

# The three varieties problem: molecular and morphological investigation on the macroalgal habitat former *Gongolaria barbata* (Sargassaceae, Fucales)

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Macroalgae of the *Cystoseira sensu lato* complex are endangered species that play an important central role as habitat formers. Since their forests are declining along the Mediterranean coasts, it is crucial to improve restoration techniques. This begins with gaining a thorough understanding of the species belonging to the complex. *Gongolaria barbata* (Sargassaceae, Fucales) is a widespread species that exhibits great morphological variability due to environmental and seasonal variation, resulting in several infraspecific descriptions, including free-living individuals. This study aims to deepen the knowledge of *G. barbata* by considering molecular, morphological, and ecological aspects. Molecular analyses were performed by sequencing the mitochondrial COI gene from both haptophytic and pleustophytic forms collected from different locations of the Adriatic and Tyrrhenian Seas. Molecular analyses revealed no variations between samples from different populations, while we identified three distinct morphotypes that appear to be related to sedimentation rates, turbidity, and hydrodynamism, suggesting infraspecific variation.