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SPRING 2018

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DNA EDITION



THE DNA BACKLOG

The DNA backlog increased dramatically in 2017, mainly due to the passage of Melissa's Law (SB 1571) and a mandated change to the technology used for DNA analysis. Melissa's Law, passed in March of 2016, requires that previously unsubmitted SAFE (Sexual Assault Forensic Evidence) kits be submitted to the lab for analysis, in addition to *all* kits collected from that point forward (only excluding kits classified as anonymous). As a result, over two thousand SAFE kits were submitted to the lab. The offense dates for these kits range from the 1990s to the present. This increase in SAFE kit submissions coincided with the FBI requiring DNA labs participating in CODIS (the Combined DNA Index System) to adopt new technology that analyzes an expanded number of DNA locations by January 1, 2017. The analysts in the DNA unit subsequently spent several months training in this technology, time that could not be spent on casework.

As of March 1, 2018, the DNA backlog was approximately 917 cases, the vast majority of which are SAFE kits. To address this, the DNA unit adopted a team-based approach which has dramatically improved efficiency and speed. This approach divides the unit into three teams: the Major Crimes team, the Y-screen team, and the Outsourcing review team. Each of the teams will be working certain categories of casework. During the month of December, these teams reduced the backlog by 63 cases. That means that we completed the 201 requests we received that month *plus 63 more!*



Analyst Tanya Kauffman uses the QIAcube to isolate sperm cells from SAFE kit samples.



The QIAcube is a recently-validated robot in the DNA lab.





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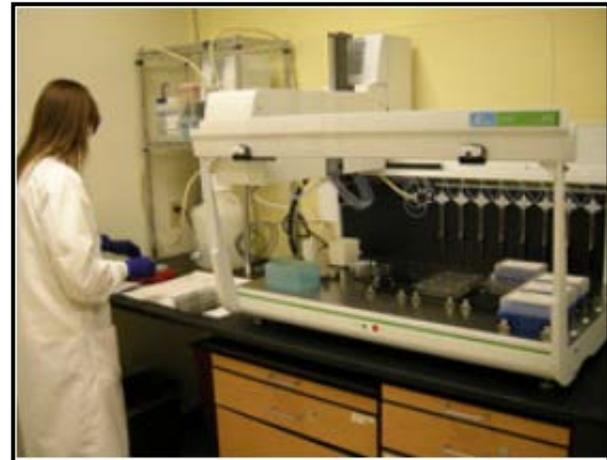
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DNA Teams

WHAT WORK DOES EACH DNA TEAM PERFORM?

Y-Screen Team

The Y-Screen team focuses on cases in which the only evidence submitted is a SAFE kit. Why is it called the Y-Screen team? The team screens these kits for evidence of male DNA by testing for the Y-chromosome. This direct-to-DNA approach was adopted after reviewing recommendations from the Scientific Working Group on DNA Analysis Methods and studies conducted by the National Institute of Justice. Screening is performed by extracting the DNA from a sample and determining the quantity of both the human and male DNA present. Most sexual assault cases are associated with a male suspect. Therefore, if no male DNA is present, analysis of the SAFE kit will stop. If male DNA is present, the samples in the SAFE kit will proceed to DNA typing via either traditional DNA analysis or Y-STR analysis. For cases in which the victim is male and/or cases in which the suspect is female, samples will proceed to DNA typing regardless of the screening results. This team was formed in October and has already tested more SAFE kits in November and December than the entire unit tested in any previous month in the last year.



Analyst Jessica Buttler sets up samples for quantification with the Janus Liquid Handling Robot.

Major Crimes Team

The Major Crimes team completes testing for all other person crimes. Cases in this category may include sexual assault investigations in which a SAFE kit was submitted along with other items which may be suitable for DNA analysis, such as articles of clothing, fingernail/hand swabs, weapons, etc. As of March 1, there are approximately 18 of these cases unassigned. Cases in this category are often more complex and time consuming than Y-screening cases, as more items of evidence may be submitted and more samples may proceed through the entire DNA workflow. The Major Crimes team also handles all cases that are being rushed for either public safety or court reasons, and analysts may also be responsible for specialized testing, including Y-STR, missing person, and bone analysis. As the backlog for these cases is further reduced, we anticipate some analysts will transition to the Y-Screen team.

Outsourcing Review team

Several counties applied for and received federal funding to outsource analysis of their SAFE kit backlog to a private laboratory. The private laboratory is unable to upload eligible profiles to the CODIS database, a requirement of Melissa's Law, so two OSP analysts are devoted to reviewing the private lab's results and uploading eligible profiles to the database. Approximately 3600 cases were outsourced. As of March 1, OSP has reviewed all cases that have been completed by the private lab. There are still cases at the private laboratory waiting to be analyzed. Once all of the outsourced cases are complete, these analysts will join the Y-screen team.

