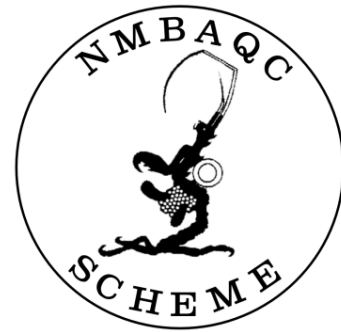




Sir Alister Hardy Foundation for Ocean Science



National Marine Biological
Analytical Quality Control Scheme

Zooplankton UK Trial Ring Test

2014/2015

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SAHFOS

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Introduction

In January 2013 SAHFOS on behalf of the National Marine Biological Analytical Quality Control (NMBAQC) scheme sent out a [questionnaire](#) to organisations known to be involved in zooplankton research. The questionnaire was aimed at gauging current quality control mechanisms, as well as identifying possible interest in a zooplankton ring test, similar to the other NMBAQC components. Zooplankton are an MSFD indicator group, however, there are no current standards for their sampling. As such a quality control mechanism for the correct identification was identified by the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) to be one of the areas that NMBAQC should investigate.

This UK Zooplankton trial ring test was a follow-on from the questionnaire, to assess current identification levels and to determine the best way forward. A ring test containing 10 actual zooplankton specimens from the North Sea and 10 written questions were sent out in November 2014 to twelve participants from six UK laboratories. Participants were given 8 weeks to complete their test, and results were consequently judged by one of SAHFOS' senior taxonomists.

Results

The results from the trial zooplankton ring test are summarised in table 1-3 below, and discussed in detail in the remainder of this report. Correct answers are highlighted in green, incorrect in red, and partially correct and requiring discussion in amber. The results were discussed during the Zooplankton Trial Ringtest Workshop to ensure a consensus on the results was reached.

Overall score	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04	Maximum score
per participant	38.5	38	38	38	27.5	34.5	39	40	35	30.5	36	29	40
% of maximum	96.3%	95%	95%	95%	68.8%	86.3%	97.5%	100%	87.5%	76.3%	90%	72.5%	100%
per laboratory	38.2			38	27.5	34.5	39.5		32.6				
% of maximum	95.4%			95.0%	68.8%	86.3%	98.8%		81.6%				

Table 1: Overall scores per participant and per lab

Written quiz	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04	Maximum score
1	4	4	4	4	3	4	4	4	3	4	4	4	4
2	2	2	2	2	2	2	2	2	2	0	2	0	2
3	2	2	2	2	2	2	2	2	2	2	2	2	2
4	2	2	2	2	1	2	2	2	2	2	2	1	2
5	2	0	2	2	0	0	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2	2	2	2	2
7i	1	2	1	2	1	0	1	2	1	1	2	2	2
7ii	2	2	2	2	2	2	2	2	0	0	0	0	2
8	2	2	2	2	2	2	2	2	2	2	2	0	2
9	4	4	4	4	4	4	4	4	4	4	4	4	4
10	6	6	6	6	2	6	6	6	6	6	6	6	6
per participant	29	28	29	30	21	26	29	30	26	25	28	23	30
	28.7			30	21	26	29.5		25.5				

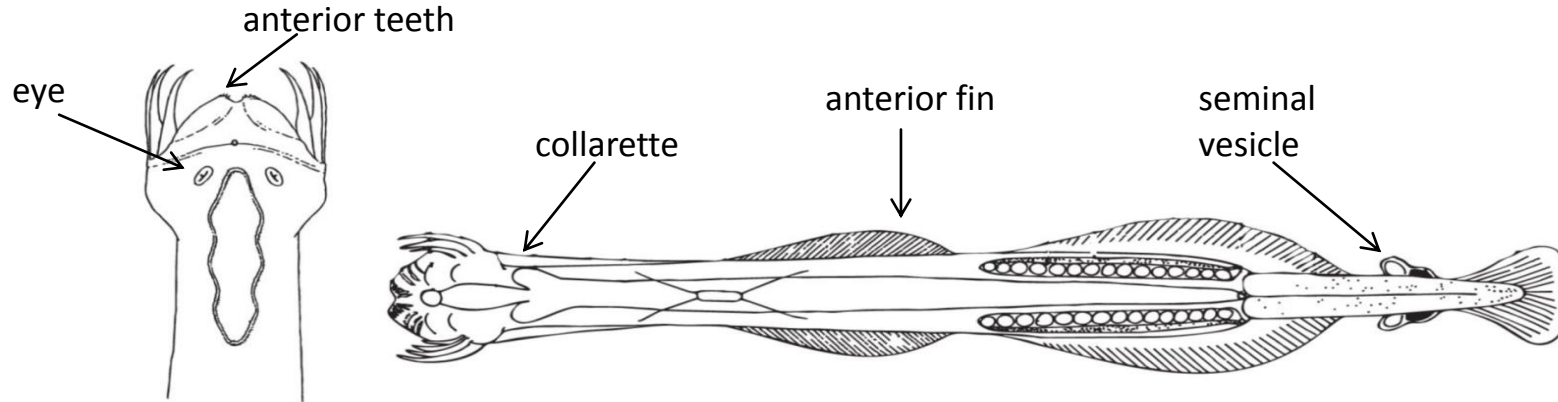
Table 2: Written test scores per participant and per lab

Specimens	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04	Maximum score
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	0	0	0	1	1	1	1	1	1	0	1
3	1	1	1	0	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	0	1	1	1	0	1	0	1
5	1	1	1	1	1	1	1	1	0	1	1	1	1
6	1	1	1	1	0	1	1	1	1	0	1	0	1
7	1	1	1	1	0	1	1	1	1	0.5	1	1	1
8	0.5	1	1	1	1	1	1	1	1	0	0	0	1
9	1	1	1	1	0.5	1	1	1	1	0.5	0.5	1	1
10	1	1	1	1	1	0.5	1	1	1	0.5	0.5	1	1
per participant	9.5	10	9	8	6.5	8.5	10	10	9	5.5	8	6	10
per laboratory	9.5			8	6.5	8.5	10		7.1				

Table 3: Specimen test scores per participant and per lab

Question 1.

