

Antedon bifida (Crinoïds Echinodermata): Immune properties

Michel Leclerc

Immunology of Invertebrates University of Orleans, 556 rue Isabelle Romée, 45640 Sandillon, France

Abstract :

We discover the Fundamentals immune properties of the Crinoïd: Antedon Bifida by the use of its genome. We review the presence of IGH gene, Fab fragment gene, Fc receptor one and MHC genes. In summary, Antedon bifida presents an IPA (Invertebrate Primitive Anti body) and an Adaptive Immunity.

Introduction :

The aim of this work is to confirm or infirm the presence of immune genes in an ancestral Echinodermata: Antedon Bifida which belongs to the class of Crinoïds. Echinodermata are composed of 5 classes: The Asterids, the Echinids, the Ophiurids, the Crinoïds, and There for the Holothurids which haven't the famous axial organ considered as an ancestral lymphoid organ. It's an ancestral Echinodermata.

The body is a concave disc surrounded by ten pinnately divided arms, giving it a fan-like appearance. Antedon Bifida is a strange animal, with a disc (the main body) which is surrounded by ten arms. The mouth and ambulacral grooves are on the upper surface of the disc. The arms can be up to 10 cm (4 in) long but are usually shorter than this. The undersides of the arms have prominent transverse ridges and some have modifications for feeding and reproduction. The pinnules are jointed, have around 35 portions and bear inconsistent measured cylinder feet in gatherings of three. The arm colour is variable, starting from yellow or pink to deep purple, sometimes spotted or blotched, and therefore the pinnules are usually paler or white. There are around twenty short cirri, joined and masterminded in transverse lines on a focal raised ossicle. These twist under and handle the surface empowering the creature to slither around which it can do with extraordinary quickness. It may be mistaken for the fairly comparable Antedon petasus however that species is commonly bigger with up to 50 cirri, looks neater and doesn't have edges on the undersides of its arms.

Antedon bifida is primarily found on the shorelines of north-west Europe, the range expansion from the Shetland Islands south to Portugal. It has additionally been accounted for from Algeria, Tunisia, West Africa and Venezuela. Around the British Isles, it is found on northeastern and on western coasts. It occurs from the low tide mark to a depth of about 200 m (650 ft) and occasionally much deeper. It is often related to other crinoïds and bryozoans and should dominate its habitat. It moves from place to place, clinging to rocks, seaweed and molluscs with its clawed cirri. It favours areas with strong currents in both sheltered and fairly exposed positions and is often found in gullies.

A. Bifida may be a suspension feeder, catching detritus and plankton with its pinnules as they float past. Larger particles are captured and held by the two larger tube feet of each group of three. Small particles adhere to the mucus they extrude and the smaller third foot helps to bundle these together to form a bolus. The food is then transferred to the ambulacral groove where it's moved towards the mouth by the present created by the cilia that line the groove. As well as crawling around, this feather star can swim short distances by flapping its arms.

A. Bifida is dioecious, each individual being either male or female. Gametes are produced, mostly between May and July, from the genital canals found at the bottom of some arms. The eggs stick with the surface of the pinnules where fertilisation takes place. The female produces a mucus net and protects the developing embryos by holding her arms together in what is described as brooding behaviour. After about five days, the eggs hatch into free-swimming larvae which soon choose a solid surface and fasten

themselves with a brief stalk. Now referred to as pentacrinoïd larvae, they need an identical feeding system thereto of the adults. Eventually, they develop clawed cirri and become detached from their stalks, reaching maturity in one to two years. A. Bifida features a symbiotic relationship with the marine worm, Myzostoma cirriferum. The worm larvae are caught by the tube feet of the feather star and treated like food particles. They join inside the ambulacral notches of the pinnules where they experience transformation and develop. They hold on with parapodial hooks and can move about on the host

We have performed genomic studies in 2018, concerning this ancestral Echinoderm, as following: Antedon bifida possesses two adhesive systems: the papillae and therefore the hillocks. It comes from Roscoff (France) (see the figure below)



Materials and Methods

Creatures: Antedon Bifida was gotten at the station « Of Biologie Marine of Roscoff » France.

Obtention of crinoïd mRNA: Digestive coeca were extracted from the A. Bifida body. A. Bifida mRNA was acquired from Uptizol (Interchim). Quality control was worked.

Sequencing: Sequencing was made on Illumina Next Seq 500 with matched end: 2.75 bp Transcriptome was gathered from RNA-Seq fastq documents utilizing Trinity v2.1.1 with default boundaries. A BLAST database was made with the gathered transcripts utilizing makeblastdb application from ncbi-blast+ (v2.2.31+). The groupings of transcripts of intrigue were then impacted against this database utilizing blastn application from ncbi-blast+ with boundary word_size 7.

Results:

We discover in it :

- 1) An IGH gene recalling the IPA (Invertebrate Primitive Antibody)
- 2) A Fab fragment gene which matches with human Fab Gene
- 3) An Fc receptor gene
- 4) At Last MHC genes class I and Class II)

Conclusion:

From data to data it appears that Echinodermata, especially Antedon Bifida, possess a sophisticated immune system from a point of genomic point of view. Many human immune genes are shared with Echinodermata genes and in particular: Antedon Bifida: It's of special interest in the domain of Comparative Immunology. So, 3 classes of Echinodermata: the Asterids, the Ophiurids and the Crinoïds possess the IPA, Fab fragment gene, Fc receptor gene and MHC genes. They present Adaptive Immunity. 2 classes: the Holothurids, the Echinids, have not. We suppose these last ones are less evolved and show we think just an innate immunity.