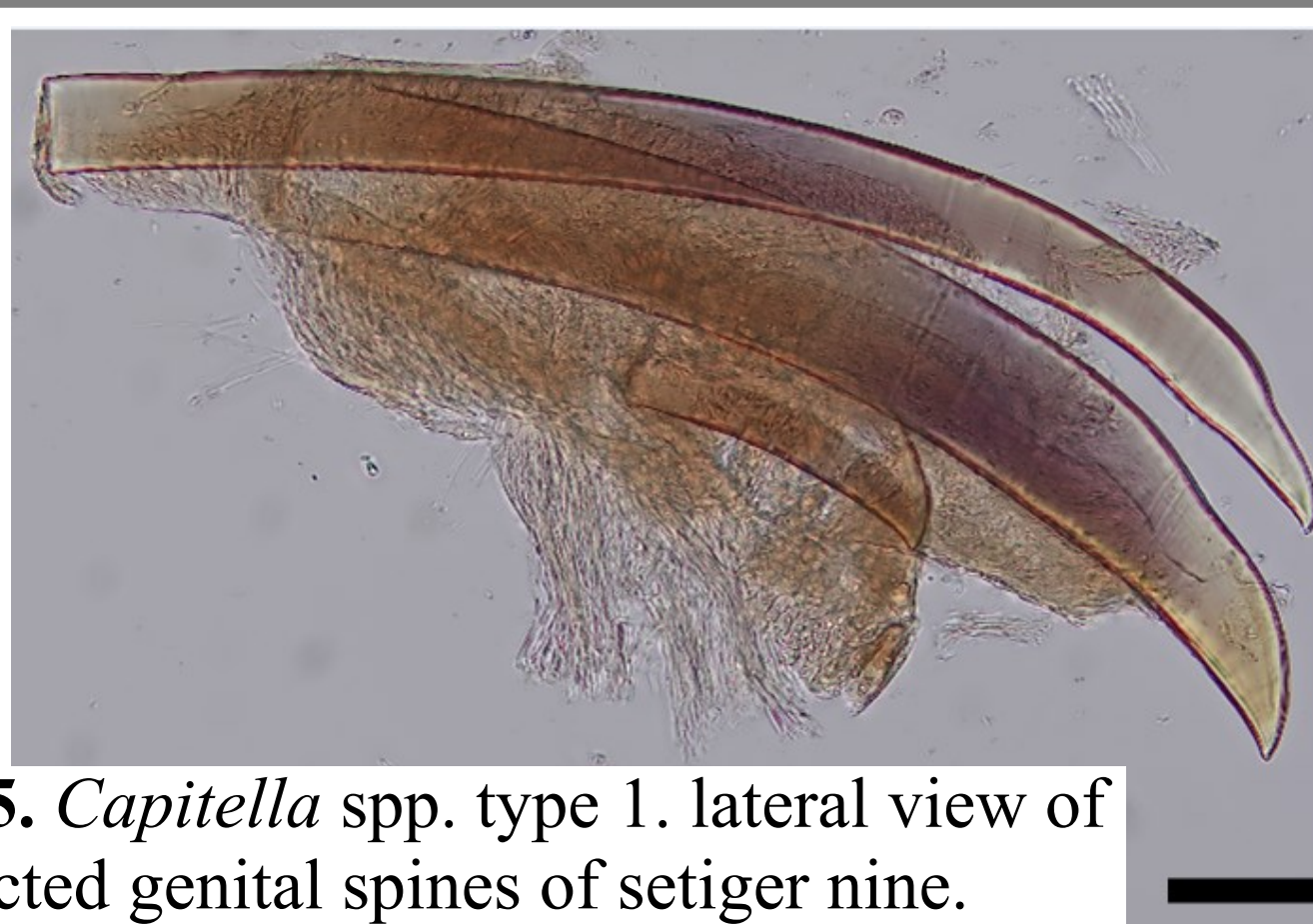
## The aftermath

*Capitella* spp. type 1 (n = 47) was identified in the Marlborough Sounds. The individual length ranges between 17.4 - 45.6 mm. the species has a rounded triangular and dorsally depressed head region with an indistinct boundary between the pro- and peristomium. Lateral eye spots are faintly visible. The thoracic setal formula is 1-7 Capillary, 8 Mixed, (8)-9 Hooks (seldomly 1-8 C, 9 H). Hooded hooks have 2-3 (seldomly 4) rows with in total 8-17 apical teeth above the main fang (Fig. 1). Females have 5-14 notopodial hooks in setiger eight and 8-13 hooks in setiger nine. Mature females have a lateral genital pore between setigers seven and eight (Fig.2). Mature males have 10 genital spines on setigers eight and 6 on segment nine (Fig.3). However, I found that smaller male individuals with 6 external and 3 internal genital spines in setiger eight (Fig. 4). The same individuals had 6 internal spines in setiger nine (Fig. 5).

*Capitella* spp. type 2 (n = 10) was identified in the collection from Pāuatahanui Inlet. Body size range: 2.6 - 4.9 mm, the head region is like for *Capitella* spp. type 1. The thoracic setal formula is 1-4 C, 5(-6) M, 6-9 H (Fig. 6). Hooded hooks have one row of apical teeth above the main fang. Males have 4 genital spines each on setiger eight and nine.



