SUMMARY
Phenoloxidase is a potentially dangerous enzyme to insects, because it oxidizes phenolic compounds to the corresponding quinones. Precursors of granular phenoloxidase and laccase are programmed to be activated at defined times of development. However present results have clear evidence that wound phenoloxidase and hemolymph phenoloxidase must be readily activated in response to invasion of microorganisms into the hemocoel.

Whatever mechanisms silkworms have exploited, it is obvious that their malfunction would seriously jeopardize it's survival. For example undesired systemic activation of hemolymph phenoloxidase in silkworms would result in blackening of hemolymph in a matter of seconds and would lead to the death of the silkworms.

During our experiments, regulation mechanisms for activation of cuticular phenoloxidase in hemolymph as is suggested by the occurrence of many immuno signals affecting the silkworm resistance.

Present results along with those of previous studies demonstrate the ubiquity of prophenoloxidase throughout the silkworm body (hemolymph and cuticle). The insect tissues literally bathed in or surrounded by this enzyme zymogen and it's activating cascade. Predominant evidence from this results are that prophenoloxidase picks up oxygen from both the vast body surface and tracheal system and transport it through the hemolymph to the tissues.
Hemolin is a bacteria-inducible protein of the immunoglobulin superfamily identified in silkworm \textit{(Bombyx mori)}. The role of this protein in hemocyte aggregation stimulated by the LPS was prevented by hemolin in a dose dependent fashion, present results suggest that hemolin is involved in the regulation of the cellular immune responses.

Antibacterial activity in the hemolymph of \textit{Bombyx mori} increased in parallel with cecropin activity after injection of the larvae with soluble peptidoglycan. The elicitor specificity for lysozyme induction was identified to that for cecropin suggesting a common mechanism for recognition of bacteria suggesting that phagocytosis of bacteria by silkworm hemocytes may not be essential process for the induction of antibacterial protein synthesis in the silkworms.

In a few mammalian systems LPS binding protein in plasma was shown to potentiate cellular response to LPS by facilitating binding of the complex of LPS binding protein and LPS to plasma membrane protein. However the silkworm protein with similar function to the mammalian LPS binding protein has not been found, but it remains a moot question whether peptidoglycon recognition factor (PGRP) has opsonic activity for Gram +ve bacteria or other biological activities in addition to it’s activity to trigger the prophenoloxidase cascade.
We surmise, that immune signaling may lead to enhanced pro-enkephalin proteolytic processing freeing both opioid peptides and antibacterial peptides during innate immune response. In this scenario the peptides would stimulate hemocyte chemotaxis and phagocytosis as well as the secretion of immunostimulatory factors. During this process the stimulatory liberated pro-enkephalin fragment having antibacterial activity would attack bacteria immediately, allowing time for the immune stimulating opioid peptides to manifest themselves. Such innate immuno mechanisms seem conserved in course of evolution.

Knowledge of evolutionary ancient mechanisms of innate immunity of invertebrates play a major role not only as the first barrier of defense against disease but efficiently providing adaptive immunity with specific information about infectious and neoplastic danger. Further the role of innate immune mechanisms in adverse inflammatory, Autoimmune and allergic reactions and the development of novel approaches for therapeutic interventions are made easy after exploration of these novel peptides from silkworm (Bombyx mori).