

Permanently Condensed yet Active? The Unorthodox Chromosome Organisation of the Dinoflagellates

I Ian Hu¹ and Ross F. Waller¹

1. Department of Biochemistry, University of Cambridge, UK

The dinoflagellates are a group of marine organisms closely related to apicomplexan parasites. Besides being major contributors to net primary production and responsible for toxic algal blooms, their wildly derived nuclear biology makes the dinoflagellates very interesting cases to study. In comparison with apicomplexans and other sister groups, the dinoflagellates host largely inflated genomes in the format of permanently condensed chromosomes throughout the life cycle, have diminished expression of histone proteins, and have no detectable nucleosomes. In addition, they have adopted a small positive soluble nuclear protein termed DVNP, which outside Dinoflagellata is only found in a group of marine large DNA viruses. We are interested in two questions: 1) the biophysical properties of both dinoflagellate and viral DVNPs, and 2) how other nuclear proteins interact with the unusual compactness of DNA, more specifically whether RNA polymerase read sequences lying within the condensed chromosome. As there is no reliable genetic manipulation method for the dinoflagellate, we had to be creative to be able to answer these questions. We analysed the location of DVNP in dinoflagellate and biophysical characteristics of DVNP proteins and their interactions with DNA *in vitro*. We also employed fluorescently conjugated β -amanitin, a toxic ligand of DNA-dependent RNA Polymerase II, to elucidate the spatial relationship between the permanently condensed chromosomes and RNAP II. Our data brings insight to the true nature of the permanently condensed chromosomes.