**Fig. 4.** *Capitella* spp. type 1. Anterior view of genital spines of the eight setiger; 6 external and 3 internal spines (arrows). CLA Pen 3 Sample #129. Stain: Shirlastain, magnification: 40x. Scale: 50µm



**Fig. 5.** *Capitella* spp. type 1. lateral view of dissected genital spines of setiger nine. CLA Pen 3 #129. Stain: Shirlastain, magnification: 100x. Scale: 100µm

## The way forward.

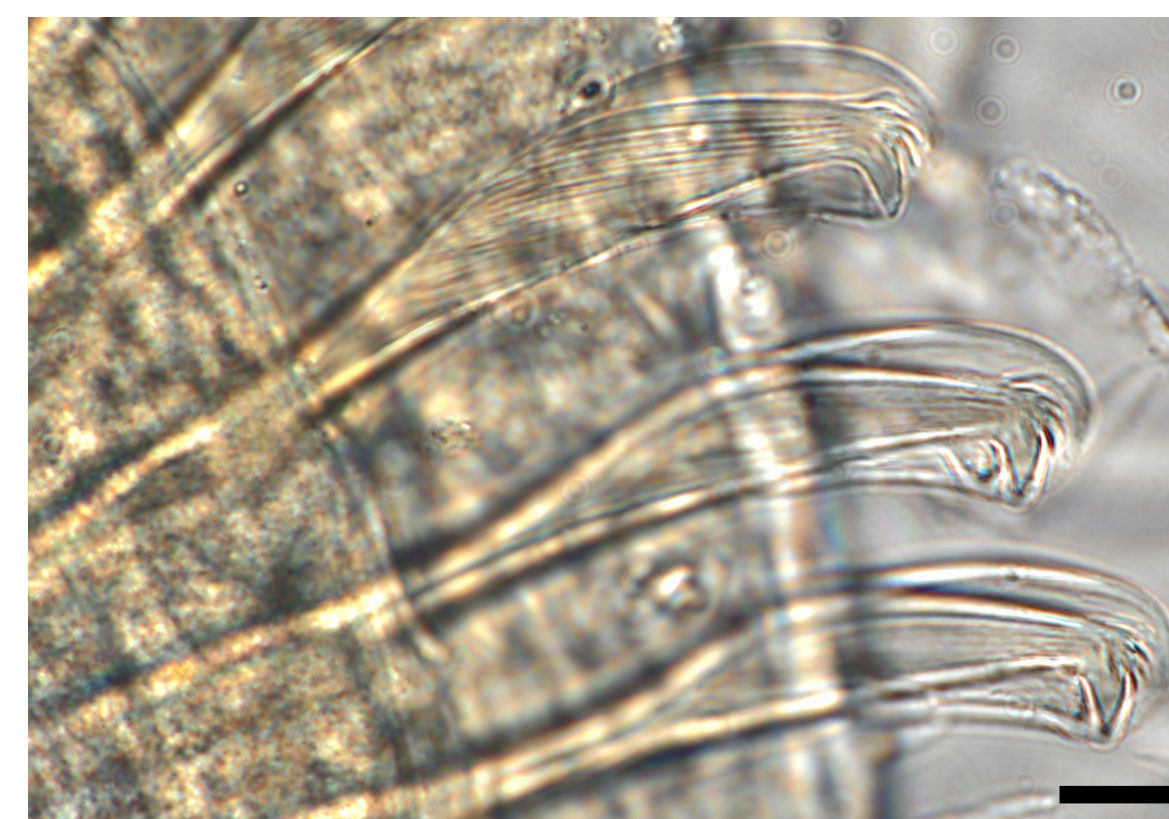
Future taxonomy studies on the genus *Capitella* should take caution when defining the setal arrangement for a *Capitella* spp. because it may be a growth dependent feature. Misclassifications can be avoided by concentrating efforts on describing mature adult individuals. I furthermore found that the number of setae per fascicle was extremely variable within species and since it is very time-consuming to count capillary setae I would recommend future studies to not worry about this. Concerning *Capitella* spp type 2, I only found juveniles with underdeveloped genital setigers. Hence I cannot assign the individuals to a species. In a first step I would need to find the adult specimens, before I can further identify these juveniles of *Capitella* spp..



