

Investigation of a Putative Polysaccharide Deacetylase from Gut Microbe *Bacteroides ovatus*

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Bacteroides are often the most abundant species in the gut microbiome of industrialized human populations. Many have demonstrated beneficial properties to their host, for example gut microbe *Bacteroides ovatus* has been linked to the suppression of intestinal inflammation. A distinctive characteristic of gut-dwelling *Bacteroides* that may help confer these immunomodulatory effects is the production of cell surface components called capsular polysaccharides (CPS). Recent studies have begun to explore the diversity of CPS loci in *Bacteroides*, however there is still much unknown. Here we present characterization of a putative polysaccharide deacetylase (BACOVA_03992) encoded in a likely CPS loci from *Bacteroides ovatus*. Sequence analysis indicates the enzyme is a member of the carbohydrate esterase 4 (CE4) superfamily. However it is missing a key histidine present in other CE4 members that is known to coordinate a metal required for catalysis, and deacetylase activity against common carbohydrate substrates was not detected. Despite the absence of this conserved histidine, we obtained two high resolution crystal structures of the enzyme bound to either nickel or cobalt at 1.5 Å and 1.45 Å respectively. Our findings confirm that this putative polysaccharide deacetylase can bind metals and should be functional with the appropriate substrate.