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CODIS: COMBINED DNA INDEX SYSTEM



THE CODIS TEAM AND AN OVERVIEW OF THE CODIS PROGRAM

CODIS is a network of databases maintained at local, state, and national levels. The Oregon State Police CODIS team consists of one State Administrator, one back-up Administrator and one analyst dedicated to analyzing and entering offender profiles. The sixteen remaining DNA analysts enter profiles from casework evidence. The Oregon State CODIS team also receives assistance from the state's Forensic Anthropologist when analyzing and entering profiles from missing or unidentified persons. Oregon participates in the CODIS network under a Memo of Understanding between the Oregon State Police and the FBI. This Memo of Understanding compels us to comply with the FBI's rules as well as those set forth in the Congressional DNA Act of 1994.

For a profile from casework evidence to be entered into the CODIS database, it must be eligible. Eligibility criteria are satisfied when the answer is "Yes" to all of the following questions:

- (1) Was a crime committed?
- (2) Is the profile from biological evidence associated with the crime scene?
- (3) Is the profile attributable to the putative perpetrator of the crime?

SAFE Kits can present some specific eligibility challenges. Some cases are very old and their incident reports have been purged. Without some form of documentation that a crime was committed, a profile is not eligible for CODIS. With some cases, an incident report describing the crime is available, but the investigator later uses terms like "unfounded" or "no crime." Profiles are not eligible for CODIS entry if either of these terms is used in the incident report. Because we have agreed to only enter profiles from putative perpetrators into the CODIS database, it is important that we receive DNA reference standards from consensual partners. Without them we are unable to distinguish between a consensual (non-criminal, not eligible) profile and a non-consensual (criminal, eligible) profile.



Analyst Heidi Stetson can process up to 86 samples at a time with the CODIS puncher.

Possessions also present specific eligibility challenges. Generally, profiles obtained from sampling items removed directly from an individual (drug paraphernalia, cell phone, lighter, etc.) are not eligible for the CODIS database. A profile from an item that was seized from an individual's car or home may be eligible for the CODIS database if there is sufficient documentation that the item is linked to the crime scene. For example, a profile developed from a sample taken from a hat worn during a robbery, or a blunt object that was used in an assault would probably qualify. Profiles from firearms are not eligible for the CODIS database if the crime is Felon in Possession.

One-time searches of the Oregon State CODIS database may be approved by a CODIS Administrator for serious crimes, or if there are public safety concerns and all other investigative leads have been exhausted. One-time searches of another state's CODIS database are at the discretion of that state's CODIS administrator.



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Y-STR ANALYSIS & DNA STATISTICS

WHAT'S NEW IN DNA?

This spring will mark the five year anniversary of OSP offering Y-STR analysis as a supplemental DNA investigative tool. Y-STR analysis is a specialized analysis in which a DNA profile is obtained from the Y-chromosomes present in the sample. Because only males carry a Y-chromosome, this analysis is able to obtain profiles from samples that have high levels of female DNA and low levels of male DNA. However, because Y-chromosomes are generally the same through a paternal line, Y-STR analysis is usually not as robust of an associating tool as traditional DNA analysis.

Over the last five years, the Y-STR group has gathered data on every sample in order to make data-based decisions on this analysis type. Y-STR analysis is very sensitive technology. In approximately 10% of the samples in which no male DNA was detected in our quantitation step, partial to full Y-STR profiles were obtained. This sensitivity is a double-edged sword. For example, in a sexual assault case of a female victim, preliminary test results indicated no male DNA from her external genitalia swabs; however a Y-STR profile matching the suspect was obtained from that sample. This low level profile could have been due to physical contact but could just as likely have been transferred from clothing to her body. If the victim and suspect lived in the same house, this analysis may be of little value.

Y-STRs and clothing:

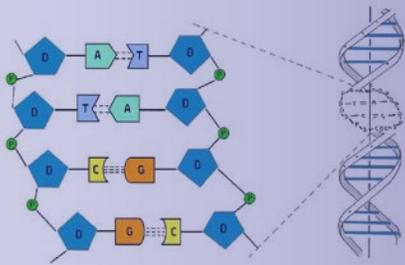
According to our data, approximately 70% of the Y-STR profiles obtained from clothing are mixtures of at least two males of different paternal lineage. These mixtures can be the result of DNA transfer in the laundry. If your case involves Y-STR analysis of clothing, please submit standards from all males in the household. Be aware that if the victim's clothing is washed in communal washer/dryer, this may complicate any testimony concerning the results.

