

## The Complement System in Echinodermata A Third Pathway: A Lectin Pathway?

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### ABSTRACT

Complement Classical and Alternate pathways co-exist in Echinodermata (Asterids, Ophiurids and Crinoïds). A third pathway: the Lectin Pathway appear in Ophiurids and Crinoïds.

**Keywords:** Echinodermata; Invertebrates; Complement; Lectin Pathway

### INTRODUCTION

Complement component genes of the classical and alternate pathway have been described in Asterids ( Ref.1) then in Ophiurids (Ref.2) at last in Crinoïds ( Ref.3). All these components found in these Echinodermata can be completed, to day, by MBL2 gene and MASP1 gene which characterize the well-known: Lectin Pathway. They are present in 2 classes of Echinodermata which are just studied: The Ophiurids and the Crinoïds

### MATERIAL AND METHODS

#### Animals

Ophiocomina nigra (Ophiurid) Antedon bifida (Crinoïd) were obtained at the station

« Of Biologie Marine of Roscoff » France.

### Obtention of Ophiurid 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.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

**Table1.** summarizes the obtained results with first Ophiurids. A table 2 shows those obtained with Crinoïds

QueryID	Query Name	SubjectID	Identity (%)	Length	Mismatch	Gap	Query cover	E-value	Bitscore
NM_000242.2	MBL2	TRINITY_DN15627_c0_g1_i1	100	22	0	0	1	2,30E-02	41,7
NM_001031849.2	MASP1	TRINITY_DN55866_c0_g1_i1	95,65	23	1	0	1	2,00E-01	38,1

**Table 1** The Transcriptomes of MBL2 and MASP1 Genes are the Following

TRINITY\_DN15627\_c0\_g1\_i1

```
5' GTTGA AAT TAAATATAAAAATATAAACCAGAACTACTAGCAAAGCTCTGAGCAAGTTGCA
TCTACCTGGATGCAATTGTGTTGTTAGCTTTCAACAGGCTGATATTATACCCAATCTATT
CCCATATTTAAAAGCAGTGACCTGGCTATATCATACGCAGCACATTGTAGGGTATTCTCT
TCAAAATGCAGAGAAAGAAAATATGAATAAAATAAAATATGATTTCAATTTTCAGCAGCAT
ACCACAAGTTATTTTTTCTACTGTAGAGATACAATATCAATCATCATCTTGTCTTCTACA3'
```