1. Please correctly label the chaetognath diagrams below with the following terms: eye; anterior teeth; collarette; anterior fin; seminal vesicle. (4 points)



Images reproduced from Ghirardelli 2006 (head dorsal), and Pierrot-Bults & Chidgey 1988 (whole body ventral)

Lab code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
Anterior teeth	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct
Eye	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct
Collarette	Correct	Correct	Correct	Correct	(Not marked)	Correct	Correct	Correct	Correct	Correct	Correct	Correct
Anterior fin	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct
Seminal vesicle	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Correct	Correct	Correct

Question 2.

2. Please circle the correct answer.

Statocysts are found in:

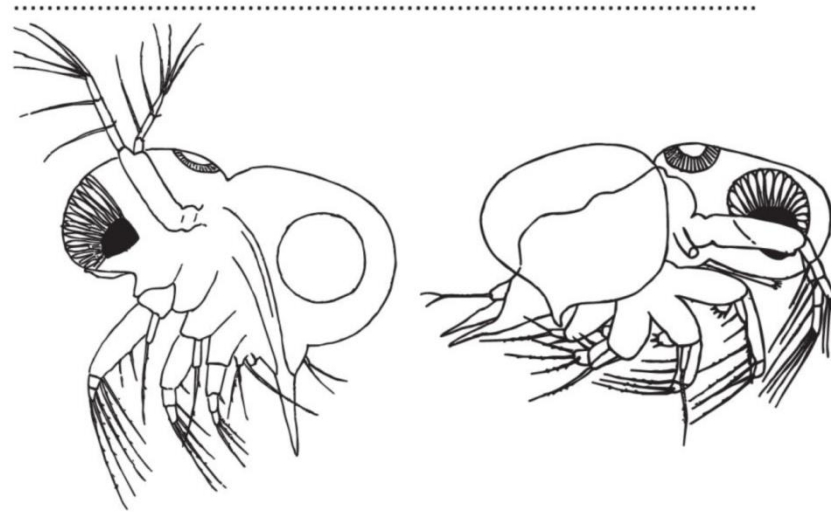
- a) mysids
- b) euphausiids
- c) decapods
- d) cnidarians
- all of the above
- a), c) and d)

(2 points)

Lab code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
	a, c and d	a, c and d	a, c and d	a, c and d	a, c and d	a, c and d	a, c and d	a, c and d	a, c and d	a	a, c and d	a

Question 3.

3. What is the genus (2 points), and species name (2 points) of the cladoceran below?

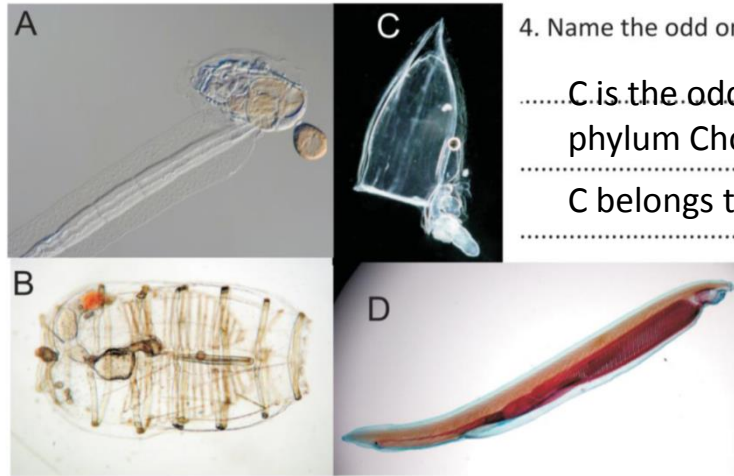


Thoracic limb exopods of legs 1-3 with 1 seta = ***Podon***

Thoracic limb exopods of legs 1-4 with setal formula 1,1,1,2 = ***Podon leuckarti***

LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
	<i>Podon leuckarti leuckarti</i>	<i>Podon leuckarti leuckarti</i>	genus <i>Podon</i> . Species <i>Podon leuckarti</i>	<i>Podon leuckarti</i>	<i>Podon leuckarti</i>	<i>Podon leuckarti</i>	<i>Podon leuckarti</i>	<i>Podon leuckarti</i>	<i>Podon leuckarti</i>	Genus <i>Podon</i> , Species <i>Podon leuckarti</i>	genus: <i>Podon</i> , species: <i>Podon leuckarti</i>	<i>Podon leuckarti</i>

Question 4.



4. Name the odd one out and why. (2 points)

..... C is the odd one out. A, B, D are all members of the phylum Chordata.

C belongs to the phylum Cnidaria

LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
	C. A, B & D are Chordates. C is a siphonophore	belongs to Cnidaria	<i>Branchiostoma</i> are all phylum Chordata	<i>Branchiostoma</i> Cephalochordata which have a notochord	C is the odd one out. A, B & D are individual animals, C is one zooid of a colonial organism	C- Not in Chordata	C. A, B, and D are Chordates, C is a Cnidarian	whilst the others are in Chordata as A, B and D are in the phylum Chordata.	C- because it is in the Phylum Cnidaria	C is the odd one out, as A, B, D are all from the phylum Chordata. C is from the phylum Cnidaria	C is the odd one out. A, B and D are all members of the phylum Chordata, so at some point in their life cycle they have a notochord. C is in the phylum Cnidaria	C is the odd one out as it is from the phylum Cnidaria, whereas A, B and D are from the phylum Tunicata

Question 5.

5. What is the genus name of the organism opposite (2 points)

Parafavella

- Undeveloped aboral horn
- Polygonal reticulated wall structure



Favella serrata



LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
	Parafavella	Favella serrata ?	Parafavella	Parafavella	Favella	Favella Jørgensen, 1924	Parafavella	Parafavella	Parafavella.	Don't normally ID tintinnids	Parafavella	Parafavella denticulata)

Question 6.

