NMBAQC

The National Marine Biological Analytical Quality Control Scheme

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Year 17

Rocky Shore Macroalgal identification

Ring Test RT05

Queen's University Belfast

Drafted April 2011; finalized June 2011

ALGAL RING TEST 2011 RESULTS SUMMARY

Ring Test - RM-RT 2011

Type/Contents – Intertidal Macroalgae

Circulated – 5.06.11

Completion Date – 31.04.11

Number of participating Centres – 5

Number of results received – 9

Table 1. Summary of differences

Specimen	**Genus**	**Species**	**Total differences for 9 participants**	
			Genus	**Species**
1	*Haliptilon*	*squamatum*	4	4
2	*Dasya*	*ocellata*	2	6
3	*Polysiphonia*	*nigra*	0	3
4	*Laurencia*	*obtusa*	2	5
5	*Monosporus*	*pedicellatus*	4	4
6	*Aglaothamnion*	*tripinnatum*	2	3
7	*Callithamonion*	*corymbosum*	6	7
8	*Aglaothamnion*	*roseum*	5	6
9	*Porphyra*	*linearis*	0	0
10	*Griffithsia*	*corallinoides*	0	2
11	*Lomentaria*	*articulata*	0	0
12	*Ulothrix*	*speciosa*	0	2
13	*Codium*	*vermilara*	0	8
14	*Blidingia*	*minima*	2	2
15	*Cladophora*	*lehmanniana*	1	7
16	*Hincksia*	*granulosa*	4	5
17	*Leathesia*	*marina*	0	0
18	*Cystoseira*	*baccata*	5	6
19	*Elachista*	*fucicola*	1	1
20	*Laminaria*	*ochroleuca*	0	3
		Total differences	**40**	**76**
		Average differences/centre	**8**	**15.2**

For species number 11 *Ulva lactuca* was accepted as well as *Lomentaria articulata* as additional *U. lactuca* photographs were included in the test materials in error. Identification of species number 16 as *Giffordia granulosa* (a synonym) was accepted for *Hincksia granulosa*.

Table 2. Identification of intertidal macroalgae made by participating laboratories in RM-RT 2011

Specimen No.	**1**	**2**	**3**	**4**	**5**
Centre No.	*Haliptilon squamatum*	*Dasya ocellata*	*Polysiphonia nigra*	*Laurencia obtusa*	*Monosporus pedicellatus*
1	*Corallina officinalis*	*Polysiphonia lanosa*	*Polysiphonia fucoides*	*Osmundea hybrida*	*Antithamnionella ternifolia*
2	*Corallina officinalis*	*Polysiphonia ?*	*Polysiphonia nigra*	*Laurencia obtusa*	*Borentia secundiflora*
3	*Corallina officinalis*	*Dasya ocellata*	*Polysiphonia nigra*	*Osmundea hybrida*	*Monosporus pedicellatus*
7a	*Haliptilon squamatum*	*Dasya hutchinsiae*	*Polysiphonia nigra*	*Gelidium pusillum*	*Monosporus pedicellatus*
7b	*Haliptilon squamatum*	*Dasya hutchinsiae*	*Polysiphonia nigra*	*Laurencia obtusa*	*Callithamnion tetragonum*
7c	*Haliptilon squamatum*	*Dasya hutchinsiae*	*Polysiphonia subulifera*	*Pterocladia capillacea*	*Monosporus pedicellatus*
7e	*Haliptilon squamatum*	*Dasya ocellata*	*Polysiphonia fucoides*	*Laurencia obtusa*	*Aglaothamnion byssoides*
7f	*Haliptilon squamatum*	*Dasya hutchinsiae*	*Polysiphonia nigra*	*Osmundia obtusa*	*Monosporus pedicellatus*
8	*Corallina officinalis*	*Dasya ocellata*	*Polysiphonia nigra*	*Osmundea hybrida*	*Monosporus pedicellatus*

