National Marine Biological Analytical Quality Control Scheme

Intertidal Macroalgal Ring Test
RT01

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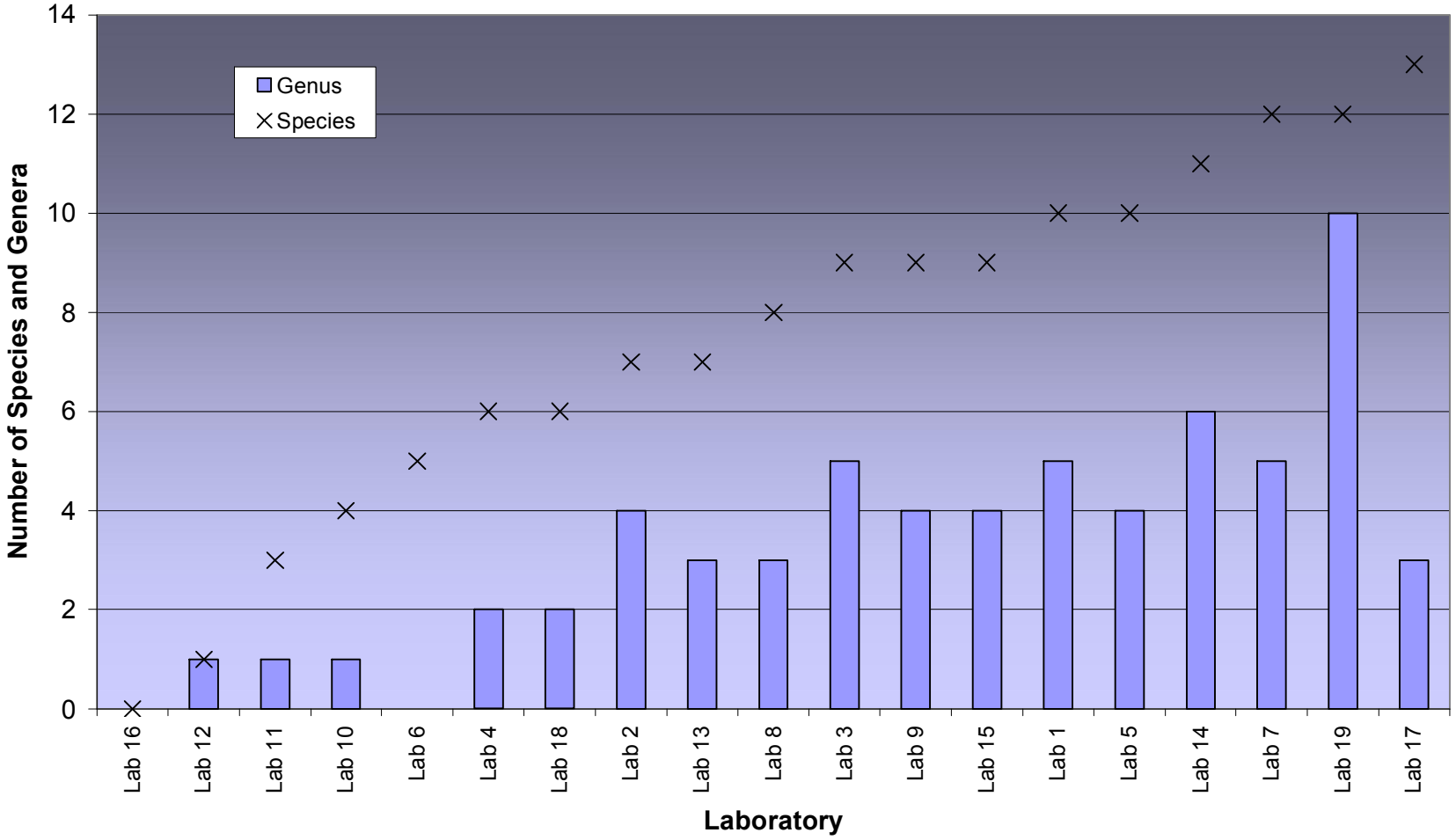
ALGAL RING TEST (RT01) RESULTS SUMMARY

