



Evidence of Fc Receptor Gene in an Ophurid : Ophiocomina Nigra (Echinodermata)

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Abstract

The emergence of Ophurid IGH gene, of Fab fragment gene occurred in the Ophurid : Ophiocomina nigra genome, when a Fc receptor gene was found in this last one. Notions of adaptive immunity, in Echinodermata have to be reviewed and it's a great novelty since it was spoken of invertebrates

Keywords: Invertebrate, Ophurids, Ophiocomina Nigra, Fab Fragment Gene, Primitive Antibody

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Introduction :

We recall the emergence of primitive antibody in two classes of Echinodermata : the asterids and the ophurids.

The characteristics of sea star antibody are the presence of Ig sites, Fab fragment site (Ref.1) and Fc receptor site (Ref.2).

We have just discovered the Ophurid IGH gene (Ref.3)

The aim of this paper is to look for Fc receptor gene in the Ophiocomina nigra genome. We say again : it is a great novelty in Invertebrate immune response studies and particularly in adaptive immunity in Invertebrates

Materials and Methods :

Animals : Ophiocomina nigra was obtained at the station « Of Biologie Marine of Roscoff » France

Obtention of ophurid mRNA : Digestive coeca were excised from the O.nigra body.

O.nigra mRNA was obtained from Uptizol (Interchim). Quality control were operated.

Sequencing : Sequencing was made on Illumina Next Seq 500 with paired-end : 2. 75 bp

Transcriptome was assembled from RNA-Seq fastq files using Trinity v2.1.1 (Ref.4) with default parameters. A BLAST database was created with the assembled transcripts using makeblastdb application from ncbi-blast+ (v2.2.31+). The sequences of transcripts of interest were then blasted against this database using blastn application from ncbi-blast+ (Ref.5) with parameter word_size 7.

Results:

The transcriptome shows a sequence of Fc receptor gene as following:
>NM_001253737.1 Fc2a (14128) Fc receptor / Mus musculus Fc receptor, IgE, low affinity II, alpha polypeptide (Fc2a), transcript variant 2, mRNA