Specimen No.	**6**	**7**	**8**	**9**	**10**
Centre No.	*Aglaothamnion tripinnatum*	*Callithamnion corymbosum*	*Aglaothamnion roseum*	*Porphyra linearis*	*Griffithsia corallinoides*
1	*Aglaothamnion tripinnatum*	*?*	*?*	*Porphyra linearis*	*Griffithsia corallinoides*
2	*Acrochaetium corymbifera*	*Callithamnion ?*	*Aglaothamnion roseum*	*Porphyra linearis*	*Griffithsia corallinoides*
3	*Aglaothamnion hookeri*	*Seirospira interrupta*	*Heterosiphonia japonica*	*Porphyra linearis*	*Griffithsia devoniensis*
7a	*Aglaothamnion tripinnatum*	*Aglaothamnion byssoides*	*Aglaothamnion roseum*	*Porphyra linearis*	*Griffithsia corallinoides*
7b	*Aglaothamnion tripinnatum*	*Bonnemasonia asparagoides*	*Brongniartella byssoides*	*Porphyra linearis*	*Griffithsia corallinoides*
7c	*Seirospora interrupta*	*Ceramium secundatum*	*Brongniartella byssoides*	*Porphyra purpurea*	*Griffithsia corallinoides*
7e	*Aglaothamnion tripinnatum*	*Callithamnion corymbosum*	*Dasya hutchinsiae (Brongniartella byssoides)*	*Porphyra linearis*	*Griffithsia devoniensis*
7f	*Aglaothamnion tripinnatum*	*Callithamnion corymbosum*	*Aglaothamnion pseudobyssoides*	*Porphyra linearis*	*Griffithsia corallinoides*
8	*Aglaothamnion tripinnatum*	*Plenosporium borreri*	*Aglaothamnion roseum*	*Porphyra linearis*	*Griffithsia devoniensis*

Table 2. continued

Specimen No.	**11**	**12**	**13**	**14**	**15**

Centre No.	*Lomentaria articulata*	*Ulothrix speciosa*	*Codium vermilara*	*Blidingia minima*	*Cladophora lehmanniana*
1	*Lomentaria articulata*	*Ulothrix ?*	*Codium fragile*	*Monostroma grevelli*	*Lamprothamnium papulosum*
2	*Lomentaria articulata*	*Ulothrix speciosa*	*Codium tomentosum*	*Blidingia minima*	*Cladophora sericea*
3	*Lomentaria articulata*	*Ulothrix flacca*	*Codium tomentosum*	*Blidingia minima*	*Cladophora sericea*
7a	*Lomentaria articulata*	*Ulothrix speciosa*	*Codium tomentosum*	*Blidingia minima*	*Cladophora laetivirens*
7b	*Ulva lactuca*	*Ulothrix speciosa*	*Codium tomentosum*	*Blidingia minima*	*Cladophora lehmanniana*
7c	*Ulva lactuca*	*Ulothrix speciosa*	*Codium vermilara*	*Blidingia minima*	*Cladophora lehmanniana*
7e	*Lomentaria articulata*	*Ulothrix speciosa*	*Codium tomentosum*	*Blidingia minima*	*Cladophora hutchinsiae*
7f	*Ulva lactuca*	*Ulothrix speciosa*	*Codium tomentosum*	*Blidingia minima*	*Cladophora hutchinsiae*
8	*Lomentaria articulata*	*Ulothrix speciosa*	*Codium tomentosum*	*Prasiola calophylla*	*Cladophora vagabunda*

Specimen No.	**16**	**17**	**18**	**19**	**20**
Centre No.	*Hincksia granulosa*	*Leathesia difformis*	*Cystoseira baccata*	*Elachista fucicola*	*Laminaria ochroleuca*
1	*?*	*Leathesia difformis*	*?*	*?*	*Laminaria hyperborea*
2	*?*	*Leathesia marina*	*Cystoseira ?*	*Elachista fucicola*	*Laminaria hyperborea*
3	*Hincksia granulosa*	*Leathesia difformis*	*Sargassum muticum*	*Elachista fucicola*	*Laminaria hyperborea*
7a	*Giffordia granulosa*	*Leathesia difformis*	*Cystoseira baccata*	*Elachista fucicola*	*Laminaria ochroleuca*
7b	*Feldmannia globifera*	*Leathesia difformis*	*Sargassum muticum*	*Elachista fucicola*	*Laminaria ochroleuca*
7c	*Haplospora globosa*	*Leathesia difformis*	*Sargassum muticum*	*Elachista fucicola*	*Laminaria ochroleuca*
7e	*Giffordia granulosa*	*Leathesia difformis*	*Sargassum muticum*	*Elachista fucicola*	*Laminaria ochroleuca*
7f	*Giffordia granulosa*	*Leathesia difformis*	*Cystoseira baccata*	*Elachista fucicola*	*Laminaria ochroleuca*
8	*Hincksia secunda*	*Leathesia difformis*	*Cystoseira baccata*	*Elachista fucicola*	*Laminaria ochroleuca*

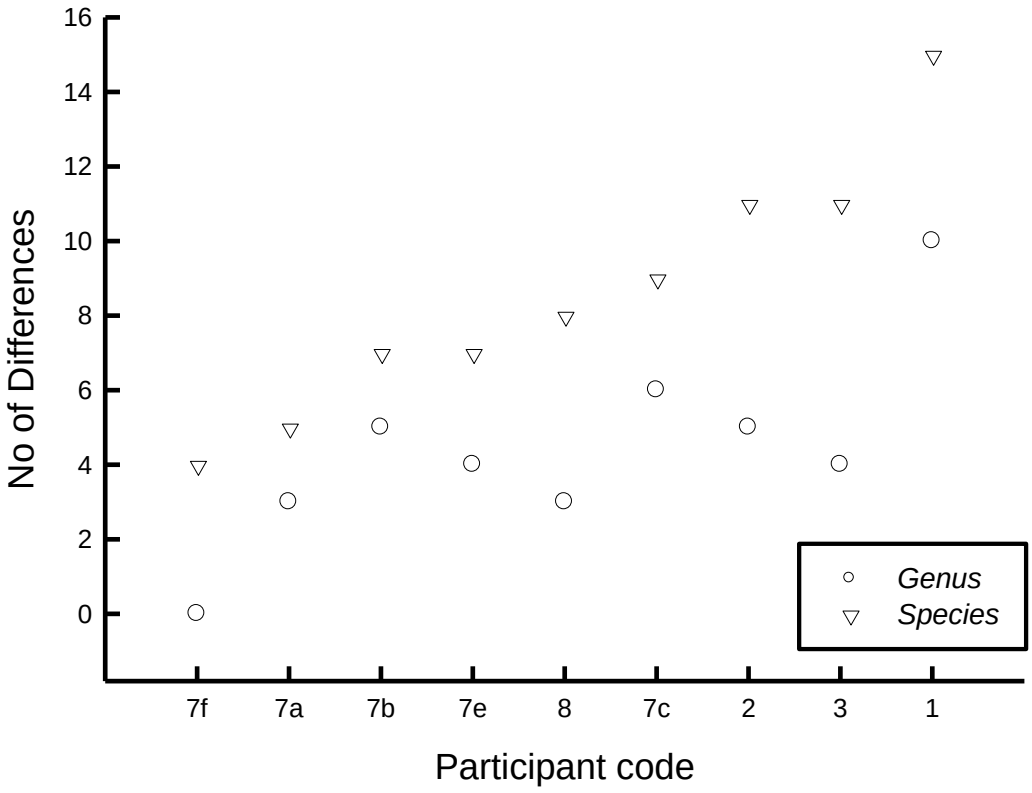

Figure 1. Number of differences from the AQC identification of intertidal macroalgal specimens for each participant, arranged by increasing number of differences.

Detailed breakdown of specimen identifications

RM-RT11 Species 1 – *Haliptilon squamatum*

Eight generic and eight specific differences recorded. Participants 1, 2, 3 and 8 recorded as *Corallina officinalis.*

Diagnostic features of *Haliptilon squamatum* shown in the photographs include the segments with spiny extensions (not present in *Corallina officinalis*) and the branching holdfast (crustose in *Corallina officinalis*).

RM-RT11 Species 2 – *Dasya ocellata*

Two generic and six specific differences recorded. Participants 1 & 2 recorded as *Polysiphonia.* Participant 1 recorded as *P. lanosa* and 2 did not give a species name. Participants 7a, 7b, 7c & 7f recorded as *D. hutchinsiae*.

Generic ID: The features shown that indicate the specimens are not a *Polysiphonia* species are the monosiphonous (i.e. one cell wide) forked laterals (technically they are pseudolaterals as they are equivalent to trichoblasts) and the reproductive branchlets (stichidia).

Species ID: Even without a section through the stichidia showing how many sporangia there are, the branching pattern of monosiphonous laterals allows the specimen to be keyed out as *D. ocellata* because in *D. hutchinsiae* monosiphonous laterals appear to arise in pairs and branch from every cell (see Maggs & Hommersand, Seaweeds of the British Isles, 3A Ceramiales, Fig. 84). In fact, the small thalli and neat branching shown are very typical of *D. ocellata* and the photographed specimens were quite characteristic.

RM-RT11 Species 3 – *Polysiphonia nigra*

No generic differences and three specific differences recorded. Participants 1 & 7e recorded as *P. fucoides* and 7c recorded as *P. subulifera*.

Species ID: Both of the misidentifications are reasonable, particularly as trichoblasts were not visible (they aren't always). *P. fucoides* would not have short laterals along the axes, but would have more flat-topped branching. It would not have spiral periaxial cells, shown clearly here. The axis shown with a scale (Fig 3-2) is about 200 µm wide, whereas *P. subulifera* keys out when axes are more than 350 µm wide. The sandy pool habitat shown is quite typical for *P. nigra*, which is very common on the right kind of shores.

RM-RT11 Species 4 – *Laurencia obtusa*

Osmundea obtusa was accepted (a misunderstanding of the separation of *Osmundea* from *Laurencia*: the only British Isles species remaining in *Laurencia* are *L. obtusa* and *L. pyramidalis*). There were two generic and five specific differences. Participants 1, 3 & 8 recorded *Osmundea hybrida*; 7a *Gelidium pusillium* and 7c *Pterocladia capillacea*.

Generic ID: Although there were some *Gelidium* specimens shown in the photograph in situ, the photo is clearly labelled as referring to the central specimens. The photograph of the cortex (Fig. 4-2) could not show *Gelidium* or *Pterocladia*, which have tiny cells (less than 10 µm).

Species ID: *Osmundea hybrida* was a reasonable identification, as the holdfast was missing from the specimen shown. However, the spherical bodies within the cells of the cortex are diagnostic of *Laurencia obtusa* and *L. pyramidalis.* In the absence of the holdfast, the observer would have to try both branches of the key, which would have led to *Laurencia obtusa* and *L. pyramidalis*, and the size would have separated these two.

RM-RT11 Species 5 – *Monosporus pedicellatus*

Four generic and four specific differences. Participant 1 recorded *Antithamnionella ternifolia*, 2 *Bornetia secundiflora*, 7b *Callithamnion tetragonum* and 7e as *Aglaothamnion byssoides*.

Generic ID: *Antithamnionella ternifolia* would differ almost totally from this species, except in being a filamentous red alga. For example, *A. ternifolia* has paired branchlets. *Bornetia secundiflora* has many similarities to the specimens shown, but all parts are much larger, with cells to 0.5 mm or

more wide, whereas they are labelled here as about 0.1 mm. The specimen we illustrate in Fig. 5-3 is indicated as having developing propagules - this would immediately suggest that the specimen is *Monosporus*. The scale of cells etc is far too large to be *Aglaothamnion* or *Callithamnion* sp.: *Monosporus* apical cells are indicated as c. 100 µm wide whereas they would be more like 10 µm wide in *Aglaothamnion* and *Callithamnion.*

RM-RT11 Species 6 – *Aglaothamnion tripinnatum*

Two generic and three specific differences recorded. Participant 3 recorded as *A. hookeri*. Participant 2 recorded as *Acrochaetium corymbifera* and 7c as *Seirospora interrupta*.

Generic ID: *Acrochaetium* spp. would be much much smaller (less than 10 mm whereas this specimen is labelled as 3.5 cm) and would not have such a regular branching pattern. The difference between *Seirospora* and *Aglaothamnion* will be discussed under species.

Species ID: *Aglaothamnion* and *Seirospora* have a similar overall appearance. The key character separating *Aglaothamnion* from *Callithamnion* (uninucleate cells) could not be seen here. However, there are few *Callithamnion* species and they are mostly very distinctive, often iridescent. *A. hookeri* was a reasonable identification but the branching pattern shown here - the adaxial branchlet from the basal cell of branches - is diagnostic of *A. tripinnatum*. The rounded shape of the tetrasporangia shown here is also seen in *A. hookeri* but not in *Seirospora,* which has elongate tetrasporangia.

RM-RT11 Species 7 – *Callithamnion corymbosum*

Six generic and seven specific differences recorded. Participant 1 gave no answer and 2 recorded *Callithamnion* with no species name. Participant 3 recorded *Seirospora interrupta*, 7a *Aglaothamnion byssoides*, 7b *Bonnemaisonia asparagoides*, 7c *Ceramium secundatum* and 8 *Pleonosporium borreri*.

Generic ID: *Aglaothamnion* and *Seirospora* are eliminated because of the clearly multinucleate cells shown (Fig. 7-2). *Bonnemaisonia* and *Ceramium* misidentifications are difficult to understand given that neither genus has filaments one cell wide (Fig. 7-2). *Pleonosporium borreri* was a reasonable identification but it would lack the corymbose (flat-topped) branching shown in Fig. 7-4 and has wider axes than shown in Fig. 7-4.

RM-RT11 Species 8 – *Aglaothamnion roseum*

Five generic and six specific differences. Participant 1 gave no answer and 7f gave *A. pseudobyssoides*. Participants 7b & 7c recorded *Brongniartella byssoides* and 7e *Dasya hutchinsiae* with *Brongniartella byssoides* in parentheses. Participant 3 recorded *Heterosiphonia japonica*.

Generic ID: *Brongniartella, Dasya* and *Heterosiphonia* differ from these photos of Aglaothamnion in many ways, but most obviously in the tetrasporangia (Fig. 8-4) which are shown borne singly on filaments whereas in *Brongniartella* they are in rows within the polysiphonous axes, and in *Dasya* and *Heterosiphonia* they are in special reproductive stichidia.

Species ID: *A. pseudobyssoides* does not form a rhizoidal cortex as shown in Fig. 8-5.

RM-RT11 Species 9 – *Porphyra linearis*

No differences recorded.

RM-RT11 Species 10 – *Griffithsia corallinoides*

No generic and two specific differences recorded. Participants 7e & 8 recorded *G. devoniensis*.

Species ID: *G. devoniensis* has cylindrical mature cells whereas they are pyriform (pear-shaped) in *G. corallinoides* (shown in several photos). *G. devoniensis* does not exhibit the "beaded" appearance of *G. corallinoides.*

RM-RT11 Species 11 – *Lomentaria articulata*

Ulva lactuca was accepted along with *L. articulata* as two different sets of photographs were included in the Ring Test Powerpoint and supplementary photograph folder in error. No differences from these two species were recorded.

RM-RT11 Species 12 – *Ulothrix speciosa*

No generic and two specific differences were recorded. Participant 1 gave no species name and 3 gave *U. flacca*.