RING TEST DETAILS
Ring Test – RT01
Type/Content – intertidal macroalgae
Circulated – 01/09/06
Completion Date – 15/09/06
Number of Tests Distributed – 29
Number of Results Received – 19

Summary of Differences

			Total differences for 19 laboratories		
Specimen	Genera	Species	Genus	Species	Don't Knows!
RT0101	Ahnfeltia	plicata	6	6	0
RT0102	Ascophyllum	Nodosum	0	0	0
RT0103	Blidingia	marginata	0	11	3
RT0104	Bryopsis	plumosa	4	6	1
RT0105	Ceramium	ciliatum	0	8	0
RT0106	Cladophora	sericea	2	7	2
RT0107	Codium	tomontosum	0	10	0
RT0108	Corallina	officinalis	1	1	0
RT0109	Epicladia	flustrae	1	1	9
RT0110	Fucus	serratus	0	0	0
RT0111	Halurus	flosculosa	0	1	2
RT0112	Himenthalia	elongata	0	0	0
RT0113	Hypoglossum	hypoglossoidies	7	7	1
RT0114	Lomentaria	articulata	0	2	1
RT0115	Mastocarpus	stellatus	3	3	0
RT0116	Myrionema	strangulans	7	7	7
RT0117	Osmundea	hybrida	0	11	2
RT0118	Padina	pavonia	0	1	0
RT0119	Pelvetia	canaliculata	1	1	0
RT0120	Percurcaria	recursa	5	7	3
RT0121	Polysiphonia	stricta	0	13	0
RT0122	Rhizoclonium	riparium	4	4	3
RT0123	Rhodothamniella	floridula	3	6	3
RT0124	Sargassum	muticum	4	4	1
RT0125	Spacelaria	sp.	9	9	5
RT0126	Spongomorpha	arcta	2	3	4
RT0127	Ulothrix	implexa	4	13	1
			63	142	48
			3.706	8.353	2.824

Total number of species and genera identified incorrectly within each laboratory



Detailed breakdown of specimen identifications

RT0101 – Ahnfeltia plicata
Six generic differences recorded: Lab 08 identified as Gracillaria verrucosa, 15 identified as Gracillaria gracilis, 02 as Gracillaria sp., Labs 07 and 13 identified as Gigartina (Chondracanthus) acicularis (these two genera have a wider frond, usually flattened and more red in colour, and considerably less wiry), lab 03 identified as Griffithsia flosculosa (this is a uniseriate filamentous species, very fine, highly branched and very pink in colour).

RT0102 – Ascophyllum nodosum
No differences recorded.

RT0103 – Blidingia marginata
Eleven specific differences recorded: Labs 03, 04, 07, 09, 11, 14 identified as Blidingia minima (which has slightly more irregularly arranged cells and a wider frond which often increases from base to apical end), labs 05, 13, 15, 17, 18 identified to genus level only.

RT0104 – Bryopsis plumosa
Four generic and six specific differences recorded: Lab 02 identified as Bryopsis hypnoides (which has profuse branching in various planes and lacks the plumose feather like branching and pyramidal shape of B. plumosa), lab 17 identified to genus level only, lab 03 identified as Codium adhaerens (which is also coenocytic but consists of a thick spongy, felty frond composed of interwoven filaments unlike the delicate and filamentous like growth of Bryopsis), lab 05 identified as Cladophora rupestris, labs 07, 15 identified as Cladophora species (this genera is not coenocytic with regular cell walls throughout the uniseriate filament).

RT0105 – Ceramium ciliatum
Eight specific differences recorded: Labs 01, 05, 06, 07, 08, 14, 15 identified as Ceramium shuttleworthianum (although this species of Ceramium also has spines these are located on the outer axis only whereas C. ciliatum has whorled spines) and lab 17 identified to genus level only.

