Hematology has been extensively studied in vertebrate models because it is one of the most effective aids in the diagnosis of diseases. On the contrary very little is known about the structure and functions of crustacean blood cells. Hence the present investigation is carried out with an aim to update the knowledge regarding the decapod hemocytes and its immunological role in the defense processes. *Paratelphusa hydrodromous*, the freshwater crab is used as the experimental animal to study the hematological characteristics. Since a controversy exists in the classification scheme of the crustacean hemocytes, an attempt has been made to characterise the hemocytes of *P. hydrodromous* based on morphological, functional and developmental criteria. *P. hydrodromous* in common with most crustaceans possesses four general types of circulating hemocytes. Prohemocytes, which are very small are regarded as stem cells and hyalinocytes are immature cells with no granules. Intermediate granulocytes include all other granular cells that have not matured completely. Eosinophilic granulocytes are considered to be fully differentiated cells.

The organic and inorganic composition of the hemolymph are analysed and quantified, since this would provide a groundwork to assess the physiological state of the animal. The influence of endogenous and exogenous factors on hemogram and hemolymph biochemistry is evaluated, as they elicit the mechanism, which manifests the haemostasis in crustaceans.

The immunotoxic potential of the crab hemocytes in relation to environmental xenobiotics is studied and illustrated. The hemocyte response in the internal defense due to experimental bacterial challenge is clearly elucidated. Hence the whole study will constitute a rewarding exercise, since it may obviate the difficulties faced by previous workers in the identification and functions of hemocytes. It is also hoped that the experimental findings of this research work will assist cellular immunologists in their comparative studies.