DNA is found within almost every cell and contains the instructions for life. It is extremely individualizing, as every person with the exception of identical twins has different DNA, and is often used in criminal cases to prove or disprove contact between individuals. DNA used in a criminal case may come from any area of the body or from any bodily fluid, including blood, saliva, and semen.

It is important to know the origin of the DNA because it helps to characterize, in an unbiased way, the nature of the contact in which the DNA was left behind.

All conventional methods of identifying saliva rely on identifying human salivary amylase in the suspected stain. Human salivary amylase is an enzyme in saliva that digests starches. Shown on my slide are two of the typical methods used to identify saliva.

Wurster-Laux paper is a method that utilizes the amylase’s ability to digest starch by bringing starch into close contact with the suspected stain. Areas where no starch has been digested will turn blue upon treatment with iodine and areas that have been digested by the amylase will remain white.

Rapid Stain Identification cards, also shown on my slide, function in the same way as an at-home pregnancy test: a sample of the questioned stain is placed on the test strip and if amylase is present, antibodies bind twice to the amylase as the sample diffuses across the test strip and appear as a pink line. While both of these methods are fast and can be very sensitive, they lack specificity.

Human salivary amylase, while a component of saliva, can be found in other body fluids, especially feces, and even in nonhuman sources. These alternative sources can be confounding, especially when trying to recreate an unbiased account of a crime. A possible solution to the amylase problem lies in our human microbiome. The microbes found in our mouth are proven to be seldom, if ever, found in other body fluids.

This provides a higher degree of discrimination between saliva and other bodily fluids. In the past, a variety of these bacteria have been demonstrated to be resistant to degradation by ultraviolet light radiation, heat shock, and other microbes. My research is focused on further evaluating the robustness of these bacteria as they degrade over a period of one month at various temperature conditions, with the intention of further characterizing the potential of these bacteria as a marker for human saliva in a forensic, criminal setting, allowing us the best method of determining the nature of contact between two individuals in which DNA was left behind.