DNA-Based Identification and Chemical Characteristics of Hypnea musciformis from Coastal Sites in Ghana

This work reveals new, important insights about the influence of broad spatial variation on the phylogenetic relationship and chemical characteristics of Ghanaian Hypnea musciformis—carrageenan-containing red seaweed. DNA barcoding techniques alleviate the difficulty for accurate morphological identification. COI barcode sequences of the Ghanaian H. musciformis showed <0.7% intraspecies divergence, indicating no distinct phylogenetic variation, suggesting that they actually belong to the same species. Thus, the spatial distribution of the sampling sites along the coast of Ghana did not influence the phylogenetic characteristics of H. musciformis in the region. The data also showed that the Ghanaian Hypnea sp. examined in this work should be regarded as the same species as the H. musciformis collected in Brazilian Sao Paulo (KP725276) with only 0.8%–1.3% intraspecies divergence. However, the comparison of COI sequences of Ghanaian H. musciformis with the available COI sequence of H. musciformis from other countries showed intraspecies divergences of 0%–6.9% indicating that the COI sequences for H. musciformis in the GenBank may include different subspecies. Although samples did not differ phylogenetically, the chemical characteristics of the H. musciformis differed significantly between different sampling locations in Ghana. The levels of the monosaccharides, notably galactose (20%–30% dw) and glucose (10%–18% dw), as well as the seawater inorganic salt concentration (21–32 mg/L) and ash content (19%–33% dw), varied between H. musciformis collected at different coastal locations in Ghana. The current work demonstrated that DNA-based identification allowed a detailed understanding of H. musciformis phylogenetic characteristics and revealed that chemical compositional differences of H. musciformis occur along the Ghanaian coast which are not coupled with genetic variations among those samples.