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**THE EFFECT OF AGRICULTURAL AND RESIDENTIAL RUNOFF ON THE  
MICROBIOLOGY OF A HAWAIIAN AHUPUA'A**

The objective of this project was to study the relationship between environmental runoff and the incidence of antibiotic resistance in bacteria in freshwater streams. Five water systems were studied along the windward coast. Collection sites along the watercourse included sites upstream of residential areas, throughout residential areas, and sites of entrance into the sea or bays. It was hypothesized that the incidence of antibiotic resistant microorganisms should be correlated with runoff from residential and agricultural areas into the stream. Seemingly “pristine” sites contained bacteria resistant to at least one antibiotic. The percentage of antibiotic resistance did not increase along the course of the stream, contrary to what had been expected. Data showed that the incidence of bacterial resistance isn't necessarily directly correlated to environmental and residential runoff. Areas most affected by runoff didn't show a dramatic increase in the percentage of resistant organisms. Antibiotic resistance was found in the bacteria cultured from even the most pristine systems. Therefore antibiotic resistance can't solely be based on the influence of runoff in the environment. Further data clearly showed that many antibiotic resistant microorganisms are also resistant to concentrations of heavy metals reported in the sediments of indicator streams (Waihee, System III). ). The data shows that if a bacterium has antibiotic resistance it has a high probability of having dual resistance to a heavy metal. A plasmid (pSTAMP) of size 3,200 base pairs was isolated from a bacterium with dual antibiotic and heavy metal resistance. Further analysis of the plasmid is currently in progress.