Extended Abstract

Global MHC, Class I, Class II Genes in Invertebrates

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Abstract:
It appeared to be intriguing to sum up the discovered outcomes in Ophiocomina nigra and Antedon bifida(Echinodermata) according to a perspective of genomic advancement : 2 MHC class I genes(HLA-E, HLA-B), 2 MHC class II genes(HLA-DRB1, HLA-DQB1) appeared in them in the past (may be at the Cambrian period).

Introduction :
As of late, it was demonstrated that, HLA-DRB1 quality existed in Ophiocomina nigra, so HLA-DQB1 quality (Ref.2). In a similar way we exhibited the presence of HLA-E, HLA-B qualities in Ophiocomina nigra and Antedon bifida (Ref.2). It was associated to the nearness of IPA (Invertebrate Primitive Antibody) in Echinodermata. (Ref .3, 4). A reviewing of these works was

assessed in this new paper."The capacity of MHC atoms is to tie peptide parts got from microorganisms and show them on the cell surface for acknowledgment by the proper T cells. The outcomes are quite often harmful to the microbe—infection tainted cells are executed, macrophages are actuated to eliminate microscopic organisms living in their intracellular vesicles, and B cells are enacted to create anti bodies that dispose of or kill extracellular microorganisms. In this manner, there is solid particular weight for any microorganism that has transformed so that it gets away from introduction by a MHC particle. Two separate properties of the MHC make it hard for microbes to avoid safe reactions thus. Initially, the MHC is polygenic: it contains a few distinctive MHC class I and MHC class II qualities, so every individual has a lot of MHC atoms with various scopes of peptide binding specificities. Second, the MHC is highlypolymorphic; that is, there are various variations of every quality inside the populace overall. The MHC qualities are, truth be told, the most polymorphic qualities known Because of the polygeny of the MHC, each individual will communicate in any event three distinctive antigen presenting MHC class I particles and three (or some of the time four) MHC class II atoms on their cells . Indeed, the quantity of various MHC particles communicated on the cells of the vast majority is more noteworthy on account of the outrageous polymorphism of the MHC and the

codominant articulation of MHC quality items. The term polymorphism originates from the Greek poly, which means many, and morphe, which means shape or structure. As utilized here, it implies inside species variety at a quality locus, and accordingly in its protein item; the variation qualities that can possess the locus are named alleles. There are in excess of 200 alleles of some human MHC class I and class II qualities, every allele being available at a moderately high recurrence in the populace. So there is just a little possibility that the relating MHC locus on both the homologous chromosomes of an individual will have a similar allele; most people will be heterozygous at MHC loci. The specific mix of MHC alleles found on a solitary chromosome is known as a MHC haplotype. Articulation of MHC alleles is codominant, with the protein results of both the alleles at a locus being communicated in the cell, and both quality items having the option to introduce antigens to T cells. The broad polymorphism at every locus in this manner can possibly two fold the quantity of various MHC atoms communicated in an individual and subsequently expands the decent variety effectively accessible through polygeny . Notwithstanding the profoundly polymorphic 'old style' MHC class I and class II qualities, there are numerous qualities encoding MHC class I-type particles that show little polymorphism; the majority of these still can't seem to be relegated a capacity. They are connected to the class I locale of the MHC and their definite number fluctuates significantly among species and even between individuals from similar species. These qualities have been named MHC class IB qualities; like MHC class I qualities, they encode β2-microglobulin-related cell-surface particles. Their appearance on cells is variable, both in the sum communicated at the cell surface and in the tissue dispersion" In human, the fundamental capacity of significant histocompatibility complex (MHC) Class II atoms, is to introduce handled antigens which are inferred basically, from exogeneous sources. Constitutive articulation of MHC Class II atoms, is additionally restricted to proficient antigen-introducing cells (APC) of the invulnerable system.Since we have found the IPA (Invertebrate Primitive Antibody), to secure a superior comprehension of the invertebrate safe framework, it appeared to be helpful to search for MHC class I, class II qualities in spineless creatures

with Ophiocomina nigra (Ophuirids), Antedon bifida (Crinoïds) as model of studies.

MATERIALS AND METHODS :

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

Obtention of ophuirid and crinoïd mRNA : Digestive coeca were extracted from their bodies and

mRNA were acquired from Uptizol (Interchim) at that point quality controls were worked.

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

Transcriptome was collected from RNA-Seq fastq record utilizing Trinity v2.1.1 with default boundaries. A BLAST database was made with the amassed records utilizing makeblastdb application from ncbi-blast+ (v2.2.31+). The arrangements of records of intrigue were then impacted against this database utilizing blastn application from ncbi-blast+ with boundary word_size 7.

RESULTS :

First HLA-DRB1 (Class II) transcriptome which is found in Ophiocomina nigra :

>TRINITY_DN4807_c1_g1_i1
5'CATATAGTTTAGGGGGGTTATAAAAAAATGACTCCGGTTAC
TGACATATTTGGGACCCCAA
CTGTCCAAAGAAAATTATAGCCCCTATAAATTATAATTTATTA
ATTTTTGTTTTCTCTTG
TATAGGGACCAGAGCCAATCCCACTGGAAGTTAGGGCACG
AGCAGTCAAAGACCAATTTT
AAATGTAAAAAAAAAAAAAAAAAAAAAAATAAAAAATTAAAA
AAAAAAAAAAAAAAATAAAA
AATTAAAAAAAAAAAAAAAAAAAAATAAA3'

