

Cancer-inhibiting Diet-Derived Alkaloids in Secretions from Hawaii Poison Dart Frog *Dendrobates auratus*

Cook, Aslan (School: Kamehameha Schools Kapalama Campus)

Dendrobates auratus is a species of poison dart frog with skin secretions that contain diet-derived alkaloids. Plant alkaloids have been used in cancer research, so alkaloids in *D. auratus* secretions may also have anticancer properties. Previous years' research has shown that *D. auratus* secretions affect RPMI-8226 myeloma cells. This year focused on specifying cellular effects of alkaloids. Three pumiliotoxin and two allopumiliotoxin alkaloids were identified in *D. auratus* secretions via liquid chromatography mass spectrometry. Pumiliotoxins and allopumiliotoxins block voltage-gated sodium channels, which are key in cell proliferation for many cancers, breast cancer in particular. Interfering with these channels can lead to cell-cycle arrest, which was observed in cells treated with alkaloid-containing frog and ant extracts. Extracts were made from *D. auratus* skin secretions, as well as from two species of ant found in the *D. auratus* diet— *Technomyrmex difficilis* and *Plagiolepis alluaudi*. Extracts were tested against RPMI-8226 myeloma and MCF-7 breast cancer cells at various time points. Cells were quantified via hemocytometer counting and XTT viability assay. Both frog and ant extracts significantly inhibited RPMI-8226 and MCF-7 growth. Hoechst nuclear staining showed enlarged cells in extract-treated cells, which may indicate that extracts are inducing cell cycle arrest in the form of senescence. Pumiliotoxin and allopumiliotoxin alkaloids from the diet and secretions of Hawaii *Dendrobates auratus* inhibit the growth of RPMI-8226 myeloma and MCF-7 breast cancer cells, likely by blocking voltage-gated sodium channels in the cell.

Awards Won:

