

Draft 29/6/15

Cruise Report for MERP mini-cruise PQ6/15.

Date: 22-23/6/15

Destination: L4, Plymouth

Vessel: Plymouth Quest

Captain: Andy Perkins

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Cruise Report

Plymouth Quest left Sutton Harbour at 17:15 for L4 on the afternoon of Monday 22 June 2015. Weather conditions had improved from the morning and were approximately Beaufort F3, with a 1-2m swell when outside the breakwater. These conditions improved during the evening and sampling was not affected by the weather.

During steaming to L4, estimates of abundance of *Rhizostoma octopus* (the Barrel Jellyfish) were made after recent reports of frequent observations on social media and in the local press. Steaming at 9.6 kts no *Rhizostoma* were seen between Mountbatten breakwater (17:19) and just short of Plymouth Breakwater (17:27). After this large (est 10-20 kg, 50-60 cm bell diameter) jellyfish were observed in the western entrance of Plymouth Sound in the top 3 m (est) surveying an area approximately 5m wide from the port-side bridge deck. Twelve individuals were observed between 17:27 and 17:31, with another 15 individuals by 17:40, and four more by 17:45 when observations stopped. Overall densities could be estimated at 0.47 per 1000 m² (3000 m³) on average, and 1.18 per 1000 m² (3000 m³) in the higher density regions. The entrance to Plymouth Sound is reported to be where the freshwater and marine water mixes (A. Perkin *pers comm*) and therefore may be a highly productive region for feeding.

On arrival at L4 (18:00) the same protocol as PQ4-15 was conducted with two double-oblique jelly nets (1 m², 500 µm mesh) followed by two sets of 200 µm and 63 µm vertical ring (WP2) nets; two further jelly nets and two more sets of ring nets followed. As before, each net sample was divided in half, with half being filtered and frozen at -20°C in 50ml Falcon Tubes or in plastic bags (between 1 and 4 bags were used per sample; some bags contained the mesh the sample was concentrated on). Half nets of each mesh size (500 µm jelly net, 200 µm, 63 µm) were preserved in 4% Formaldehyde and 95% Ethanol.

Two half samples from the jellyfish net were picked over for preserving and measuring individual jellyfish species for biomass estimates and gut contents analysis. The final 200 µm net (D200-4) was dropped on deck and less than half preserved (treat volume filtered with caution). Daytime sampling was concluded at approximately 20:15.

Night-time sampling resumed by deploying the jelly net at 22:15 (last light 22:20) and recovering it at 22:35. The same sequence of two jelly nets, two sets of ring nets, two jelly nets and two sets of ring nets was followed. The last nets were on deck at 00:15 (23/6/15) and return to Sutton Harbour by 01:15.

Logistically the net sampling went very smoothly, with both crew and scientists working together to achieve the most efficient sampling. At times this meant that samples built up and three scientists were barely sufficient to manage the workload. Recording when nets came on deck and internal labelling of samples were both neglected and needs attention in future. The volume of gelatinous material in the samples was particularly high which blocked filters and slowed the rate of processing. The high number of jellies also meant that a lot of time was spent picking individual jellyfish. Whilst it was attempted to rinse each individual with 0.2µm filtered seawater and then remove excess liquid, this became more difficult with the build-up of samples. Large numbers of jellyfish are preferable to few or no individuals, but meant we had to be selective over which species to pick out. Samples of *Cyanea lamarckii* (few) *Leuckartiara*, *Beroe* and *Cosmetira* (all abundant) were prioritised over *Pleurobrachia* for which plenty of samples had already been obtained. For *Beroe* and *Leuckartiara* length measurements were taken; for *Cosmetira*, bell diameter was recorded.

During the previous sampling occasion individual jellyfish had been preserved in individual ziplock bags. These had been found to be difficult to extract the specimen from, and so Eppendorf and Falcon tubes were used for all individuals during this cruise. The additional volume of these sample containers was an issue with regard to freezing space and the rate of freezing. This needs bearing in mind with regard to sample storage and the method of preservation.

Additionally, a liquid nitrogen dewar was empty when it came to conducting the sampling (evaporated in the warm weather between the lab and sampling time), and a second dry-shipper was unknown how effective it would be at preserving the samples. Therefore all samples were preserved at -20 and NOT flash-frozen. If samples from this data yield different results this should be born in mind. Future sampling needs a dewar with a clip-on lid, and potentially a dry shipper lined with tights or mesh for storage of samples at cold temperatures.

In total more than 100 samples were individually frozen and most of these individual measured for biomass estimates. Further measurements will be made from the Formalin preserved samples.

In terms of the plankton diversity, since PQ4-15 there has been a changing of main species. Previously *Pleurobrachia* was very abundant, with a number of *Leuckartiara* also observed. Since then a large number of *Beroe* (*cucumis?*) have arrived in the area. *Beroe* are known predators of other gelatinous zooplankton, particularly ctenophores, and their rise is probably a result of the high abundance of prey. The abundance of *Pleurobrachia* was notably down compared to PQ4-15 and was probably due to *Beroe*. Potentially linked to this shift in the gelatinous species has been a significant increase in the abundance of a hydrozoan *Cosmetira* (a clear disc with gonads on four axis and tentacle bulb dots around the edge of the bell). Where previously there would be a couple of *Cosmetira* and *Leuckartiara* in a 20 minute jelly net, this time there were 100+ individuals. More *Cosmetira* and *Beroe* were preserved (and observed) at night than by day. A couple of Blue jellyfish (*Cyanea lamarckii*), large numbers of decapod larvae, and a reasonable number of fish larvae were also caught. No Barrel jellyfish were caught in any net.

Mean body lengths or bell diameter of gelatinous species were as follows: *Beroe* (62 ± 8.56 mm, n=11), *Cosmetira* (22 ± 0.97 mm, n=31), *Cyanea lamarckii* (65 ± 17.3 mm, n=4), *Leuckartiara* (12 ± 0.54 mm, n=38), *Pleurobrachia* (11 ± 0.58 mm, n=15).

The next minicruise is proposed for the first week of August 2015, with regular L4 WP2 nets continuing weekly in the meantime.