Species ID: The smooth outer walls of the filaments indicate that the specimens are likely to be *U. speciosa*. Also, cells are more than 4 times wider than long, distinguishing this species from *U. flacca*.

RM-RT11 Species 13 – *Codium vermilara*

No generic and eight specific differences were recorded. Participant 1 gave *C. fragile* and 2, 3, 7a, 7b, 7e, 7f & 8 recorded *C. tomentosum*.

Species ID: *C. fragile* would have pointed spines (mucrons) at the tips of the utricles. *C. vermilara* can be identified by the inverted pear shape of the utricles - in *C. tomentosum* they would expand again below ("hour-glass shape"), but it is not easy to separate them, particularly as the hair scars were not visible in these photos. The hair scars are about one-third down the utricles in *C. vermilara* but subapical in *C. tomentosum.*

RM-RT11 Species 14 – *Blidingia minima*

Two generic and two specific differences were recorded. Participant 1 gave *Monostroma grevillei* and 8 *Prasiola calophylla*

Generic ID: Neither *Monostroma* nor *Prasiola* are tubular like *Blidingia minima*. *Monostroma grevillei* forms flat sheets; *Prasiola calophylla* makes small fans but only the base might be tubular.

RM-RT11 Species 15 – *Cladophora lehmanniana*

One generic and seven specific differences were recorded. Participant 1 gave *Lamprothamnium papulosum*. Participants 2 & 3 gave *C. sericea*, 7a *C. laetevirens*, 7e & 7f *C. hutchinsiae* and 8 *C. vagabunda*.

Generic ID: *Lamprothamnium* is a charophyte so it has whorls of branches around the main axes.

Species ID: As we all know, *Cladophora* species are very difficult to identify and keys are almost impractical to use. *C. lehmanniana* is closely related to and very similar to *C. hutchinsiae*, which shows considerable morphological variation. *C. lehmanniana* can be distinguished from *C. laetevirens* by the stiffer texture (which you can infer from the photos), and by the greater width of axes. *C. sericea* has tapering apical cells.

RM-RT11 Species 16 – *Hincksia granulosa*

Four generic and five specific differences were recorded. Participants 1 & 2 recorded no answer. Participant 7b recorded *Feldmannia globifera*, 7c *Haplospora globosa* and 8 *H. secunda*.

Generic ID: Filamentous brown algae are difficult to identify. There are some useful characters, such as shape of plastids and branching pattern.

Species ID: The identification of *Hincksia granulosa* is suggested by the opposite branching, the cortication of main older axes, the lack of terminal hairs, the lack of intercalary sporangia (found in *Pilayella littoralis*), and the presence of ovoid lateral sporangia.

RM-RT11 Species 17 – *Leathesia marina*

All identifications were correct, with all except Participant 2 using the older synonym *Leathesia difformis*.

RM-RT11 Species 18 – *Cystoseira baccata*

Five generic and six specific differences recorded. Participant 1 gave no answer and 2 *Cystoseira* with no species name. Participants 3, 7b, 7c and 7e recorded *Sargassum muticum*.

Generic ID: *Sargassum muticum* has bladders that are terminal on small stalks whereas the bladders here are clearly shown embedded along the axes.

Species ID: *Cystoseira* species are indeed difficult to identify. *C. tamariscifolia* would have a turquoise iridescence though, and *C. nodicaulis* would have bladders as large swellings at base of main branches. There are good drawings on the internet by phycologists at Roscoff (http://www.sb-roscoff.fr/INVENTAIRES/InvAlgues/index.algues.php?action=fiche_algue&id_algue=108)

RM-RT11 Species 19 – *Elachista fucicola*

One generic and one specific difference recorded (= participant 1 recorded no identification).

RM-RT11 Species 20 – *Laminaria ochroleuca*

No generic and three specific differences recorded. Participants 1, 2 & 3 gave *L. hyperborea*.

Species ID: The photographs show clean smooth but rigid stipes diagnostic of *L. ochroleuca*. The golden colour would also help to identify the specimens.