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Short Communication

Role of Sea Star Platelets, of Sea Star Lymphocytes in Invertebrates

Michel Leclerc*

French Director and Screenwriter, France

***Corresponding Author:** Michel Leclerc, French Director and Screenwriter, France.

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These structures could be of mesodermic origin like the axial organ cells (in a general way) [1-3].

We know that blood platelets are issued, in vertebrates, from bone marrow: they are mesodermic from an embryologic point of view. In Echinodermata there is no bone marrow but a stone canal [3] which resembles a "strange structure" it evokes bone marrow of vertebrates and the sea star axial organ lies along the stone canal [3].

These sea star platelets could play a role in coagulation phenomenon in invertebrates or may be in experimental assay in vertebrates.

We recall that the echinodermata coelomic liquid contains various cell types involved in preserving the organism's integrity. Some of these cells are involved in coagulation and cicatrisation of injuries, while others are responsible for phagocytosis and cytotoxicity, thus enabling clearance and graft rejection. Bertheussen and Seljelid [4], for instance, have shown that 67% of the coelomocytes in Strongylocentrotus droebachiensis are phagocytes. An approach to the study of lytic activity in Echinodermata consisted of the search for lysing substances in the coelomic fluid.

Ryoyama [5] has demonstrated, in various sea urchins, not only agglutination, but also lytic activity against erythrocytes of several species of vertebrates. Such haemagglutinins and haemolysis have also been detected in the coelomic liquid of a sea urchin, a sea star [6]. An exhaustive study of the lytic system has been carried out by the team of Canicatti [6].

They have shown that two categories of haemolysins are produced by two different sub-categories of amibocytes. The first called haemolysin 1, or Hel, Ca dependent and thermosensitive, is a natural constituent of the coelomic fluid. The second, called haemolysin 2, or He2, Ca-independent and not thermo-sensitive, is only produced after antigenic stimulation. These haemolysins have a dual function: firstly, they are responsible for opsonizing activity via which the not-self in recognized and phagocytized ; secondly, they can interact with the membrane of the target cell and damage it, leading to lysis of the cell. The latter process is reminiscent of the cytolytic effect mediated by the constituents of the complement system and by the perforins in vertebrates, with which a phylogenetic affinity has been established by Bertheussen and Canicatti [6].

It should be mentioned that anti-bacterial activity due to lysosomal enzymes has also been revealed in an holothurid (Echinodermata) [7].

We recall now that the true evidence of antigen-antibody reactions in Echinodermata was given by Leclerc's works [8], He shows that sea star lymphocytes interact with phagocytes playing the role of macrophages to initiate the sea star primitive antibody: the IPA (Invertebrate Primitive Antibody) We recall also the presence of a complement system similar to vertebrate one [9].

Another category of molecules which have considerable importance in the immune response of invertebrates is cytokins (lymphokins, monokins and interleukins) [10]. They are polypeptides which are synthetized by a wide range of cells in sea star system: lymphocytes and phagocytes/macrophages. They interact with sea star primitive antibody to regulate the immune response.

So, the immune system of sea star (Echinodermata) is greatly sophisticated. It may also include platelets.

Figure: TEM view of sea star platelet.

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