RT0106 – Cladophora sericea
Two generic and seven specific differences recorded: Lab 01 identified as C. rupestris, lab 02 identified as C. laetevirens, lab 07 identified as C. lehmanniana, lab 18 identified as C. albida (C. rupestris and lehmanniana do not display the characteristic comb-like or ‘secund’ branching and C. laetevirens is general double the width of C sericea both in lower and upper parts of the plant) lab 15 identified as Chaetomorpha sp. (which general lacks the profuse branching), lab 19 identified as Ectocarpus siliculosus (which is a brown algal species), lab 03 identified to genus level only.

RT0107 – Codium tomentosum
Ten specific differences recorded: Lab 04, 06, 07, 10, 13, 14 identified as Codium fragile (which have mucronate utricles at the filament tip), lab 18

identified as Codium vermilara (which have flattened utricles and irregular branching), lab 09, 15, 17 identified to genus level only.

RT0108 – Corallina officinalis
One generic and one specific difference recorded: Lab 19 identified as Lomentaria clavellosa (which is not a jointed calcareous algae).

RT0109 – Epicladia flustrae
One generic and one specific difference recorded: Lab 14 identified as Pseudendoclonium dynnamenae (which consists of erect filaments forming a turf on muddy substrate).

RT0110 – Fucus serratus
No differences recorded.

RT0111 – Halurus Flosculosa
One specific difference recorded: Lab 17 identified to genus level only.

RT0112 – Himanthalia elongata
No difference recorded.

RT0113 – Hypoglossum hypoglossoides
Seven generic and seven specific differences recorded: Lab 03, 14 identified as Apoglossum ruscifolium (which is very similar but has distinctly rounded apices), lab 05 identified as Callophyllis laciniata, lab 09 identified as Myriogramme bonnemaisonii, lab 17 identified as Palmaria sp. and lab 19 identified as Calliblepharis jubata. (all these species lack the distinct midrib and have much wider foliose fronds), lab 15 identified as Plumaria plumosa (which is a fine filamentous species and not foliose).

RT0114 – Lomentaria articulate
Two specific differences recorded: Lab 01 identified as Lomentaria clavellosa (not constricted as L. articulate), and lab 17 identified to genus level only.

RT0115 – Mastocarpus stellatus
Three generic and three specific differences recorded: Lab 03 identified as Chondrus crispus (which has more dichotomous branching with a flattened frond unlike the channelled frond of Mastocarpus), lab 08 and 19 identified as Fucus sp (which is a large brown species with a distinct midrib).

RT0116 – Myrionema strangulans
Seven generic and seven specific differences recorded: Lab 02, 09, 13, 14, 18 identified as Ulvella lens (which is a green species), lab 11 and 12 identified as Melobesia membranacea (which is a calcareous red species).

RT0117 – Osmundea hybrida
Ten specific differences recorded: Lab 01, 04, 05, 06, 07, 08, 13, 14 identified as Osmundea pinnatifida (which has a compressed frond), lab 19 identified as Osmundea obtusa (which is very similar but has a stoloniforous base) and lab 17 identified to genus level only.

RT0118 – Padina pavonica
One specific difference recorded: Lab 17 identified to genus level only.

RT0119 – Pelvetia canaliculata
One generic and one specific difference recorded: Lab 01 identified as Fucus spiralis (which is also an upper shore species but has a distinct midrib and Pelvetia also has a channelled frond).

RT0120 – Percursaria percursa
Five generic and seven specific differences recorded: Lab 13 identified as Enteromorpha prolifera, lab 05 identified as Enteromorpha sp., lab 19 identified as Blidingia minima (both these genera are tend to be greater than 2 cells wide along the full length of the frond), lab 09 identified as Urospora neglecta, lab 18 identified as Ulothrix flacca (both these genera are uniseriate filaments), lab 10 and 17 identified to genus level only.

RT0121 – Polysiphonia stricta
Thirteen specific differences recorded: Labs 01, 09 identified as Polysiphonia macrocarpa (very similar and difficult to distinguish with a microscopic photo only but P. macrocarpa is a southern coast species and has not been confidently recorded from northern shores), lab 10 identified as Polysiphonia elongata and lab 14 identified to P. fibrillosa, (both of which have cortication overlying the 4 primary periaxial cells), lab 15 identified to P. lanosa (which has greater then 4 periaxial cells), labs 02, 03, 05, 06, 07, 08, 17 and 19 identified to genus level only.

