

# Evidence of low affinity immunoglobulin epsilon Fc receptor gene in an invertebrate: The sea star *Asterias rubens*

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## Abstract

Kappa genes and complement genes were found in the sea star in the past. Recently, we discovered a “sea star IgKappa gene”. We present now a low affinity Ig epsilon Fc receptor gene when compared to mouse genome, in immunized and non-immunized sea stars to HRP.

## Introduction

In 2011, it was striking to discover Kappa genes [1] in the transcriptome of *Asterias rubens*, when compared to mouse genome. Two years later we found complement genes [2] from C1 to C9. At last, we cloned a gene, with a SMART kit PCR cDNA synthesis (Clontech) [3]: the “sea star Igkappa gene” with two Ig sites, which lead to the synthesis of a primitive antibody: an anti-HRP antibody, by the use of a *E. coli* plasmid [4]. To date we find all these elements in immunized and non-immunized sea stars to HRP (Horse- radish Peroxydase) and the emergence of low affinity Immunoglobulin epsilon Fc receptor, we describe now.

## Material and methods

Sea stars were obtained from the Biology Institute (Gothenburg University). Immunizations, genomic studies were already described [1]. After ligation of adapters for Illumina's GSII sequencing system, the cDNA was sequenced on the Illumina GSII platform sequencing. 1.100 bp from one side of the approximately 200 bp fragments sequences were assembled using Velvet [5].

## Results

Low affinity Immunoglobulin epsilon Fc receptor appear in immunized and non-immunized sea star genomes. Result with non-immunized animals is given:

One contig (Contig10847) could be annotated via BLASTX to *Mus musculus* “Isoform 3 of Low affinity immunoglobulin epsilon Fc receptor” from the Swissprot database (FCER2\_MOUSE), with an e-value of 1.49e-11. On an aligned region of 118 amino acids, 63 positive and 40 identical amino acids were found.

5'TCCATTAGGGCAATGAGTGGGACTGCGCGGCTTGCCA-CAGATCATCCCTTTTCTATCACGACACCTCGAGTCTTTC-CACTTGCCGTTGCTAATCTGTAATGCCACACAGTTATTCTC-CAATGATTCCGACTCCAGACAGCTCAGTTTGCTCTCTTCGAT-GAAGTTCGTGTAGTTGACGGGGGAATCGTTTGACCATTTC-

CAATCGCTTTCGTTGTGTGTATCATGGAGCCCGATCCACAC-GTCCCTGTCAATTAGGTCGGTAAGAAAATCATTAAATTTCTTG-GTCAGTGATGGCGACCAGCCTAGCGCCGTCGTATTTAGTG-CACTTCTGTTTCAGCATCGACCCAGCGTGCTACATCGTCTG-GAATCCAGAAGCATTCATCACGGAAGAGATGGCCGTTGTT-TAGGCAGTACTGTGGTTGACCACGTACTGTTGAAGAAGAT-GAGCTGACCCAATAACCATCATCATCAGAAATGGAATCATT-GTGAATTTGTTTGAGATACGTCGGATACGTCGGTCCGTTAG-ATGAAAAAACTGCCGAAGTCTCTCACATAATTCACCAG-GCATTGTTGATGCCTTGCTGCTCTATGTTGATGCTTGGTG-GCAGTCCACGAAAGAATGTGCAGTTAGGGAAAGTCCAGCTT-GTATATCTC3”

## Discussion and conclusion

A similar result was obtained with immunized sea stars. The existence of immunoglobulin Fc receptor gene corroborates the presence of an immunoglobulin in sea star immune system.

In mouse, it is well-known that Fc receptor binds the antibody to the antigen. In this interaction, antibody can regulate the immune response [6] through Fc receptor. In mouse the antibody is an IgE. We have not found IgE gene in sea star genome but exclusively Kappa genes. We suggest again that the sea star primitive antibody is composed of 4 light kappa chains [7] without disulfid bonds.

## References

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