Guide to Implementing a Forensics Unit in the Classroom

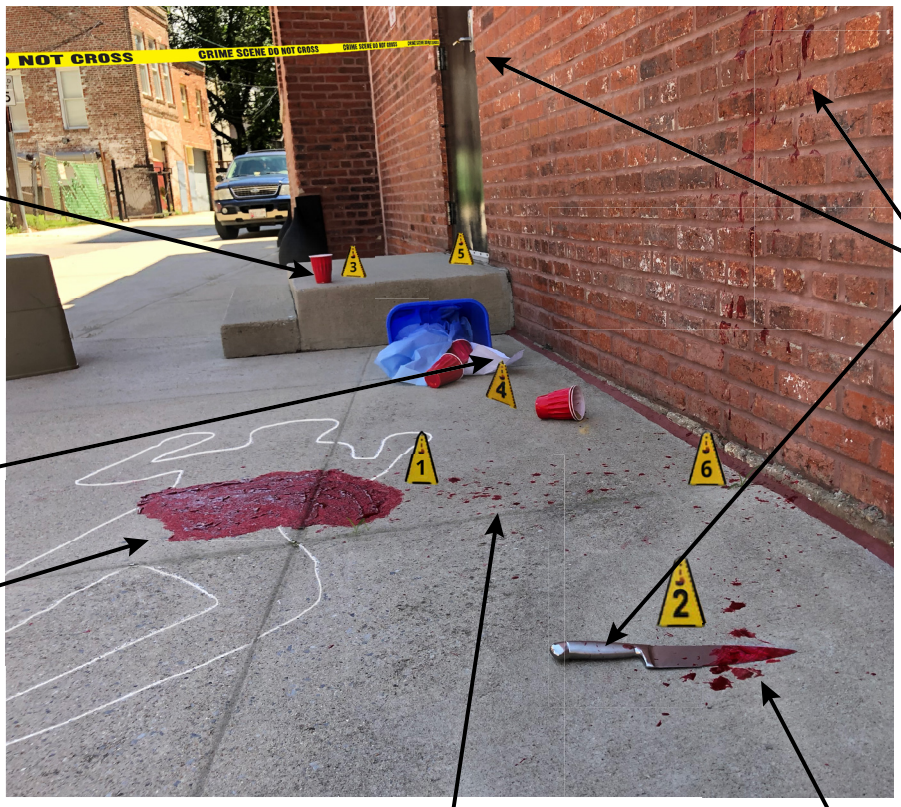
Forensic science is the application of scientific knowledge to answer questions of interest within the legal system. Forensics incorporates diverse fields such as biotechnology, toxicology, chemistry, and physics to characterize physical evidence found at the scene of a crime. Given forensics' widespread reach in popular culture and mainstream media, it's a great way to introduce the applications of biotechnology to your class. However, putting together a standalone forensics unit can be a lot of work, and there are a lot of options for activities. Here, we outline a basic forensic investigation and the different experiments that your class could use to solve a classroom crime.

Where to Start

The first step in incorporating forensics into your classroom is coming up with a crime scene scenario. Many teachers will use suspects from their school or community to fabricate a crime. Should you not want to come up with your own scenario, a scenario for this kit and background on the characters involved is provided in Appendix A.

The next step is to create the evidence! Forensic experiments from Edvotek include both physical evidence (fingerprints, ransom notes, etc) and simulated biological evidence (blood, saliva, etc).

Below is an image of a (staged) murder in an alley. Each potential piece of evidence is marked with an Edvotek kit's catalog number.



Could someone have been drugged?
Cat. #195
Cat. #193

Can we identify this handwriting?
Cat. #196

Whose blood is this?
Cat. #130
Cat. #S-51
Cat. #225
Cat. #109
Cat. #371

Are there fingerprints? Do they match a criminal's?
Cat. #S-91

Is that blood?
Cat. #191
Cat. #194

What kind of blood is that?
Cat. #192
Cat. #140

Student Investigation

As forensic investigators, students will collect the evidence and determine whether it is physical or biological. Once they have confirmed the presence of a biological sample (blood, saliva, etc.), the next step is to perform DNA analysis on it to rule out or implicate suspects. Analyzing several polymorphisms within a person's genome generates a unique DNA "fingerprint". DNA fingerprints can allow us to distinguish one individual from another and match crime scene DNA to a suspect.

In every Edvotek® forensic DNA kit, you will be provided with crime scene and suspect DNA. DNA is analyzed by first amplifying it using the polymerase chain reaction (PCR), and then visualized using agarose gel electrophoresis. Depending on the skill level of your class, Edvotek® offers many different options for DNA fingerprinting exercises.

Level 1: Easy - Edvo-Kit #S-51
This experiment includes simulated pre-amplified DNA which is packaged in Ready-to-Load™ QuickStrips™. Students simply puncture through the aluminum foil and load their samples directly into the DNA gel. The DNA is simulated using dyes, so no post-electrophoresis staining is necessary.

Level 2: Intermediate - Edvo-Kit #130 and Edvo-Kit #109
These kits include simulated crime scene and suspect DNA which is packaged into Ready-to-Load™ QuickStrips™. The samples have already been subject to PCR amplification alone (Edvo-kit #130) or with additional restriction enzyme analysis (Edvo-Kit #109). The samples contain DNA and require post-electrophoresis staining using the FlashBlue™ provided in the kit.

Level 3: Advanced - Edvo-Kit #225 and Edvo-Kit #371
Students perform the DNA analysis themselves in these kits! In Edvo-Kit #225, crime scene and suspect DNA is provided, along with restriction enzymes. Students digest the DNA with restriction enzymes and analyze the banding patterns using agarose gel electrophoresis. In Edvo-Kit #371, the crime scene and suspect DNA has not been amplified by PCR. Template DNA and primers are provided, along with a PCR EdvoBead™. Students combine the reagents and perform PCR. The PCR products are then analyzed using agarose gel electrophoresis.

No matter the level your students are at, Edvotek® can help you bring the exciting world of forensic DNA fingerprinting directly into your classroom.