**Biological Pest Control**

After completing the “Evolution of Caffeine Biosynthesis” section of the case, read the following abstract and answer the following questions.



Here we will explore the structure of a specific enzyme (Chitinase, PDB ID 3g6m) from Clonostachys rosea, a mycoparasitic fungus, and a potential biocontrol agent with worldwide distribution in complex with its inhibitor, caffeine.

Q1. Explore the structure (PDB ID 3g6m) and explain where in the structure of the chitinase does the caffeine bind? Include an image to illustrate your answer.

Q2. Where is the conserved DXDE motif in the structure? Support your answer with a suitably labeled illustration.

Q3. Explore the neighborhood of the bound caffeine and list some of the non-covalent interactions that stabilize it. Support your answer with an illustration.

Q4. The Trp381 is the most conserved residues in all Family 18 chitinases. Can you explain the structural and functional significance of this residue – why do you think this is highly conserved? Support your answer with a suitably labeled illustration.