Coastal Coccolithophores (Guest Ed. R.W. Jordan)
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Preface

At 'Coccolithophores 2014', an INA Workshop on extant coccolithophore research that was held in Heraklion, Crete on 5–10 October, 2014 (see *JNR* **34**/*Special Issue* **2**), I proposed that a special issue be compiled on the ecology of coastal coccolithophores. Why? Well, surprisingly, we actually know more about open-ocean communities than those closer to the shore, which seems crazy when you think that you could simply drive to the nearest coast, take samples in knee-deep water, and get your samples back to the lab on the same day. Instead, most of us willingly undergo the logistical nightmare of trying to get ship time, transporting equipment around the world, and finding the funds to cover travel costs to and from foreign ports.

It is quite shocking to learn that we don't actually know a lot about the distribution of coastal species; for example, there are no papers on the global distributions of *Hymenomonas*, *Pleurochrysis* or *Jomonlithus*, and only a handful on the spotty distributions of *Cruciplacolithus* and *Braarudosphaera*. In addition, most of the extant species in these genera were described a long time ago. So, in some ways, it is not surprising that *Tergestiella* was recently rediscovered in Japan and Croatia, when someone actually took the time to investigate coastal waters (Hagino et al., 2015). It begs the question, what else is lurking in these neritic environments?

Most figures illustrating the biogeographic zones of coccolithophores have lines that do not reach the coast. This is largely because coastal waters are dynamic (e.g. tides, seasonal upwelling, river outflow events), but it is also a reflection of our lack of knowledge of coastal assemblages. In addition, we often think of offshore subtropical/tropical vertical zonations as permanent features; however, occasionally, middle or lower photic-zone species are found at, or near, the surface in coastal areas. Clearly, the ecological picture that we have painted is not as simple as we had first thought.

The first three papers herein deal with coccolithophorid assemblages in shallow coastal waters from the Pacific region – Japan (Hagino-Tomioka et al.), Guam (Konno et al.) and certain South Pacific atolls (Jordan & Riaux-Gobin). All of these studies can be regarded as being opportunistic, with some of them based on only a few samples, containing low abundances, and lacking basic support data.

Hagino-Tomioka et al. perfectly demonstrate what can be achieved by long-term opportunistic sampling and logistical creativity, and, amazingly, all of this carried out on a shoestring budget, mostly self-financed. The search for living *Braarudosphaera bigelowii* around Japan has resulted in a number of key papers on its ecology and phylogeny (Takano et al., 2006; Hagino et al., 2013, 2016), and has also led to the rediscovery of *Tergestiella adriatica* (Hagino et al., 2015). These samples have now been analysed for other species, and the resultant dataset provides vital clues about the seasonality and ecology of not just coastal coccolithophores, but also, more unexpectedly, about the middle to deep photic taxa that sometimes appear near the sea surface.

Konno et al. report, for the first time, on coccolithophorid assemblages from Guam, and their differences from, and similarities to, other published assemblages, particularly those from Palau (Konno & Jordan, 2006). Perhaps another first is the discovery by Jordan & Riaux-Gobin of coccolithophores attached to living oyster shells, and the assemblages from atolls in the South Pacific.

Cruz et al. record the changes in coccolithophorid assemblages – both horizontal and vertical – observed along three transects, from the continental shelf to deeper waters, following an oil-well blowout in the Gulf of Mexico in 2010. These changes, recorded over a three-year period, include an increase in species diversity with distance offshore and with successive years. The hydrographic data and the coccolithophorid assemblage compositions clearly demarcate the boundary between the upper and lower photic zones (0–75m and 75–125m, respectively). This survey includes the finding and illustration of a number of rare species (e.g. *Alveosphaera bimurata*, *Navilithus altevelum* and *Placorhombus ziveriae*).

The following two papers document coastal coccolithophorid assemblages using innovative methods – analysing the faecal pellets of mussels (Prista & Cachão) and the gut contents of sea cucumbers (Tsutsui et al.). Prista & Cachão demonstrate that the species diversity and abundance of coccolithophores in the water-column can be replicated in mussel faecal pellets, and that even coccospheres can survive passage through the digestive system of the mussel. Tsutsui et al., on the other hand, conclude that calcareous nannoplankton are eventually dissolved in the foregut,

and so are absent from the hindgut (and presumably also from the faeces), of the sea cucumber. The presence of reworked coccoliths in the foregut provides evidence of the erosion and transport of older material, and confirms that these animals are indiscriminate detritus feeders.

Finally, there are two papers on nannofossil assemblages from coastal sediments. Bown & Young provide a timely review of the geological record of coastal coccolithophores, and indicate how recent research on modern coastal taxa is being used to reconstruct the palaeoecology of Mesozoic and Early Cenozoic shallow-water environments. Püttmann & Mutterlose report on diverse nannofossil assemblages from the Upper Cretaceous of northern Germany, and interpret these as having been deposited in a shallow (≤30m) nearshore setting, whilst also representing a Late Cretaceous 'water world' in which open-ocean conditions prevailed.

I hope this volume will provide a stimulus to those people working on neritic assemblages, and that enough interest will be generated to make a second special issue on coastal coccolithophores in the near future.

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Front cover images:

top left – Kyoko Hagino-Tomioka and Natsuko Tomioka opportunistically sampling in Tomari Port, Tottori, Japan (see Hagino-Tomioka et al., this issue)

top right – Shiori Tamura taking a net sample in very shallow waters near the Achang mangrove forest in Guam, March 2013 (see Konno et al., this issue)

bottom, left to right – coccospheres of *Emiliania huxleyi* (Ishijiro, Hahajima), *Gephyrocapsa oceanica* (Ishijiro, Hahajima), *Gephyrocapsa ericsonii* (Ishijiro, Hahajima), *Syracosphaera binodata* (Oki-ko, Hahajima), all collected in August 2001 from around the Ogasawara Islands (Bonin Islands), Japan