RT0122 – Rhizoclonium riparium (tortuosum)
Four generic and four specific differences recorded: Lab 01, 07 identified as Ulothrix flacca (which has a plate-like or parietal chloroplast), lab 19 identified as Cladophora rupestris and lab 17 as Cladophora sp (which is a highly branched species).

RT0123 – Rhodothamniella (Audouinella) floridula
Three generic and six specific differences recorded: Lab 05 identified as Audouinella purpurea (which lacks pyrenoids and has a reticulate chloroplast), lab 07 and 13 identified as Audouinella sp., lab 14 identified as Chaetomorpha melagonium (which is a green uniseriate species), lab 17 identified as Griffithsia flosculosa (which is highly branched) and lab 19 identified as Jania rubens (which is an jointed calcareous species with distinct dichotomous branching).

RT0124 – Sargassum muticum
Four generic and four specific differences recorded: Lab 05 identified as Callithamnion sp., lab 19 identified as Corynospora pedicellata and lab 07 identified as Asparagopsis armata (all of which are fine filamentous red species), lab 14 identified as Rhodomela confervoides (a filiform red species lacking the small air bladders),

RT0125 – Sphacelaria sp.
Nine generic and nine specific differences recorded: Lab 01 identified as Polysiphonia sp. (which is a red polysiphonous species), lab 02, 08 identified as Ectocarpus sp. and lab 04 identified as Hincksia granulosa, (both of which are uniseriate filaments lacking the prominent apical cell), lab 03, 07 identified as Cladophora sp. and labs 09, 14, 19 identified as Spongomorpha aeruginosa, (both of which are green uniseriate species).

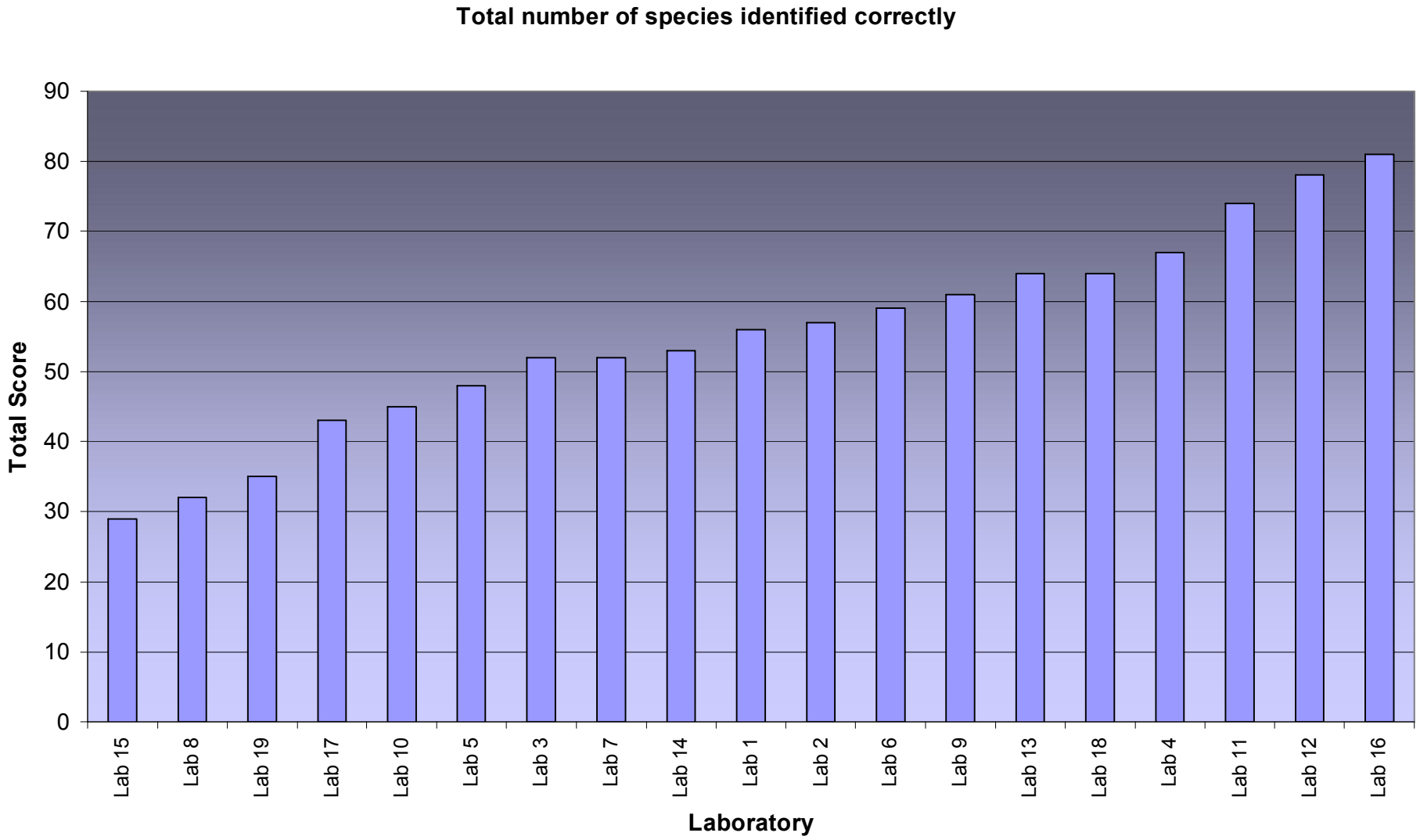
RT0126 – Spongomorpha arcta
Two generic and three specific differences recorded: Lab 01 identified as Bostrychia scorpiodes (which is a filamentous red species with strongly in-rolled apices), lab 04 identified as Cladophora dalmatica (which lacks the curled branches and has a reticulate chloroplast with less distinct pyrenoids), lab 08 identified to genus level only.

