



# Isolation and characterization of a novel acidic matrix protein hic22 from the nacreous layer of the freshwater mussel, *Hyriopsis cumingii*

X.J. Liu<sup>1\*</sup>, C. Jin<sup>1\*</sup>, L.M. Wu<sup>1</sup>, S.J. Dong<sup>1</sup>, S.M. Zeng<sup>1</sup> and J.L. Li<sup>1,2</sup>

<sup>1</sup>Key Laboratory of Freshwater Aquatic Genetic Resources, Shanghai Ocean University, Ministry of Agriculture, Shanghai, China

<sup>2</sup>E-Institute of Shanghai Universities, Shanghai Ocean University, Shanghai, China

\*These authors contributed equally to this study.

Corresponding author: J.L. Li

E-mail: jlli2009@126.com

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**ABSTRACT.** Matrix proteins that either weakly acidic or unusually highly acidic have important roles in shell biomineralization. In this study, we have identified and characterized hic22, a weakly acidic matrix protein, from the nacreous layer of *Hyriopsis cumingii*. Total protein was extracted from the nacre using 5 M EDTA and hic22 was purified using a DEAE-sepharose column. The N-terminal amino acid sequence of hic22 was determined and the complete cDNA encoding hic22 was cloned and sequenced by rapid amplification of cDNA ends-polymerase chain reaction. Finally, the localization and distribution of hic22 was determined by *in situ* hybridization. Our results revealed that

hic22 encodes a 22-kDa protein composed of 185 amino acids. Tissue expression analysis and *in situ* hybridization indicated that hic22 is expressed in the dorsal epithelial cells of the mantle pallial; moreover, significant expression levels of hic22 were observed after the early formation of the pearl sac (days 19-77), implying that hic22 may play an important role in biomineralization of the nacreous layer.

**Key words:** Freshwater mussel; *Hyriopsis cumingii*; Nacre; Matrix protein; Biomineralization