**Fig. 6:** *Capitella* spp. type 2 (juvenile male). NIWA, Z18685. Stain: Shirlastain, mounting media: Glycerol, magnification 10x. Scale: 100µm

## Where does the worms coming from and what has been done to them?

Samples were retrieved by the Cawthron institute from marine soft sediment under salmon farms at ~25 m depth in the Marlborough Sounds in year 2021. The initial preservation of specimens was in a mixture of 96% ethanol with 5% glyoxal. Additionally, samples from the Pāuatahanui Inlet, collected by G. Read in 1978 were examined. For microscopic examination specimens were stained with numerous chemicals and fixed to slides using various mounting media.



**Fig. 1** *Capitella* spp. type 1; anterior view of hooks, with three rows of apical teeth above the main fang. CLA Pen 3 Sample #129. magnification 100x. Scale: 10µm



**Fig. 2** Female *Capitella* spp. type 1, genital pore between segment seven & eight circled in red. CLA Pen 3 Sample #129. Stain: Victoria Blue, magnification: 2x. Scale: 1000µm



**Fig. 3** Male *Capitella* spp. type 1, Segment eight with two sets of 5 genital spines and segment nine with 6 fused genital spines (internal, dissected out). CLA Pen 3 Sample #129. Stain: Methyl Green, magnification: 5x. Scale: 1000µm

## To be or not to be *Capitella cf. giardia*?

*Capitella giardi* and *Capitella* spp. type 1 seem to be similar in their dentition of hooded hooks, the number of genital spines on setiger nine, general shape of genital setigers, head shape, location of the ventral groove and female genital character. However, *C. giardi* has less genital spines and is described as a hermaphroditic species<sup>5,6</sup>. Therefore, it is plausible that the *Capitella* spp. type 1 with sexual dimorphism is an undescribed species. Further I propose that here found smaller individuals with less genital spines are juvenile *Capitella* spp. type 1. Most juvenile male individuals had internal genital spines on setiger eight (Fig.4 & 5) which may increase in number and grow to external spines with increasing age. If my proposal is correct, it would follow that the arrangement of seta and spines for *Capitella* spp. type 1 is growth dependent. Capillary setae replacing hooded hooks on setigers six and seven as individuals mature. Similar to my observations for other species found also that the setal arrangement with age changes and capillaries eventually replace hooks on the earlier segments in more mature individuals<sup>5,7</sup>.

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