

## Evidence of *Il2* and *Il6* Genes in the Crinoïd: *Antedon bifida* (Echinodermata)

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For the first time, in 1984, the concept of lymphokine-like substances was evoked in an Echinodermata: the sea star *Asterias rubens* (1). Later, in 1996, it was spoken of interleukin (*Il*)2, *Il*4, and *Il*6 in the same animal (2).

Immunogenomics contributed to determine evidence of the presence of *Il*2 (3) and *Il*4 genes in Echinodermata but not of *Il*6 gene.

The aim of this work, was the research of this last one, in an ancestral Echinodermata: the *Antedon bifida* which belongs to the class of Crinoïds.

*Antedon bifida* was obtained at the station of Biologie Marine of Roscoff, France. Digestive coeca were excised from the *A. bifida* body. mRNA was obtained from Uptizol (Interchim, France), and quality control was operated. 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 (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+ (5) with parameter word\_size 7.

Table 1 summarizes the obtained results with sea star *Il*2 and *Il*6 transcriptomes, when compared to Homo sapiens and Mus musculus ones. Figure 1 shows the corresponding sequences in 5'-3'direction.

Although *Il*2 gene appears like something well-known in Echinodermata, *Il*6 gene evidence was not yet related in invertebrates. Beck and Habicht spoke of *Il*6-like protein in 1996 in invertebrates (6). So it is the first time that *Il*6 gene is found in invertebrates. Our work in *Antedon bifida*, a Crinoïd, an ancestral Echinodermata shows that in

Table 1. *Il*2 and *Il*6 transcriptome characteristics

Query ID	Query Symbol	Species	Subject ID	Identity (%)	Length	Mismatch	Gapopen	Query cover (%)	E-value	Bitscore
NM_000586.3	IL2	Homo sapiens	TRINITY_DN20229_c2_g8_i1	97,06	34	1	0	4	5,00E-08	58,4
NM_001314054.1	IL6	Mus musculus	TRINITY_DN19147_c3_g2_i1	96	25	0	1	2	0,026	39,9

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TRINITY\_DN20229\_c2\_g8\_i1 (IL2)  
 5'ACACCCTCCATCTTGTAGCATAATTACTACAAAGATTAAGAAAAATCAAGCTGCTTAAG  
 A  
 AATAATACTGAACAATGGTGTAAAGCACCATTACACCTATACAATCATTAAAGCAATAAA  
 CGCAACAAGTATATTCAACTATTACAATAATATATTGCCCTGTCGTAATAGTATTTAACA  
 TAATTATATTGCGAAGAATTAAGCTGCGATAGAATTAGACAAAGAGAAGGTAATGAACAA  
 TATAAAAAATAATAA  
 AAA  
 AAAAAAAAAAAAAAAAAATAAAAAATTAAATAATAAAAAATAAAAAAAAAA3'

>TRINITY\_DN19147\_c3\_g2\_i1 (IL6)  
 5'AGTGAATTACGCAAAGTTCTGATTGGTTCCAAATCAATAAATTATCGCTAAATGAATCC  
 AAATCAAATTATATTATATTTAAACATAAAAAACAAAAATCCATCTCTCAAAACTTAAAA  
 GTTTTAATTAATGACAAGGTAATCACACGTGTTGAGGAAACCAAATTTCTTGGCGTCTCC  
 ATTGACTCAAATTTATCTTGGAACATCATATCAATACAATCTGCAACACAATTGCGAGA  
 AACACTGGTATGATGAACAAATTAAAGTACACACTTCCATCAAACATTTTATTTAATTTA  
 TATAATACTTTAATTCTTCCGTACATATCACTGCAACATTGCCTGGGCCGTTACACCT  
 GGCAAGTTCAGCACTTTATGCCCTGGACTAGTTTCGAAACTACCAATATTGACCGAATT  
 TTAAATTGCAAAAACGAGCAATCCGAATCTGTTTCAGGGGCATCATTGAGATCTCATTCA  
 AACACTTATTTTAACTTTAAATCTCTCAACGTCTTTGATGTTAATAAACTTCAAAC  
 GCATTATTCATGTACCGACTTACAAATAATCTACTTCCGACCCACATATGTTCACTCTTT  
 ACTAAACCTTCTGATACCCATACACATTTTACCCGTTTTTCCAATACTAATGTATACACT  
 GTTAAAACTGCGACTCGCACATTAGACGTCATTCAATACTTTATACCGGACCTAAACCT  
 TGGGAAAGTCTTTACATTCACCTGATAAAGAAACCTTCACTTTTATGTTTAAATTAACA  
 TATAAGCAATCTCTAATCCAAGCATATGATGAATAAGGTGTTATGATTATTTTAAATAAT  
 GTTAATTTATTGTTATTCTATTTTATATATTATAATTTAGTCACAACCTATTACTGATA  
 TTTGTTATTCTCTAATTTTACTAGGCATTTTGTACAGCAAATATCAAT3'

Figure 1. *Il2* and *Il6* sequences.

an original way.

In summary cytokine genes such as *Il1*, *Il2*, *Il4*, *Il6* exist in invertebrates. The present finding highlights the novelty of our work.

#### Conflict of interest

The authors declared no conflict of interest.

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