

Other MHC, Class I, Class II Genes in Invertebrates

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ABSTRACT

It seemed interesting to recall all the found results in *Ophiocomina nigra* and *Antedon bifida* (Echinodermata) from a point of view of genomic analysis: 2 MHC class I genes (HLA-E, HLA-B), 2 (HLA-G, HLA-A) with an e-value nearly significant and at last 2 MHC class II genes (HLA-DRB1, HLA-DQB1) and HLA-DRA which was not retained because of the approximative e-value. appeared in the genomes of these invertebrates. Blasts were performed against Human.

INTRODUCTION

Recently, it was shown that, HLA-DRB1 gene existed in *Ophiocomina nigra* (Ref.1), so HLA-DQB1 gene (Ref.2). In the same manner we demonstrated the existence of HLA-E, HLA-B genes in *Ophiocomina nigra* and *Antedon bifida* (Ref.2). It was correlated to the presence of IPA (Invertebrate Primitive Antibody) in Echinodermata. (Ref.3, 4). Genesis of these works were recalling in this paper.

MATERIALS AND METHODS

Animals: *Ophiocomina nigra* (Ophuirid) *Antedon bifida*(Crinoïd) were obtained at the station « Of Biologie Marine of Roscoff » France.

Obtention of Ophuirid and Crinoïd mRNA : Digestive coeca were excised from their bodies and mRNA were obtained from Uptizol (Interchim) then quality controls 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.5) 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.6) with parameter word_size 7.

RESULTS

MHC gene Class II appears in the genome of *Ophiocomina nigra* and *Antedon bifida* one, in a significant manner. The transcriptomes are given

with their sequences. *Ophiocomina nigra* results show the "HLA-DRB1" transcriptome which possesses a short sequence but a significative one.

>TRINITY_DN4807_c1_g1_i1

```
5'CATATAGTTTtagggggttataaaaaaat  
GACTCCGGTTACTGACATATTTGGGACCC  
CAA  
CTGTCCAAAGAAAATTATAGCCCCTATAA  
ATTATAATTTATTAATTTTTGTTTTCTCTTG  
TATAGGGACCAGAGCCAATCCCCTGGA  
AGTTAGGGCACGAGCAGTCAAAGACCAA  
TTTT  
AAATGTAAAAAAAAAAAAAAAAAAAAAAT  
AAAAAATTAAAAAAAAAAAAAAAAAAAAAA  
AAAA  
AATTAAAAAAAAAAAAAAAAAAAAAA3'
```

Secondly, a HLA-DQB1 class II gene was found in O.nigra:the sequence of the transcriptome follows :

>TRINITY_DN20883_c0_g1_i1 HLA-DQB1

```
5'GTAAAACAGCATTTCATCTGAAAAGAA  
ATTCAATGTCCAAAGTTCAAAAACCTCTGT  
GAAG  
ACTTGAATGCAAAAAGTACTCAAGTCCAT  
CACATATTTGGCATTTTTAGATATGATCTT  
C  
CAAAGATTTTAAAATAAAAACAAAAGAAA  
AACCAAAAGAAGAAAAAATTTAACAAA  
AAAA  
TAAAGGGCCAAAAAAATTTTAAAAAAA  
AAAAACCCCATTTTTTTGGGTCTAAA  
AAA  
AAAAAAAAAAAAAAAAAATCGC3'
```

HLA-DRA appears also.

MHC Class I genes are shown in the following table in *Antedon bifida*:

QueryID	Query Name	SubjectID	Identity (%)	Length	Mismatch	Gapopen	Query cover (%)	E-value	Bitscore
NM_005516.6	HLA-E	TRINITY_DN19334_c8_g2_i1	88.15	287	28	4	11,00	2,00E-91	337,00
NM_005514.8	HLA-B	TRINITY_DN15013_c0_g1_i1	100,00	21	0	0	1,00	3,70E-02	39,90

Class I : HLA-A, HLA-G transcriptomes are not present

Class I ,HLA-E, HLA-B, transcriptomes are given in 5'-3'

First HLA-E

>TRINITY_DN19334_c8_g2_i1 HLA-E
 5'TGTAATCCCAGCACTTTGGGAGGCCGA
 GGCGGGCGGATCACGAGGTCAGGAGATC
 GAGAC
 CATCCTGGCTAACACAGTGAAACCCCGT
 CTCTACTAAAAATACAAAAATTAGCCGG
 GCG
 TGGTGGCGGGGCGCCTGTAGTCCCAGCTA
 CTCGGGAGGCTGAGGCAGGAGAATGGCG
 TGAA
 CCCGGGAGGCGGAGCTTGCAGTGAGCCG
 AGATCGCGCCACTGCACTCCAGCCTGGG
 CGAC
 AGAGCGAGACTCTGTCTCAAAAAAAAAA
 AAAAAAAAAAAAAA3'