New DNA Resources

Anyone who's seen a DNA report in the last several months may have noticed a significant change to how results are reported. In addition to adopting a kit that analyzes more DNA locations, the DNA unit also changed how it calculates statistics. We are using a software program called STRmix™ which assists us in evaluating DNA profiles and generates statistics in the form of a likelihood ratio. If you're not familiar with these topics, the DNA unit has presented a webinar to explain these statistics. This is available via the Law Enforcement Resources page on our website:

<http://www.oregon.gov/osp/FORENSICS/Pages/Law-Enforcement-Resources.aspx>.

The webinar, titled "Advances in DNA Technology – Aug 29, 2017" also contains a brief overview of the DNA analysis process and additional changes to the DNA workflow implemented last year. In addition, our CODIS team is creating a training video, with the Multnomah County Sheriff's Office. This will include how to collect convicted offender samples, how they're processed, and how they are entered into the CODIS database. The goal of this video is to standardize the statewide DNA sample collection process for use with the OSP CODIS database. In doing such, it will decrease the cost of processing, get samples into the database more quickly and, potentially, create more leads to solve crimes.



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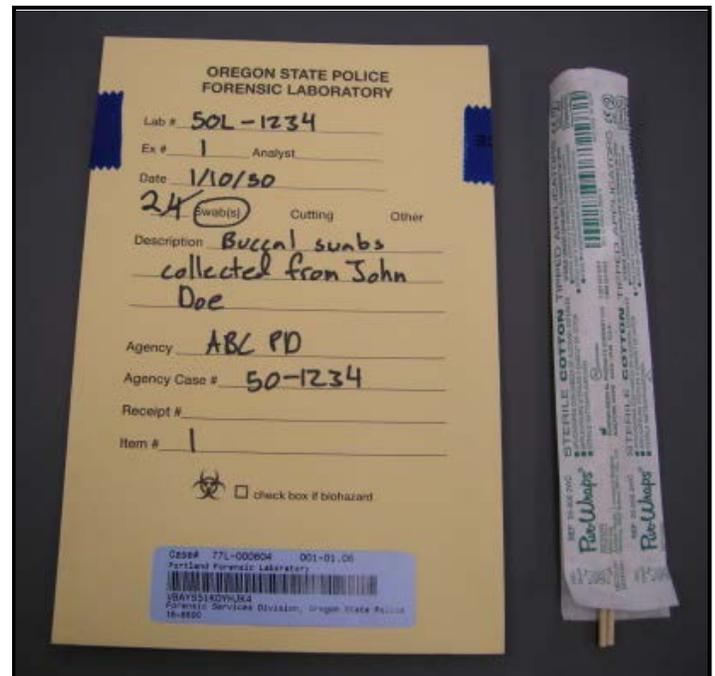
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STEP-BY-STEP DNA STANDARDS

ORAL (BUCCAL) SWAB STANDARDS: THE EASY WAY!

Submission of oral swab standards from victims, suspects, and others believed to have deposited DNA on an item of evidence allows the DNA unit to analyze casework more efficiently. To collect standards, follow these steps:

- 1) **Sampling:** Using two swabs, rub the cotton tips on the inside cheeks of the subject's open mouth. Because DNA is the same on all areas of a person's mouth, there is no need to swab separate areas with separate swabs. Rotate the swabs so all areas of the swab come into contact with the subject's cheeks.
- 2) **Packaging:** If the swabs are wet, use plastic covers, a swab carton or the like to cover the wet swab tip to keep it from leaking through the outer packaging. Place the two swabs in ONE envelope. Paper envelopes will help the swabs dry and avoid getting moldy.
- 3) **Labeling:** Label the external envelope with the appropriate agency markings, including who the standard was collected from and how many swabs the envelope contains.
- 4) **Submission:** Submit the envelope to the lab without any additional packaging. Remember to indicate the number of swabs on the lab submission form (Form-49).



Example of a properly packaged set of DNA oral (buccal) standard swabs.

Property Crimes: At this time, the OSP DNA unit is not accepting evidence in routine property crime investigations. Exceptions may be granted in circumstances of high risk to public safety, high monetary value of the property, or when a property crime is linked to a person crime. Requests for exceptions must be forwarded to your local Lab Director. Property crime evidence is still accepted by other areas of the laboratory such as Latent Prints and Trace Evidence. If you have questions, contact your local laboratory or refer to OSP's online [Physical Evidence Manual](#).

