CHEMISTRY Departmental Seminar

Spring 2018
CHEM 285 Schedule
Tuesdays at 4:30-5:45PM
Room Duncan Hall 250

May 8th, 2018

Ms Olive Burata
(SJSU Rascón Lab)
MS Final Oral Seminar

A REBEL WITH A CAUSE?

An in vitro biochemical study of a chymotrypsin-like serine protease from the female Aedes aegypti mosquito

Originally from Africa, the anthropophilic, anautogenous female Aedes aegypti mosquito has become widespread in other continents due to climate change, deforestation, increased urbanization, and through travel to endemic areas. This species of mosquito is a dominant vector of four bloodborne viruses: Dengue, Chikungunya, Yellow Fever, and Zika. The diseases largely associated with these viruses are considered to be “Tropically Neglected Diseases” by the World Health Organization, which is partly why no specific treatments are available and only one vaccine (against Yellow Fever) has been approved for use in all countries. Hence, defenses against infection and transmission are reliant on human competence to limit interactions with the vector mosquito or through direct abatement using methods that are either too expensive or too ecologically invasive upon other organisms. An alternative vector control approach focuses specifically on the mosquito. More specifically, focusing on reducing blood meal protein digestion, which is a necessary process to fuel the gonotrophic cycle. The idea is that if this process is inhibited, a resulting effect in the reduction of eggs oviposited will be observed. This can be achieved through inhibition of digestive serine proteases that are subsequently released in the midgut in the presence of a blood meal. Trypsin-like serine proteases are the major endoproteases involved in bloodmeal protein digestion, and much of the research in the 1990s, have been focused on understanding their proteolytic function and overall role in digestion. However, the study of chymotrypsin-like serine proteases has been neglected and have also been identified in the midgut of the mosquito. The focus of this work will be on AaCHYMO, a chymotrypsin-like serine protease first identified in 1996. Therefore, in order to understand the role of this protease in the blood meal digestion process, we must first isolate and study the chymotrypsin in vitro. For the first time, recombinant AaCHYMO has been recombinantly expressed solubly in bacteria, and more surprisingly, the zymogen form of the enzyme is autocatalytic and has enough activity to cleave a well-known chymotrypsin-like substrate (Suc-Ala-Ala-Pro-Phe-pNA). This activity may be novel since autocatalytic behavior in chymotrypsin-like proteases is not commonly found in both vertebrate and invertebrate organisms.

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