Secondly HLA-B

>TRINITY_DN15013_c0_g1_i1 HLA-B
 5'GCCGAATATGATGCAGAGGTATCAGGG
 GGTGAAGCATCTGGAGGTGAGGTATCGG
 CAGGA
 GAGGCATCTGGGGGAGAAGCTGAACAA
 TCTGACAATGAAAGCGATTAGATAACAT
 TTTT
 TAATTCTAGTTGCAGCCTAAATATTTTCA
 TATTACTTTTTTTTACTAGTTGAATGATT
 AA
 CAAAAGAAAGCAACAACACTGTGGTAATAT
 TGCTAATTATGAAATGAAAAATGTTTAA
 TGTG
 GCCCTGACACTAAATTGTAAACTGTTTTT
 TAGTAATAAGAATTTCAATAGCTTCTCTG
 AA
 AGAAGATGTCTCTGAGAGAGTAATATTT
 GACAGGTTCAAGTGTATTTAAAGACTTAT
 AATG
 TAAAGCAGAGATGTAAGTAGAGAAACCT
 AGATATTGATGTCAACAACTAAGGGTG
 CATG
 GAAAATGTGAAAGACTTTAAGAGTGGGT
 GACCCTGCCTACCAACACAATTCAATCC
 ATGT
 TTGAGGCTTTTTTTCATTAGCCTAATAGT
 GAAGTCAGTGGCGTAAGGCCCCCTTGT

TAG
 CACTCCTAAGGGTCCCTAATGATGGATA
 ATTGTATTGGGCTCTTCATGCTCTGGGGC
 CCT
 GGGTTTAGCTAGTGAGTGCTCATAGCAG
 TTGGCTGGGCAAGGTTAGAAAGCAATGG
 TTCT
 GTGCAGACATTTGCATTTAATTGACCAA
 TATTTCAAATCGTGTGTTACACAGGAAT
 CATA
 ACCTAATCAGCAGTTGTTTTTAATAAAC
 ATTGCATCTTGGTCGACGTAATATTGTTA
 TGG
 ACTGTCTGTGAAACCATGTGAATCTAAA
 CTCTTAAAAATGCCTGCCTCTCCTGTCT
 TGC
 TAAATATAAATTTGTTTTCTCAATTAGGC
 G
 GCCCTGACACTAAATTGTAAACTGTTTTT
 TAGTAATAAGAATTTCAATAGCTTCTCTG
 AA
 AGAAGATGTCTCTGAGAGAGTAATATTT
 GACAGGTTCAAGTGTATTTAAAGACTTAT
 AATG
 TAAAGCAGAGATGTAAGTAGAGAAACCT
 AGATATTGATGTCAACAACTAAGGGTG
 CATG
 GAAAATGTGAAAGACTTTAAGAGTGGGT
 GACCCTGCCTACCAACACAATTCAATCC
 ATGT
 TTGAGGCTTTTTTTCATTAGCCTAATAGT
 GAAGTCAGTGGCGTAAGGCCCCCTTGT
 TAG
 CACTCCTAAGGGTCCCTAATGATGGATA
 ATTGTATTGGGCTCTTCATGCTCTGGGGC
 CCT
 GGGTTTAGCTAGTGAGTGCTCATAGCAG
 TTGGCTGGGCAAGGTTAGAAAGCAATGG
 TTCT
 GTGCAGACATTTGCATTTAATTGACCAA
 TATTTCAAATCGTGTGTTACACAGGAAT
 CATA
 ACCTAATCAGCAGTTGTTTTTAATAAAC
 ATTGCATCTTGGTCGACGTAATATTGTTA
 TGG
 ACTGTCTGTGAAACCATGTGAATCTAAA
 CTCTTAAAAATGCCTGCCTCTCCTGTCT
 TGC
 TAAATATAAATTTGTTTTCTCAATTAGGC
 G3'

CONCLUSION

From data to data it appears that Echinodermata, possesses a sophisticated immune system. We recall the existence of B lymphocytes, T lymphocytes with the sea star as model of study, the IPA (Invertebrate Primitive Antibody) we meet in Asterids, Ophuirids, Crinoids, the Igkappa genes, in these last ones such as Fag gene, Fc receptor gene, Cr gene, at last **MHC class I, class II genes. Among these last ones HLA-A, HLA-G and HLA-DRA with an e-value we may discuss.**

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