6. In which direction does the shell of *Limacina retroversa* coil? **Anti-clockwise/ sinistral**
 (2 points)

Lab code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
	Anticlockwise	to the left,	anticlockwise	sinistral	Left	sinistral	anticlockwise	left handed	Sinistrally-left handed	left	sinistrally (left)	Left-coiled shell

Question 7i.

7. The photographs opposite are of a male *Calanus helgolandicus* P5.

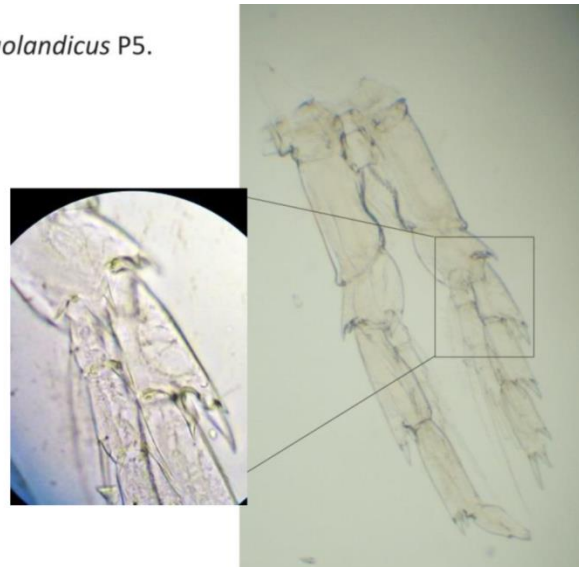
Label on the diagram:

- i) what identifies it as a male *Calanus* and
 - ii) what identifies it as a *C. helgolandicus*.
- (4 points)

Notes:

Teeth on inner border of coxa

Leg 5 similar to other legs,
Some asymmetry on left leg



LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
	Left leg longer than right leg, otherwise fairly symmetrical	P5 similar to P1-4, 3 endopods and 3 exopods, assymetrical. 1st basopod with denticulate inner margin.	Exopods of male 5th leg unequal in length	P5 similar to P1 to P4 but right and left different lengths + rows of teeth on basal segment	the assymetry of periopod 5	well developed endopods of P5	concave and serrated inner margin of basal segment	basal segments are concave and left and right legs are asymmetric	P5 assymetrical but like the other legs.	left leg longer than right	both legs are quite similar, but still assymetrical. Basal segments are concave, with rows of teeth, left leg longer than right leg.	left P5 leg much longer than the right (asymmetrical) with row of large teeth

Question 7ii.

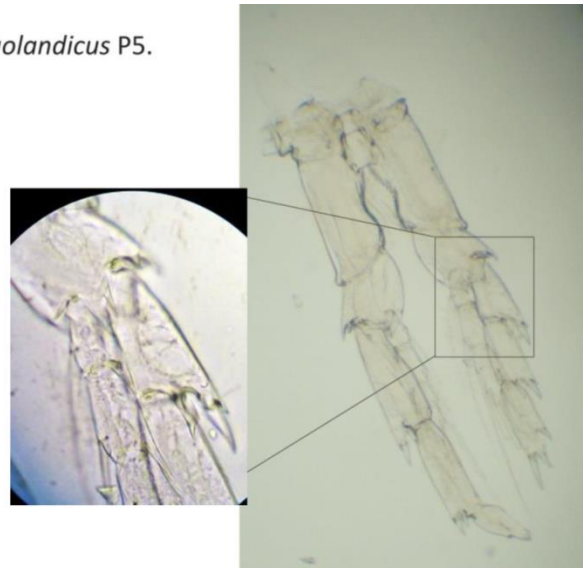
7. The photographs opposite are of a male *Calanus helgolandicus* P5.

Label on the diagram:

- i) what identifies it as a male *Calanus* and
 - ii) what identifies it as a *C. helgolandicus*.
- (4 points)

Notes:

End of left endopod only reaches to approx. 1/3 of the way down 2nd left exopod segment



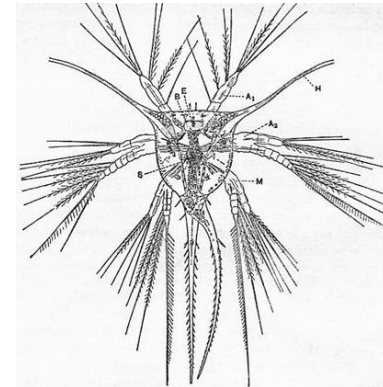
LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
ii	left leg endopodite only slightly longer than second segment of exopodite. Right leg only reaches end of penultimate segment of left leg.	the endopod of the left leg only reaches the joint between exopod 1+2 (or slightly beyond). Labelled 'x' on same leg drawing	Hel- left endopodite reaches distal limit of first third of 2nd seg of exopodite of drawing)	R. leg (exopod) almost reaching the end of the second last segment of the L. exopod	that the distal segment of the right P5 reaches to ~the end of the second last segment of the left P5 (in C. finmarchicus the distal segment of right P5 reaches 1/2 way down the final (distal) segment of P5 left leg)	last finmarchicus segment R almost reaches end last segment L exopod	left endopod extends only just beyond end of 1st exopod segment	the inner edge of the coxa curves. Also the left leg is longer than the right, with the distal segment of the right only reaching end of the second last segment of the left	Only slightly concave. More assymetrical than in C. finmarchicus -			Male C. helgolandicus has a smooth outer margin on right P5, whereas C. finmarchicus and C. carinatus males have teeth on right P5 outer margin

Question 8.

8. How would you distinguish between a *Lepas* nauplius a non-*Lepas* cirripede nauplius? (2 points)

Lepas have a unilobed labrum, dorsal thoracic spine, large fronto-lateral horns, long setose setae and progressively develop ornate shield margin spines.

.....



LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
	longer fronto-lateral horns and dorsal thoracic spine (from stage two) and spines on margin of cephalic shield (from stage 3).	the frontolateral horns of the cephalic shield are much longer than other groups, also develop on the margin of the cephalic shield from stage III up.	<i>Lepas</i> nauplius has spine on the margins. fronto-lateral horns are much longer. There is a very long dorsal thoracic spine and a long dorsal spine. Limbs bear long setae	<i>Lepas</i> nauplii- NI has long horns folded close to the body, from N2 and above, a long dorsal thoracic spine + single lobed labrum. Non- <i>Lepas</i> nauplii- doesn't have a spine and has a trilobed labrum	A combination of their characteristic shape, larger size and their frontolateral horns being usually much larger than non- <i>Lepas</i> nauplii. Also their labrum is single-lobed and bears spines		the margin of the cephalic shield of <i>Lepas</i> nauplii has pointed projections. In other genera, this margin is smooth	<i>Lepas</i> nauplii have a single lobed labrum which bears spines, they also have much longer frontolateral horns than other non- <i>Lepas</i> nauplius. In late <i>Lepas</i> nauplii stages the antennules have 2 rather than 3 preaxial setae,		the <i>Lepas</i> nauplius has larger frontolateral horns and dorsal thoracic spine	Lepodiform nauplii have 2 preaxial setae on the antennules. <i>Lepas</i> nauplius have short frontolateral horns that are open at the tip from the NI section. Non- <i>Lepas</i> cirripede nauplius do not have a frontolateral horn	

Question 9.

9. What taxonomic superorder do the organisms below belong to? (2 points)
 Associated with reproduction, females belonging to this order all possess a characteristic structure.
 What is the name of this structure? (2 points)

Peracarida

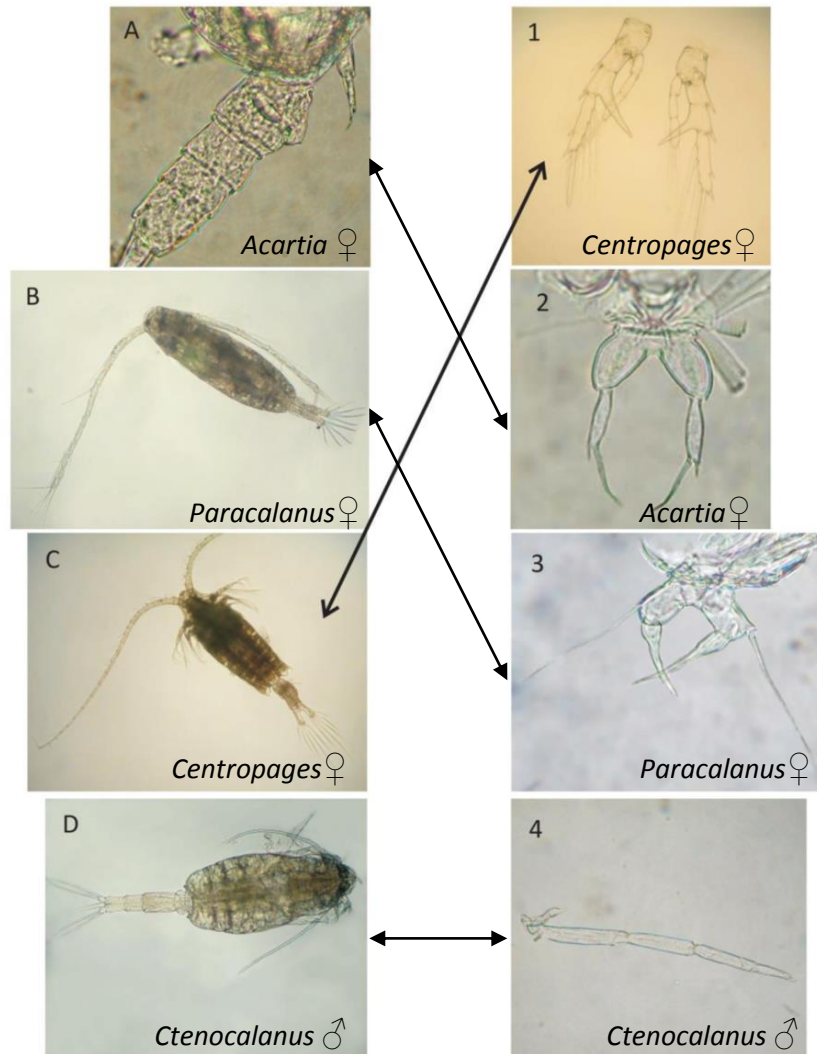
Marsupium, brood pouch, oostegites or brood plates



Lab code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
9i	Peracarida	peracarida	Peracarida	Peracarida	peracarida	Peracarida	Peracarida	The taxonomic superorder is Peracarida	Pericardia	Superorder Peracarida	Peracarida	The organisms below belong to the superorder Pericardia
9ii	Marsupium	brood pouch	They all possess a marsupium or brood pouch	All females possess a marsupium (brood pouch)	oostegites	Marsupium (= brood pouch)	marsupium	All females possess a 'marsupium' - a ventral brood pouch	Marsupium (brood pouch)	they all have a brood pouch	All possess a marsupium (brood pouch)	Females have a marsupium (brood pouch)

Question 10.

10. Connect the matching pairs below with a line, for example C matches 1. (6 points)

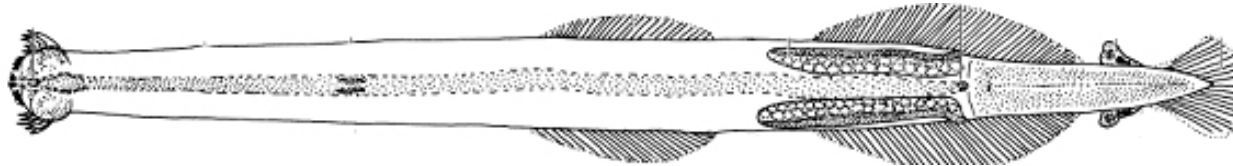


Lab code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01
10a	2	2	2	2	4	2
10b	3	3	3	3	3	3
10d	4	4	4	4	2	4

Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
2	2 2 (<i>Paracalanus</i>)	2	2	2	2
3	3 3 (<i>Acartia</i>)	3	3	3	3
4	4 4 (<i>Ctenocalanus</i>)	4	4	4	4

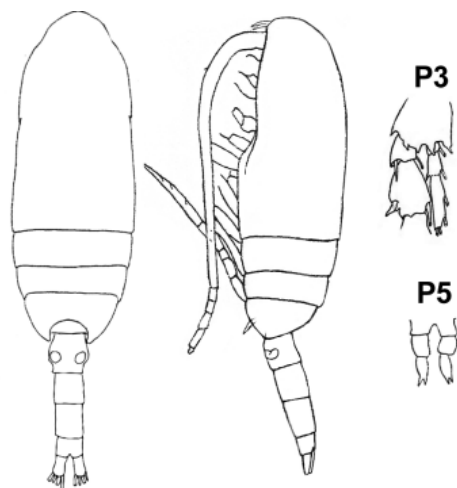
Specimen 1: *Parasagitta* spp. (likely *P. setosa*, but not adults)

Is it appropriate to speciate?



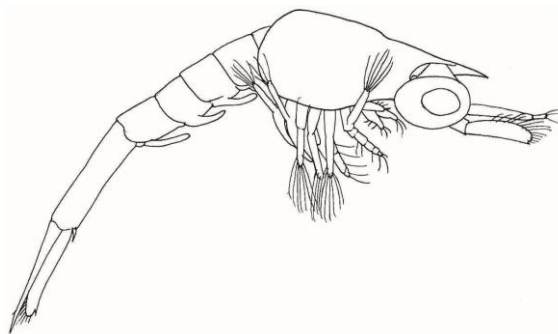
LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106	
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04	
Specimen 1	<i>Parasagitta</i> sp. Juvenile possible <i>elegans</i> . Anterior fin not visible i.e. present. Diverticula & collarette indistinct? Small round eye spots. No ovary/ seminal vesicle, 8 hooks?	<i>Sagitta</i> spp. <i>Setosa</i> ? No gut diverticulate. Complete fin rays. But v muscular for <i>setosa</i> .	<i>Parasagitta elegans</i>	<i>Parasagitta setosa</i>	<i>Parasagitta setosa</i> , Two specimens present in vial	<i>Sagitta setosa</i> , Listed as <i>Parasagitta</i> in WoRMS but Tokioka's genus has intestinal diverticula which are lacking in <i>setosa</i>	<i>Parasagitta</i> sp. Either <i>P. elegans</i> or <i>P. setosa</i> , couldn't resolve anterior teeth	<i>Parasagitta elegans/ setosa</i>	<i>Parasagitta setosa</i> . No internal vacuolation. Don't usually speciate	Chaetognatha	<i>Parasagitta setosa</i>	<i>Parasagitta elegans</i> , Phylum: Chaetognatha	

Specimen 2: *Clausocalanus furcatus* female



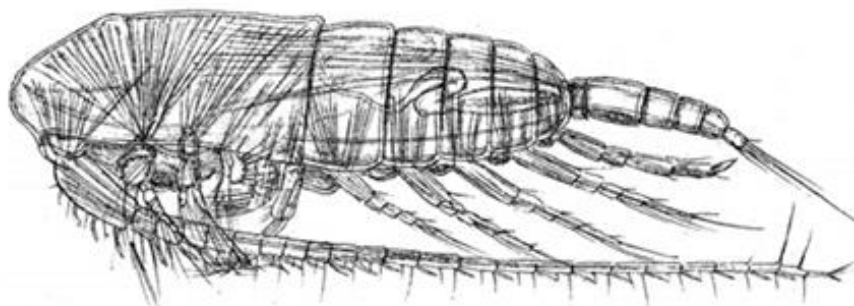
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Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
Specimen 2	<i>Clausocalanus</i> sp. Female. ~1 mm, bad condition. Small biramous p5. No terminal blades on swimming legs. Long slender rostrum	<i>Clausocalanus</i> C6F. <i>Furcatus</i> ? GNS (length)=UR3 (length). P5 very small	Calanoid copepod, C6 female. (urosome incomplete). No fifth leg	<i>Microcalanus pusillus</i> , female	<i>Pseudocalanus elongatus</i> , Female, not 100% confident on species - difficult to see pereopods.	<i>Clausocalanus jobei</i> , ?? Frost & Fleminger (1968) not available	<i>Clausocalanus</i> sp. CVI female	<i>Clausocalanus jobei</i>	<i>Clausocalanus jobei</i> . Tiny P5- 3 segments	<i>Clausocalanus</i> sp., female	<i>Clausocalanus</i> sp., female	<i>Pseudocalanus elongatus</i> , Male

Specimen 3: Decapod zoea, *Upogebia* spp.



LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
Specimen 3	Decapoda larva. Zoea? Telson widens distally.	Decapod larvae. Zoea	Decapoda. Caridean 'shrimp' larva	<i>Thyanoessa inermis</i> , furcilla stage 1b	Crangonidae zoea	<i>Upogebia deltaura</i> , 3rd larval stage	Decapod larvae, indeterminate species	Decapod larvae	<i>Upogebia deltaura</i> . Maybe <i>stellata</i> - would not normally speciate	Gebiidea	<i>Upogebia deltaura</i> . Small median telson spine. Spines in the order 7-1-7	<i>Palaemon elegans</i> , Zoea stage 1

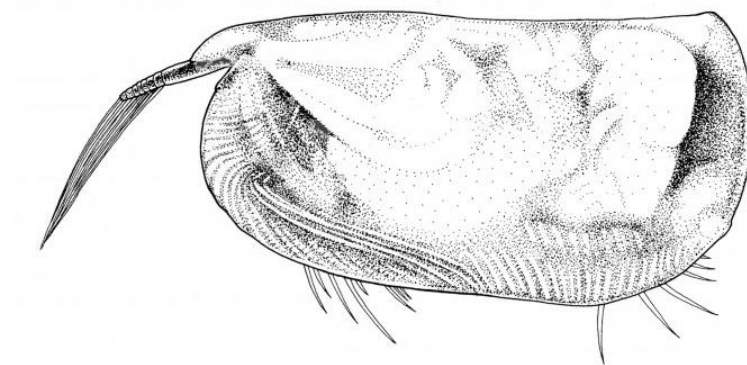
Specimen 4: *Calanus helgolandicus*, male



Due to the ecosystem importance of this species, participants were expected to be able to speciate between *C. helgolandicus* and *C. finmarchicus*. This was discussed and agreed at the workshop.