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

>TRINITY_DN20883_c0_g1_i1 HLA-DQB1
5'GTAAAACAGCATTTCATCTGAAAAGAAATTCAATGTCCA
AAGTTCAAAAACTCTGTGAAG
ACTTGAATGCAAAAAGTACTCAAGTCCATCACATATTTGGC
ATTTTTAGATATGATCTTC
CAAAGATTTTAAAATAAAACAAAAGAAAAACCAAAAGAAG
AAAAAAATTTAACAAAAAAA
TAAAGGGCCAAAAAAAATTTTAAAAAAAAAAAAAACCCCCA
TTTTTTTTGGGTCTAAAAAA
AAAAAAAAAAAAAAAATCGC3'

MHC Class I genes appear in the following table which is discovered in Antedon bifida :

Query cover (%)	E-value	Bitscore
11,00	2,00E-91	337,00

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

First HLA-E

>TRINITY_DN19334_c8_g2_i1 HLA-E
5'TGTAATCCCAGCACTTTGGGAGGCCGAGGCGGGCGGAT
CACGAGGTCAGGAGATCGAGAC
CATCCTGGCTAACACAGTGAAACCCCGTCTCTACTAAAAAT
ACAAAAAAATTAGCCGGGCG
TGGTGGCGGGCGCCTGTAGTCCCAGCTACTCGGGAGGCT
GAGGCAGGAGAATGGCGTGAA
CCCGGGAGGCGGAGCTTGCAGTGAGCCGAGATCGCGCCA
CTGCACTCCAGCCTGGGCGAC
AGAGCGAGACTCTGTCTCAAAAAAAAAAAAAAAAAAAAAAA
AA3'

Secondly HLA-B

>TRINITY_DN15013_c0_g1_i1 HLA-B
5'GCCGAATATGATGCAGAGGTATCAGGGGGTGAAGCATCT
GGAGGTGAGGTATCGGCAGGA
GAGGCATCTGGGGGAGAAGCTGAACAATCTGACAATGAA
AGCGATTAGATAACATTTTTT
TAATTCTAGTTGCAGCCTAAATATTTCGATATTACTTTTTTTT
ACTAGTTGAATGATTAA
CAAAAGAAAGCAACAACTGTGGTAATATTGCTAATTATGAA
ATGAAAAATGTTTAATGTG
GCCCTGACACTAAATTGTAAACTGTTTTTTAGTAATAAGAAT
TTCAATAGCTTCTCTGAA
AGAAGATGTCTCTGAGAGAGTAATATTTGACAGGTTCAGT
GTATTTAAAGACTTATAATG
TAAAGCAGAGATGTAACTAGAGAAACCTAGATATTGATGTC
AACAAACTAAGGGTGCATG
GAAAATGTGAAAGACTTTAAGAGTGGGTGACCCTGCCTAC
CAACACAATTCAATCCATGT
TTGAGGCTTTTTTTCATTAGCCTAATAGTGAAGTCAGTGGC
GTAAGGCCCCCTTGTTTAG
CACTCCTAAGGGTCCCTAATGATGGATAATTGTATTGGGCT
CTTCATGCTCTGGGGCCCT
GGGTTTAGCTAGTGAGTGCTCATAGCAGTTGGCTGGGCAA
GGTTAGAAAGCAATGGTTCT
GTGCAGACATTTGCATTTAATTGACCAATATTTCAAATCGTG
TGTTACACAGGAATCATA
ACCTAATCAGCAGTTGTTTTTAATAAACATTGCATCTTGGTC
GACGTAATATTGTTATGG
ACTGTCTGTGAAACCATGTGAATCTAAACTCTTAAAAATGC

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CTGCCTCTCCTGTCCTTGC

GCCCTGACACTAAATTGTAAACTGTTTTTTAGTAATAAGAAT
TTCAATAGCTTCTCTGAA

AGAAGATGTCTCTGAGAGAGTAATATTTGACAGGTTCAGT
GTATTTAAAGACTTATAATG

TAAAGCAGAGATGTAACTAGAGAAACCTAGATATTGATGTC
AACAAACTAAGGGTGCATG

GAAAATGTGAAAGACTTTAAGAGTGGGTGACCCTGCCTAC
CAACACAATTCAATCCATGT

TTGAGGCTTTTTTTCATTAGCCTAATAGTGAAGTCAGTGGC
GTAAGGCCCCCTTGTTTAG

CACTCCTAAGGGTCCCTAATGATGGATAATTGTATTGGGCT

TAAATATAAATTTGTTTTCTCAATTAGGCG
CTTCATGCTCTGGGGCCCT

GGGTTTAGCTAGTGAGTGCTCATAGCAGTTGGCTGGGCAA
GGTTAGAAAGCAATGGTTCT

GTGCAGACATTTGCATTTAATTGACCAATATTTCAAATCGTG
TGTTACACAGGAATCATA

ACCTAATCAGCAGTTGTTTTTAATAAACATTGCATCTTGGTC
GACGTAATATTGTTATGG

ACTGTCTGTGAAACCATGTGAATCTAAACTCTTAAAAATGC
CTGCCTCTCCTGTCCTTGC

TAAATATAAATTTGTTTTCTCAATTAGGC

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.
We recall also the presence of IPA (Invertebrate Primitive Antibody) we meet in Asterids, Ophuirids, Crinoïds. Finally the found Igkappa genes in these last ones which are associated to Fab gene, Fc receptor gene, Cr gene, and, at last, MHC **class I, class II genes (HLA-E, HLA-B for class I) (HLA-DQB1, HLA-DBR1 for class II).**