RT0127 – Ulothrix implexa
Four generic and thirteen specific differences recorded: Lab 01 identified as Sykidion dyeri (which is a microscopic unicellular species), lab 02 identified as Elachista fucicola (which is a uniseriate brown filament growing on Fucus), lab 19 identified as Chaetomorpha linum and lab 10 identified as Chaetomorpha sp., (which lacks the distinct parietal chloroplast, it has a reticulate chloroplast), lab 04, 11 identified as Ulothrix flacca (which has microparticles embedded in the mucilaginous cell wall), lab 09 identified as Ulothrix pseudoflacca (which has a thick cell wall with wider filaments), lab 03, 05, 06, 08, 15, 18 identified to genus level only.

The number of correct answers varied between 29 and 81 based on 3 points awarded for correct species name and 1 point awarded for correct genus. Where both the genus and species was incorrect or where no name was given no score was awarded. The maximum possible total was 81. Only 3 species were correctly identified by all 19 participants. The graph below indicates the total scores awarded to each laboratory based on the results submitted.

Individual laboratory scores

Lab Code	Total correct
Lab 1	56
Lab 2	57
Lab 3	52
Lab 4	67
Lab 5	48
Lab 6	59
Lab 7	52
Lab 8	32
Lab 9	61
Lab 10	45
Lab 11	74
Lab 12	78
Lab 13	64
Lab 14	53
Lab 15	29
Lab 16	81
Lab 17	43
Lab 18	64
Lab 19	35


Total number of species identified correctly
Total Score
90
80
70
60
50
40
30
20
10
0
Lab 15
Lab 8
Lab 19
Lab 17
Lab 10
Lab 5
Lab 3
Lab 7
Lab 14
Lab 1
Lab 2
Lab 6
Lab 9
Lab 13
Lab 18
Lab 4
Lab 11
Lab 12
Lab 16
Laboratory

A number of questionnaires were also completed, the results of which are given below:

