

DR. JOY HALVERSON

04/30/2012



**Zoogen Services**

PO Box 1157 or 1046 Olive Drive Suite A, Davis, CA 95616  
530-750-5757 Fax: 530-750-5758

April 30, 2012

**To:** John Philipsborn  
Civic Center Building  
Suite 350  
507 Polk Street  
San Francisco, CA 94102

**From:** Joy Halverson  
Zoogen Services  
Phone: (530) 750-5757 ext. 207  
Fax: (530) 750-5758

**Re:** Case # State v. Echols and Baldwin

Dear Mr. Philipsborn,

This letter outlines results of tests conducted by Zoogen Services:

1. **General:** A FedEx package arrived on July 6, 2011 containing three sealed packages/envelopes. The envelope labeled 93-05716 contained a single slide labeled E27 "Hair from Knife" Bode # 2804-114-28. The envelope labeled 93-05718 "Negroid Hair from white sheet" contained a single slide FP10 Bode# 2504-114-18 and a white Nalgene microfuge tube box with 9 microfuge tubes. The slide had no coverslip and the hair(s) appeared to have been removed and transferred to the microfuge tubes. The envelope labeled 93-05716 "Animal Hairs: BR2, E23, E7, E139, BR6, E105, E125 Note: Some slides also contain human hairs" contained 3 slides in individual envelopes and a white plastic box containing 4 slides.
2. **Plan:** the following plan was pursued:
  - a) Inventory hairs from all three packages and send a description of the hairs, and evaluation of the likelihood of successful testing. The inventory was provided on August 2, 2011 and is attached as an Addendum to this report. Permission was sought to pursue testing and was given for the fourteen hairs with a reasonable chance of expected success.

### 3. Methods:

#### Removal of Hairs from Slides

A total of 14 hairs were removed from the slides for DNA testing. A few hairs having intact root ends were bisected and the root end retained. Four hairs from slide E125 were set aside in reserve. Hair E125-3 appeared to be a human pubic hair; the shaft portion of that hair was tested and the root end held in reserve.

#### DNA Isolation

Ten hairs were extracted using Qiagen DNA purification method with the addition of 25mM dithiothreitol to the extraction buffer according to the manufacturer's recommendation.

#### Mitochondrial Amplification of Hairs

The hair DNAs were amplified with primers for both 12S and Cytochrome b portions of the mitochondrial genome. Eight of the 10 samples amplified with 12S (gives a smaller amplification product suggesting that the DNA in these samples is somewhat degraded).

#### Sequencing of Amplification Products

The amplification products were sequenced on an ABI 310 Capillary Sequencer using Big Dye Terminator chemistry and produced sequence data of moderate to excellent quality.

3. **Results:** The sequences were used to search the Genbank database and species was assigned as follows:

Slide	Hair #	Specie Assignment
BR-6	BR6-1	canine
BR-6	BR6-2	canine
E105	E105	canine
E27	E27	feline
E125	E125-1	feline
E125	E125-3	human
E125	E125-4	feline
E125	E125-7	feline

### 4. Discussion

It is important to point out that there is no way to distinguish feral domestic animals from household pets. It is also not possible to unequivocally distinguish domestic dog DNA from coyote DNA or domestic cat from bobcat with the very short stretch of sequence

analyzed with the 12S portion of mitochondrial DNA. Further testing on remaining extracted DNA could provide a more definitive result and perhaps allow more precise identification of the eight hairs successfully tested to date.

**5. Recommendation:**

It is not clear from the information I received whether mitochondrial analysis was attempted on hair samples that were tentatively identified as human but failed to produce STR results. One possible explanation for the lack of STR results is that the hairs were misidentified as human hairs and are actually animal hairs. It is also possible, of course, that the hairs were of human origin and simply had insufficient DNA. In addition, there appear to be a number of hair samples that were not tested because the hair would be consumed. Without testing the species of origin of these hairs is uncertain. A table listing these hairs is shown below:

Bode #	Evidence#	Description	Reason not tested
03-A	FP6	Hair Moore ligature	consume
09	FP6	Hair Branch ligature	*No reportable results
14	FP6	Hair Byer's body	consume
15	FP8	Hair Byer's ligature	consume
17	FP9	Hair Byer's perineum	consume
20A	E3	Hair from pants	consume
20B	E3	Hair from pants	No STR result
Q4A	E5	Hair from scout cap	consume
Q4B	E5	Hair from scout cap	consume
22	E126	Hair from knife	consume
23	E127	Hair from tree stump	consume
24	E147	Hair from knife	consume
*no "reportable" results is suggestive of a poor quality human sample that did not pass the Bode's standards for reliable data			

Attempted testing of these hairs, with the recognition that the hairs will likely be consumed, is probably the next step if further testing is required.

Best Regards,

Joy Halverson, DVM  
 Director  
 Zoogen Services