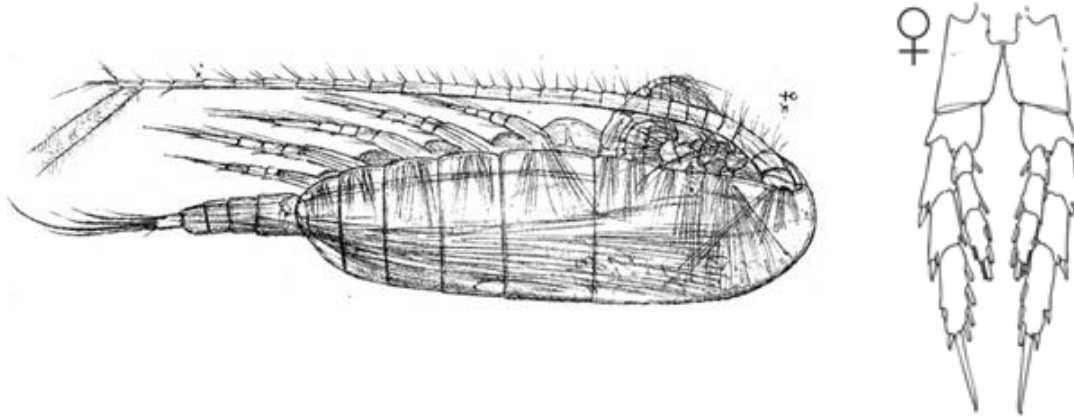
LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106	
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04	
Specimen 4	<i>Calanus helgolandicus</i> male. ~2.5 mm. P5 endopodite slightly longer than 2nd segment of exopodite on left leg			<i>Calanus helgolandicus</i> . C6 male	<i>Calanus helgolandicus</i> . C6 male	<i>Calanus finmarchicus</i> , male	<i>Calanus helgolandicus</i> , Male	<i>Calanus finmarchicus</i> , male	<i>Calanus helgolandicus</i> CVI male	<i>Calanus helgolandicus</i> C6M	<i>Calanus helgolandicus</i> , male.	<i>Calanus helgolandicus</i> , male	<i>Calanus finmarchicus</i> , Male

Specimen 5: Ostracod



LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
Specimen 5	Ostracoda. Halocypridina? Antennal notch, no compound eye.	Halocyprididae ostracod	Ostracoda. Possibly halocyprida	Ostracoda	Myodocopida, Little experience taking beyond Order	<i>Obtusoecia obtusata</i> , ??? female	Ostracod order Halocyprida	Ostracoda- order Halocypridina	Ensis? Bivalve- not normally go to taxonomic detail	Ostracoda	Halocypridina, (suborder)	Ostracoda, Identified to class only

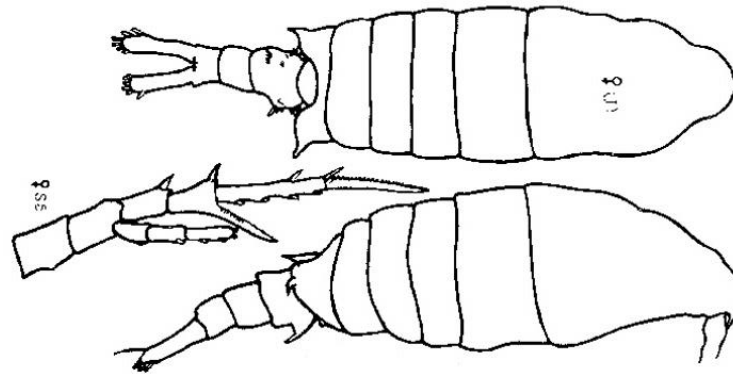
Specimen 6: *Calanus finmarchicus*, female



Due to the ecosystem importance of this species, participants were expected to be able to speciate between *C. helgolandicus* and *C. finmarchicus*. This was discussed and agreed at the workshop.

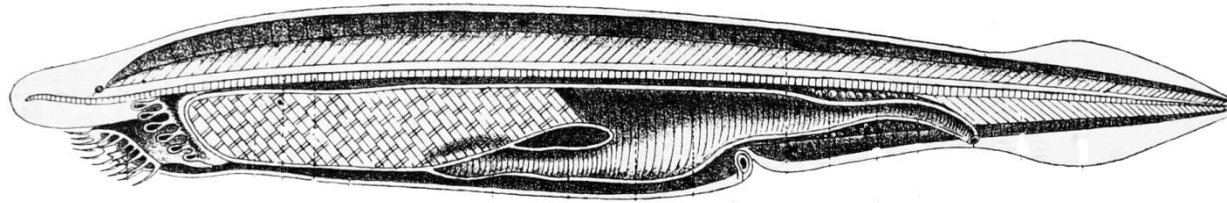
LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
Specimen 6	<i>Calanus finmarchicus</i> female. ~3mm. Straight edge on basal segment of P5	<i>Calanus finmarchicus</i> . C6 female	<i>Calanus finmarchicus</i> . C6 female	<i>Calanus sp.</i> , female. Some damage. Maybe <i>C. glacialis</i>	<i>Calanus helgolandicus</i> , Female	<i>Calanus finmarchicus</i> , female	<i>Calanus finmarchicus</i> CVI female	<i>Calanus finmarchicus</i> C6F convex	<i>Calanus finmarchicus</i> , female, p5 basal	<i>Calanus</i>	<i>Calanus finmarchicus</i> , female	<i>Calanus helgolandicus</i> , Male