1. What grade of difficulty would you rate the test?

Easy **1** Acceptable **6** Difficult **9**

2. How would you rate the quality/clarity of the specimen photographs?

Very Clear **5** Acceptable **8** Needs Improving **3**
Poor resolution, particularly when zooming details

3. How representative did you find the photographs of the specimens?

Very good likeness **3** Acceptable **13** Poor likeness **0**

4. Was enough detail provided for each specimen?

Yes **10** No **6**
Although scale details were given within the spreadsheet these were preferred on the actual photograph although some scales were accidentally missed. Photos were 2D but some of the keys make specific reference to 3D features eg no. of axial cells. Cross sections might be useful as well as details of texture (e.g if specimen is wiry, gelatinous, very slippery, cartilagineous, etc).

5. Were enough photographs provided for each specimen?

Yes **7** No **9**
A number of participants requested an increased number of photographs including both macroscopic and microscopic photos with some in-situ and whole specimens provided particularly where those details were deemed necessary for identification. Number recommended - 3: one showing the specimen in its habitat, one showing the whole specimen (e.g. in the lab), one showing detail of morphology/anatomy (e.g. surface cells, cross section, reproductive structure, longitudinal section, etc) which is typical of the species.

6. Was enough time provided for the completion of the test?

Yes **16** No **0**

7. How easy was the test structure to follow and input results?

Easy **13** Acceptable **3** Difficult **0**

8. Would your laboratory be interested in subscribing to future algal ring tests under the NMBAQC Scheme?

Yes **15** No **0**

General comments

- Had difficulty with the green algae due to lack of experience.

- Some species were immediately obvious but the keys were hard to follow without seeing the whole plant e.g. *Polysiphonia* – the key asks 'does it normally grow to more than 3 cm?' Can't tell from the picture (and there is no scale) so can't confidently identify it any further. Perhaps to the trained eye though, this species would be immediately obvious.

- Depends on the species, but more photos of different parts of the specimen would be useful. Once you are an expert you can no doubt tell at a glance that a certain specimen isn't branched or doesn't have a discoidal holdfast without having to actually see it. But when you're a beginner you need to be able to rule these things out.

- This test was suitable for people with some formal training on ID but would be difficult for those starting out, since the photographic approach is leading the eye to certain features and may remove the ability to key out in the usual way. I support this approach though for my organisations needs and methods of training.

- Some of the features such as the apical groove in Osmundea was not easy to distinguish from a 'dent' . I would prefer a specimen itself to enable a view of a range of angles.

- Perhaps future ring tests could consider the value of a '3D' approach to enable an electronic ring test which provides the additional information that otherwise only a real specimen can provide?

- Useful information for developing an idea of current skills level by participants would be useful in planning how much training and practice is required to reach the ring test score. This would enable a competency development framework to be developed.

- The most difficult part is getting started when faced with a single compound microscope image. All sense of colour and macro morphology is lost, quite often making it difficult to tell whether it is red, green or brown. This is particularly a problem if you have limited experience in these very small/microscopic examples. Numerous filamentous algae have a number of features that are required to be confident in the identification. These did not appear to be covered by all the photographs. A disproportionate number of challenging green filamentous algae.

- It was not clear whether the Authority and MCS codes are an essential part of the test?

There were some small mistakes with the test which were highlighted by some participants which have been noted and more care will be taken next time to ensure the provision of all details and key characteristics.

It was also suggested that some beginners may struggle with a photo ring test due to the restricted amount of information provided in a few photographs. At this stage a photo ring test is the easiest and most cost affective way of initiating a quality control scheme for macroalgae. Preserved samples often loose their detailed cell structure with rapid discolouration placing similar constraints on accurate identification.

It is agreed that more photographs would provide easier identification however for some species this is difficult due to their overall size, in some cases only a microscopic image is appropriate but where this is the case a couple of microscopic images can be provided.

The results and feedback will be used to target further exercises as a macroalgal QA module is established. All the comments will be considered for future tests in attempt to fulfil all requirements and all levels of identification skills.