

动物遗传学

南极eel pout (Lycodichthys dearborni) 多聚体 III型抗冻蛋白基因的克隆及进化分析

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摘要 冰冻海洋中生存的南极eel pout (Lycodichthys dearborni) 体内能合成高浓度的III型抗冻蛋白(AFP III)。为了寻找新的AFP III基因, 构建了L. dearborni肝脏cDNA文库。通过斑点杂交筛选此文库, 发现一个2.87 kb的cDNA克隆, LD12。序列分析采用DNAssist2.0和ClustalX 1.8软件。结果显示, LD12分子由12个串联重复的片段构成, 每一个片段编码一个61个氨基酸(aa)的 III型抗冻蛋白分子和一个9aa的连接子。这是第一次在合成AFP III的极地鱼类中发现这样的多聚蛋白结构基因。有趣的是, 组成、结构和起源都不相同的抗冻糖蛋白AFGP, 其基因也呈现类似的多聚蛋白结构的现象。因此, 这种独特的多聚基因结构可能是鱼类基因组在适应极端寒冷的环境中采取的一种普遍方式。

关键词 [南极 eel pout](#); [III型抗冻蛋白](#); [串联重复](#); [多聚体蛋白基因](#); [基因家族进化](#)

分类号

Characterization of a Multimer Type III Antifreeze Protein Gene from the Antarctic eel pout (Lycodichthys dearborni)

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Abstract

To survive the freezing marine environment, the Antarctic eel pout, *Lycodichthys dearborni* synthesizes high concentration of type III antifreeze proteins (AFP III). In the process of characterizing the various types of AFP III mRNA present in the *L. dearborni* liver, a 2.87 kb mRNA encodes for multiple domains of AFP III was identified. This cDNA encodes 12 tandemly repeated segments, each translates into a 7 kD AFP III molecule plus a 9-amino acid linker. This naturally occurred and functional multimer type III antifreeze protein gene is the first of this kind being identified. The organization strongly mimics the polyprotein structure found in the genes for another type of bio-antifreezes, the antifreeze glycoprotein, AFGP. The AFP III and AFGP are compositionally and structurally completely different, and synthesized by fishes in different suborders. The presence of the similar polyprotein structures in the different types of antifreeze genes may imply a common organizational mechanism in the fish genomes for adapting to the extremely cold polar environment.

Key words [Antarctic eel pout](#) [type III antifreeze protein](#) [tandem repeats](#) [polyprotein](#) [gene family evolution](#)

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