Specimen 7: *Centropages hamatus*, female



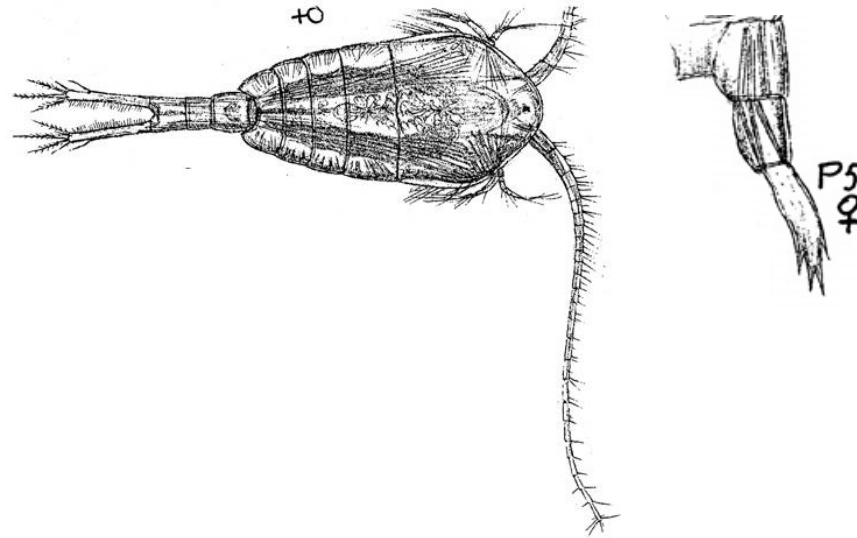
LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106	
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04	
Specimen 7	<p><i>Centropages hamatus</i> female . Bad condition. ~1mm but squashed/ bent so may be bigger. Shape of head, terminal spine on one side and swimming legs not visible. Identification based on genital segment with ciliated lateral edge and recurved spiniform process. The shape of the caudal rami and one antenna</p>				<p><i>Centropages hamatus</i> . C6F. Small. Prosome length approx 0.9 mm</p>		<p><i>Centropages hamatus</i> s. C6 female</p>	<p><i>Centropages hamatus</i> , female</p>	<p><i>Eurytemora</i> , I suspect the 1st metasome somite is slightly assymetrical, but specimen is squashed laterelly, so not very clear. May be <i>Temora</i> ?</p>	<p><i>Centropages hamatus</i> CVI female</p>	<p><i>Centropages hamatus</i> , no A1 spine, setae on genital somite</p>	<p><i>Centropages hamatus</i> , female (P5 damaged)</p>	<p><i>Centropages hamatus</i> , Female</p>

Specimen 8: *Branchiostoma lanceolatum*



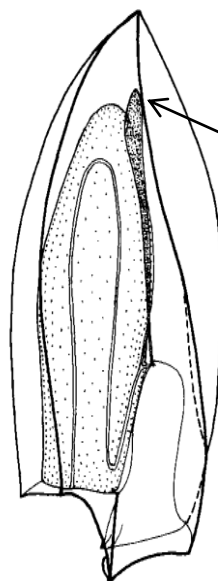
LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
Specimen 8	Chordata. Bad condition- can see what looks like a notochord, but can't tell if the surrounding tissue once had muscle blocks or head. Evidence of pigment spots?	Acrania. Branchiostomidae	<i>Branchiostoma lanceolatum</i>	<i>Branchiostoma lanceolatum</i> , larva	<i>Branchiostoma lanceolatum</i> , Poor condition	<i>Branchiostoma lanceolatum</i> , larva	<i>Branchiostoma</i> sp- too degraded for species level identification	<i>Branchiostoma lanceolatum</i>	<i>Branchiostoma lanceolatum</i> . Very damaged. Best guess	Nematoda	Appendicularia, VERY (very damaged)	<i>Parasagitta setosa</i> , Phylum: Chaetognatha. DAMAGED!

Specimen 9: *Temora longicornis*, female



LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04
Specimen 9	<i>Temora longicornis</i> female. ~1.5 mm	<i>Temora longicornis</i> . C6 female	<i>Temora longicornis</i> . C6 female	<i>Temora longicornis</i> , female	<i>Temora</i>	<i>Temora longicornis</i> , female	<i>Temora longicornis</i> CVI female	<i>Temora longicornis</i> C6F	<i>Temora longicornis</i>	<i>Temora</i>	<i>Temora</i> sp., female	<i>Temora longicornis</i> , Female

Specimen 10: *Muggiaea atlantica*



Somatocyst reaching to apex of nectosac
(reaching half way in *M. kochii*)

LAB code	Zo-2101	Zo-2101	Zo-2101	Zo-2102	Zo-2103	Zo-2104	Zo-2105	Zo-2105	Zo-2106	Zo-2106	Zo-2106	Zo-2106	
Analyst code	Zo-2101-01	Zo-2101-02	Zo-2101-03	Zo-2102-01	Zo-2103-01	Zo-2104-01	Zo-2105-01	Zo-2105-02	Zo-2106-01	Zo-2106-02	Zo-2106-03	Zo-2106-04	
Specimen 10	Anterior <i>Muggiaea atlantica</i> polygastric nectophore stage. Anterior nectophore only.		<i>Muggiaea atlantica</i>	<i>Muggiaea atlantica</i>	<i>Muggiaea atlantica</i> , polygastric stage	<i>Muggiaea atlantica</i> , Nice specimen	<i>Muggiaea kochii</i>	<i>Muggiaea atlantica</i>	<i>Muggiaea atlantica</i>	<i>Muggiaea atlantica</i> , stomatocyst extends a long way up	Diphyidae	<i>Muggiaea</i> sp.	<i>Muggiaea atlantica</i> , Family/subfamily: Diphyinae

Conclusions/recommendations

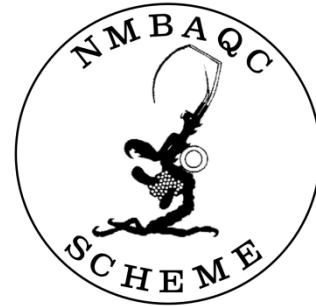
Overall, the zooplankton trial ring test was deemed a success. It showed that the level of zooplankton identification in the UK amongst participants overall is very good, and that it was a useful training exercise. The competent monitoring agencies all achieved a level of at least 80% in both tests. For the specimen test, the most difficult to ID proved to be *Clausocalanus* spp. and *Branchiostoma* spp. For the written test the most difficult question was to specify what specifics characterise the identification of *Calanus* P5 and especially that of a male *Calanus helgolandicus*. The participants enjoyed the test, saying that it challenged them and that it was gauged at the right level of expertise.