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5'GAAAGCCAATTTGAACGGGAACTTGAATTCAGAATGAATTCT-
CAAAACCAGGGATACTGGGAACCTCCT
AGAAAGCGTTGCTGCTGTGCAAGACGTGGACACAGCTCATGTTGGTGG-
GGCTGCTGAGCACAGCAATGT
GGGCTGGCCTGCTGGCCCTGCTTCTTCTGTGGCACTGGGAAACG-
GAGAAGAATCTAAACAGCTGGGAGA
CACTGCAATTCAGAATGTCTCATGTTACCAAGGACTTACAAAAATTCCA-
GAGTAATCAATTGGCCAG
AAGTCCCAGGTTGTTGATGTCACAAAACCTTGAAGAACTCCAAGCT-
GAACAGAAGCAAATGAAAGCTC
AGGACTCTCGGCTCTCCAGAACCTGACCGGACTCCAGGAGGATCTAAG-
GAACGCCAATCCAGAACTC
AAAATCTCCCAGAACCTGAACAGACTCCAAGACGATCTAGTCAACAT-
CAAATCCCTGGGCTTGAATGAG
AAGCGCACAGCCTCCGATTCTAGAGAAAACCTCCAGGAAGAGGTGG-
CAAAGCTGTGGATAGATACTGA
TTTCAAAGGGAAGTGCATGCAACATATGTCCAAGAACTGGCTCCATTT-
CAACAGAAGTGCTACTATT
TGGCAAGGGCTCCAAGCAGTGGATCCAGGCCAGGTTTCGCCTGCAGT-
GACCTGCAAGGGCGACTAGTCAGC
ATCCACAGCCAAAAGGAACAGGACTTCTGATGCAACACATCAA-
AAGAAGGATTCCTGGATTGGCCTCC
AGGATCTCAATATGGAGGGAGAGTTTGTATGGTCCGACGGGAGCCCTGTG-
GGTTATAGCAACTGGAATCC
AGGGGAGCCCAATAACGGGGCCAGGGTGAGGACTGTGTGATGATGCGG-
GGATCCGGCCAGTGAACGAC
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GCCTTCTGCCGAGCTACTTGGATGCATGGGTGTGTGAGCAGCTGGCAA-
 CATGTGAGATATCTGCCCT
 TAGCCTCTGTGACTCCAACAAGGCCACCCAAAAAGTGAACCCTGA-
 CAACTTCTGCTCACACTCTTCT
 GGATTTCTCCTTACCTTTATCGTGAAACAGCTGGGCCCTGAGGATA-
 CCTATCAGGCCAGGGCCC
 TCTCTGTGACCGAAGGCTTTGATTATGTTCCACCCATACTGAAGCAGCTG-
 GTGGATGCCAGCTCCTGCC
 AGTACCCAGAAACCTTCCAGCTCTCCAGCTAAGCTGGCCATCCATTC-
 CATCTGCCTTCTCAAACC
 TGGGCCCCAGCCTTGTAGCTCCCTGACTACGGGCATGCATGTGGG-
 CAGCTGAGCCAACCAGGGAGCTGC
 TGAGAACAAAGATTTGAAAGGCTTCTTTGAGTCCCCACCTCCTAT-
 CAAGTTCCCCACTTTCTCCCCCT
 CGGCATCAGAGAACAGGGGTTCCCTTTCCCCAGGATCTGGGAT-
 GAGTCTCCCATCAAGTTTGCATCAGT
 GGTCCAGCACTCCGACCTCCTTGGAGGCTGCACCAGGTGTGCTCCTGGT-
 GCGGGAGGTATTGAAGGAA
 CTCTAAACAGCTCCAGCAAGGCGAGCCTGGCTCTGTCTGGTAGGCCTGGC-
 CTTCTCTCCATTCTTCT
 ACCTTACTAAAAGCTGTTAGAGAACAGTCTAAAGCTAGCCCCAAGGT-
 TATTCCCTATTGGCCACT
 TCCTCCTCCTGAGGCTGACTACAAGGTCCAGCTATCCAAGTACT-
 GAAGTCTAACATCAAAGCCCCCTT
 GTCTCACCTAAGTAGCAATGCCAATCAAATACACCATCACATCATAG-
 CCAGTCTAACAGACCGCCCT
 TTTTCTTTCATAAAATTACACCTGCAACCAGGCGTAGTGGTGCAGG-
 CCTTAGTCCCAGCACTGGGAG
 GCAGAGACAAGCGAATTTCTGAGTTCGAGGCCAGCCTGGTCTACAAAGT-
 GAGTCCAGGACAGCCAGGGC

TACACAGAGAAACCTGTCTCGAAGAAAGAAAAAAAAAAAAAAAAATTA-
 CACCTGCAAGGTCACTTGCAGGCT
 GCTGTTTTTCTGCCTGAGTCAGAGGGCAGCCACTTAACTTTTCTCCCTGCT-
 TAATAAAGGATCTCTGTG3'

The identity with mouse is 94,29 % and The e-value : 2,00E-07. So, it is highly significant.

Discussion and Conclusion:

The Fc found sequence is longer(2100 nucleotides) than the one observed in the sea star *Asterias rubens*(400 nucleotides). Both share a common part and recall mouse Fc IgE low affinity one (Ref. 2) It's interesting from a point of view of phylogeny of the Fc receptor genes in Invertebrates. Now, from a point of view of evolution : It remains striking to find such elaborated genes in species which appeared in Cambrian. We recall that the Cambrian period was the first geological period of the Paleozoic Era..

Whatever the level that the Echinodermata(Asterids, Ophuirids) occupy in the phylogenetic domain, their various immune system accomodate and indeed ensure their survival.

On the other hand, we assume the existence of primitive antibody, in Asterids and in Ophuirids and so in Invertebrates. That constitutes a bomb in comparative and evolutive Immunology.

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