>TRINITY\_DN55866\_c0\_g1\_i1

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5' TATCAA AACTTGAAA AACTAGTAAAATATTTCACTAGTTTTTAACGCCATTCAATCAATAGCC
```

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AGTCTGGTGTCCATCGGACGTTTATTGTTTGACATTTAAAAACAGTCGAGATAAGTGTTA  
 AAATTCGAAAGAAAATCATGAAAAAAAATGTATGTGACACTGAAAAAACACCCTTTC  
 TTAAGTATTGATTATAAATAATGCGTAATAATTTTTTAAACAAAAATCTAAATAATAAAAT  
 CTAAACAACACTAGATCATTGAAGAATTAATCAAAAATGGAATAAAATAAAATAAAATAAAAGA  
 TTACCGTATTAAGGTACAAAATAGTAAATATGAG3'

**Table2.** And appropriate sequences concerning the transcriptomes of Crinoids genes are following

<u>QueryID</u>	<u>Query Name</u>	<u>SubjectID</u>	<u>Identit y (%)</u>	<u>Leugt h</u>	<u>Mismatc h</u>	<u>Gapope n</u>	<u>Quer y cover</u>	<u>E- value</u>	<u>Bitscor e</u>
NM_000242.2	MBL2	TRINITY_DN19440_c3_g1_i1	100	23	0	0	1	7,00E-03	43,6
NM_001031849.2	MASP1	TRINITY_DN20737_c10_g1_i2	92	25	2	0	1	7,80E-01	36,2

**Table 2**

>TRINITY\_DN19440\_c3\_g1\_i1

5'AAATAATATATTTGGAGGGTCACCCTTATCTATACTCTAAATATATAACTATAATTAATA  
 TAATTTTGTACAAAATAAATAATTTATCTATATAGTATTAATTTACAATAGTTTTTATTT  
 ATATAATTATCAAAACCTATAAAATATACAATAGTTGATCACCTATATATACATAAAATC  
 CATTATTATTGCACACATTCTGTTTAAACTCTCAAACAAGTCCATATAAATACATTTTCA  
 AATATTGATTGAACATCTACTCTATCAGAATTATACCAAATATAGTTCACCCAAAGAAAA  
 TGTTAGTGATATTAAGCGTAGCTCCGGGGTTAAAGACATTGATGATAGCCCCACTTAAT  
 TTTTCGACAGAAGTTAAGCCGAAAGTATTGTGAACAAAATGTGGTGGCAGAGGAATTTATT  
 ATTCATGATTTTATATCAAAATGAATTGAAAACAGTCATTCTGGCAAAATATAAGTGGGGT  
 TATTATCATTGTAAATGTTTATATTTTATAAAAACAATAGAAAACCTTTATGACTGGTACT  
 CTTTAAACAATTTCTCTCACTAATCTTTCAGTTCAGTTCAAAACCTGTCTATTACAAAC  
 TAGTACTAGTCTAATTTAAATTAATTAATCCTTATTACCAGAAACGTTTTTAGGCCTACT  
 ACTACTACTACTATTATTGCAATAACATCAAATGTGTTTTAAGAAAAAAAATCAGAGGTA  
 AAAGTAAATACATATAGCACTATTATTGGTGGTGATACTTCAGAATAGTCTTAGAAATAA  
 TAACAACCTTTATTATACCTGAGGTAAGGTAAGTGGTAGCTACCTATAGAATAATTTAAC  
 AATTACCAGCATATCGTTATTAATAGTAACAAGATTTTTATTAAAGAAAATGACATATTA  
 GACATTGTTTTACTACATAACAAAAGTATGAAGTAACAGAACGCAACAAGCATTGG  
 ACATGCATTCATACACAGACCGTATCATTACATACTGTAGCTATGGAAGACAACATTGG  
 AAGACAGAGAGACCAAAGAAGCAATATATAATATTATAAAGAATCACCAAAATACAATAA  
 AGACAAATAAACACAAAGAATTATTGCAGTATCACCATCATCATCATAAATCAATCT  
 TTAAAATGATAAAAATAATGAAATAGAGATTCTAGATTCTAAATGTAAATTTTGAGAAT  
 ATGCATCTGTAATAATCAGTATTTCTCTGTATATATGGCTTATGAGCTATACAGTATTTA  
 TAGCACGTAACCTGTACACTCTCCCTGTCCACTCTGGCTGCTATGATCTCAACATCTTC  
 TGCACCACAGAATAGCAATAGAGAGCTTTTCGAAAGAGGTGAGTTGGTGTATGCGACGCGCA  
 ACTGAGCATGCGGATACAAGAAAACCTTTCGAGACCGAACGCGATTTGAAGGAAGATAAC  
 ACGAGGCTGTTTCTGACTTGCTTGTCTCTCCTAACCTGTATCACTATTTTCGTAAGCTCTC  
 TATTGAACACCTATAAGGGGCAACAGCCTTCATTATCAATTTCTTTGTTCCACTAAATTC  
 CAGACTTTTCAATTTCTTTATCTTCTTTTTCCAGCAAGAATCGTCCGATAATATACATAG  
 CTCTTAGTACATTATCA3'

>TRINITY\_DN20737\_c10\_g1\_i2

5'ATTGATTGATAATTAATATATCTTTTATATTAATACGTTTAAATATGGTACCATGTGATTTGT  
 TTTTGTGATTTTTTTTTTTCAGGTGAAGACCTTTACCAAACCTCATGAAATAGTGCATT  
 GTCAGGAACCTTTTCAAGATGCATTCCATCTTCATGCTTCTATATCAGATGAGAATTC  
 TATGGTCTTTGGAGGTCACGTGATGGAGGTAATGGAGACGTATACAACCTATAGAGCTCGT  
 GGTGGTGAACCTCAAAGCCTGAAATTTACAAGAGAATTTGACTCGAGTTCTGGATACAA  
 GGAGCTTGTACATACGAAACAGAGAACAATCATCTACTACAACAGATACATAATGATATTG  
 TCTGTGAGTTAAACAACACTAATAATTGGTATTATAAAGCATATCTTGTATAGACACTACA  
 GTGCGTAACAAGATATGGTATGCCCAAAGAGGTTATATAAATAAATAGCGACCATTTTGTG  
 GAGACTTCGCTCTCGTCTAGTTACCCCTGTAGTTAATTATATAACCTCTTTGTGGTATTA  
 TATGCTGTACAAACAAGACAATATACTGTACAACAAAATCTAATTTTATTAAATTTCTA  
 CTTTCTAAATAGTATAATTGTAGAAGTGTAACTAACACCCGGGTTTTATTTTGAACG  
 ACGCCTCTTCAGTTTTTGGAGCAATGTCAAACATTTTCTGTGATGCTGAGGTAGAGAAAA  
 GGGGTAATATTGGGTAATTTTTATCTCTTAAAATAGGCCTAAACATGCACAGAGCTAGG  
 CTCTTTCTACACTATCAAAACAAAATGTGACAAAAAATGTGATGATGATGATGTCATATCA

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CTACCACCATATTGGGGCACATCACACTTTTCATCAGTAATCTGCCCTCTATTCCATAAAAT  
TAATGAAAAAACTAGATGTTTGAAGAAGGTTTTCAATCTTTTGTGAGTAGCTATAAAATG  
AATGAAAGTGAGTTGAACAGTGATTACATATGTGCATGGCTTCTGATATTAGTGCCATAG  
TATTCTTCATATTTCAGCACATACTCACTAATTGTAAATAATGTGTACATTACAGTTTATA  
CACTATTTATATGTATTACAATAGTTG3'
```

### CONCLUSION

MBL2 genes and MASP1 genes which initiate the Complement Lectin Pathway are present in these two classes of Echinodermata (Ophirids and Crinoids) with a comfortable e-value, a significant identity.

Is this pathway functional? It remains enigmatic.

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