During the workshop, a discussion was held on the next steps that could be taken with a zooplankton component of NMBAQC. A number of suggestions and recommendations, such as a enumeration exercise, were raised. All participants were keen to take part in any further inter-laboratory work. In addition, there were expressions of interest from labs outside of the UK, and some UK labs did not take part, so there could be an expansion of the tests next time. SAHFOS would be keen to continue with this component, and has the support of the NMBAQC committee.

Annex 1: Participants information.



Sir Alister Hardy Foundation for Ocean Science



NMBAQC

National Marine Biological Analytical Quality Control Scheme

Zooplankton Trial Ring Test 2014/2015

1. Introduction

In January 2013 SAHFOS on behalf of the National Marine Biological Analytical Quality Control (NMBAQC) scheme sent out a [questionnaire](#) to organisations known to be involved in zooplankton research. The questionnaire was aimed at gauging current quality control mechanisms, as well as identifying possible interest in a zooplankton ring test, similar to the other NMBAQC components. Zooplankton are an MSFD indicator group and as such a quality control mechanism for the correct identification will be of crucial importance. This trial ring test is a follow-on from the questionnaire, and is currently aimed at UK participants only, to assess current identification levels and to determine the best way forward.

2. Preliminary checks and deadlines

Upon receipt of the samples, every analyst must make sure that they have received everything listed in the Return Slip and checklist form (Return slip form.docx). Make sure that all the samples are intact and sealed properly and check that you have received the identification results log sheet (log form.xls) as an Excel workbook. Please complete Return slip form.docx: Return slip and checklist form and send it by fax to (+44 1752 600015) or scan it and send it via e-mail to acfi@sahfos.ac.uk. A receipt of fax/e-mail is necessary for SAHFOS to ensure all samples have been received properly.

Once samples have been received, analysts have 8 weeks to complete the exercise and return the results to Astrid Fischer, NMBAQC/SAHFOS, The Laboratory, Citadel Hill, Plymouth, PL1 2PB; by e-mail (acfi@sahfos.ac.uk), fax as above or post. If you decide to post your results, make sure first to make a copy of them and then send the originals to the address above. The enumeration and

identification results log sheet (Log form.xls) must be received by SAHFOS by Friday 16th January 2015.

Please note: Results received after this date will not be included in the final report. Also, if you are posting your results make sure to make a copy for your records before sending the originals.

3. Samples

The set consist of ten samples. The samples are preserved in a mixture of 2% v/v propylene phenoxytol/18 % v/v propylene glycol in 80% v/v water, which can be irritating to eyes and skin. You will therefore need appropriate personal protection (gloves, laboratory coat and goggles).

You will need to use a dissecting microscope and possibly need to dissect parts of the zooplankton for identification. We recommend using forceps and or needles where appropriate. You are entitled to use any reference books available. Please use names as used by the [World Register of Marine Species](#) for comparison purposes of this test and identify to the highest taxonomic level that you feel confident with.

Analysts will have to analyse all ten samples to complete this test. The cultures have come from anywhere in the North Atlantic. Some are taken from net samples and some are taken from the Continuous Plankton Recorder Survey samples.

4. Written quiz

In addition to the practical test, there is also a written quiz for you to complete. The quiz consists of 10 questions, all of which need to be answered. The results for the written test should be submitted by Friday 16th January 2015.

5. Workshop

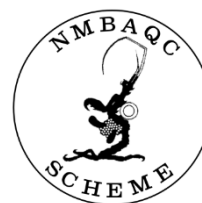
A workshop will be held from 12.00 Wednesday 1st - 12.00 Thursday 2nd July 2015 to inform the outcomes of the test and to discuss the way forward. The workshop will be held at SAHFOS, The Laboratory, Citadel Hill, Plymouth, PL1 2PB. There will be microscopes available and specimen samples from the ring test. If you have any problem samples of your own, you are encouraged to take these with you, for discussion at the workshop.

SAHFOS will do some statistical analysis on the results of the trial ring test, and participants to the workshop will be informed on these beforehand in a preliminary results report. After the workshop, a final report for NMBAQC will be produced.

6. Points to remember

1. All results must be the analysts' own work. Conferring with other analysts is not allowed.
2. The excel work sheet Log form.xls must be received by SAHFOS by Friday 16th January 2015

Annex 2: Participants checklist.



NMBAQC

Zooplankton Trial Ring Test 2014/2015

RETURN SLIP AND CHECKLIST

Please ensure to complete the table below upon receipt of samples, then fax to + 44 1752 60015 or scan and e-mail to acfi@sahfos.ac.uk

Analyst Name:		
Laboratory Name:		
Analyst Code Assigned :		
Contact Tel. No. / e-mail		
CHECKLIST OF ITEMS RECEIVED (Please circle the relevant answer)		
Please enter Sample numbers received _____	YES	NO
Set of Instructions	YES	NO
Identification result log sheet (Log form.xls)	YES	NO

I confirm that I have received the items as detailed above and that the materials were received in good working order.

(If any of the above items are missing, please contact acfi@sahfos.ac.uk)

SIGNED: _____

DATE: _____

Annex 3: Participants return form.

Analyst name	
LAB Code	
Analyst Code	

	Identification (scientific name)	Additional comments
Specimen 1		
Specimen 2		
Specimen 3		
Specimen 4		
Specimen 5		
Specimen 6		
Specimen 7		
Specimen 8		
Specimen 9		
Specimen 10		