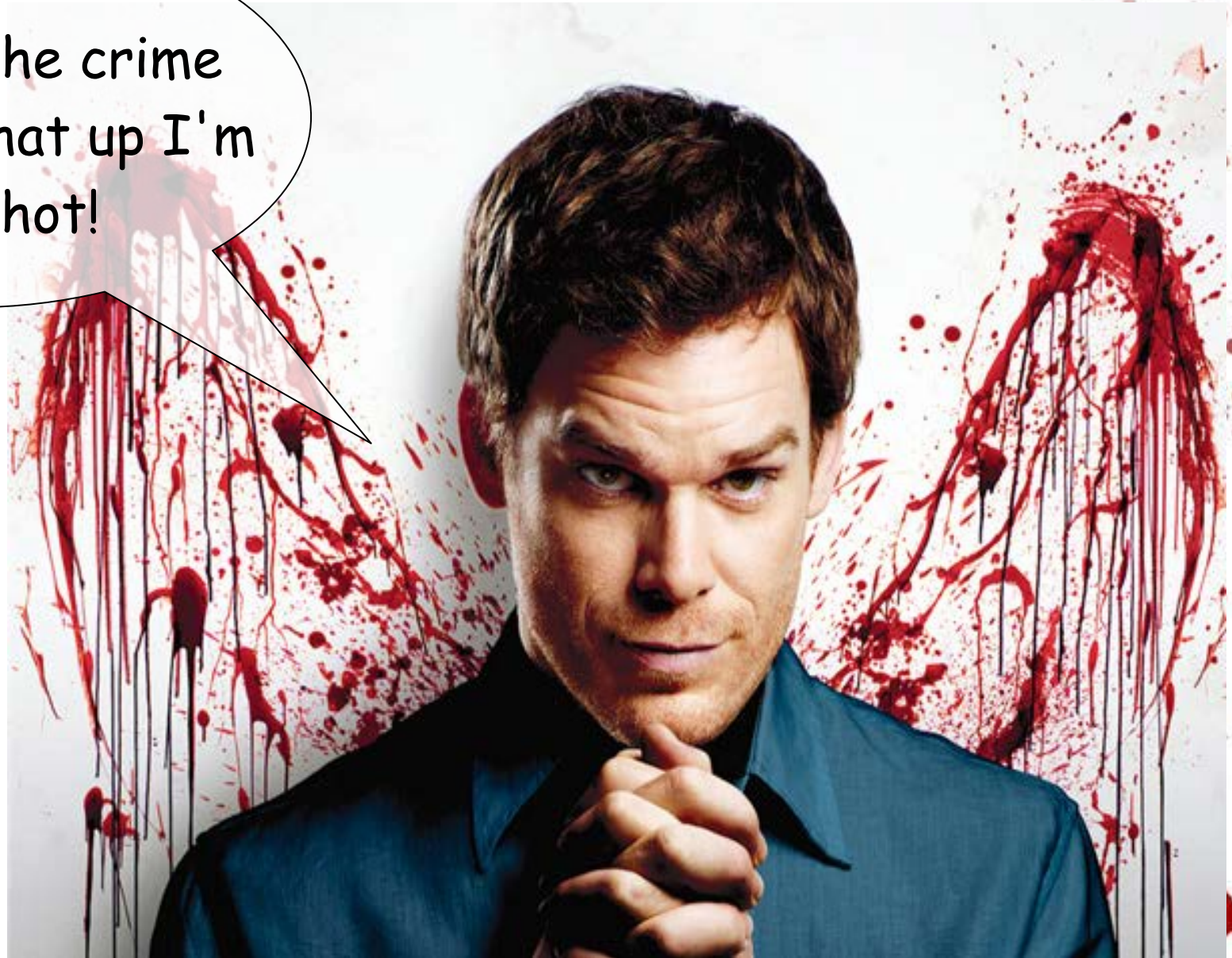


A Qualitative Examination of Latent Bloodstain Detection Reagents

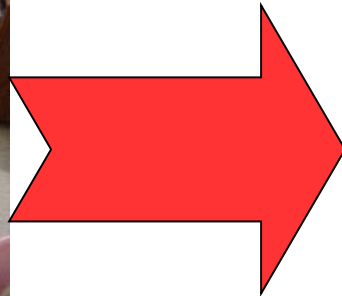
Quentin Gauthier
4/11/2014

Bloodstains can be tricky

Walk into the crime scene like what up I'm a big shot!



The Reality



Latent Bloodstain Detection

BlueStar



Hemascein

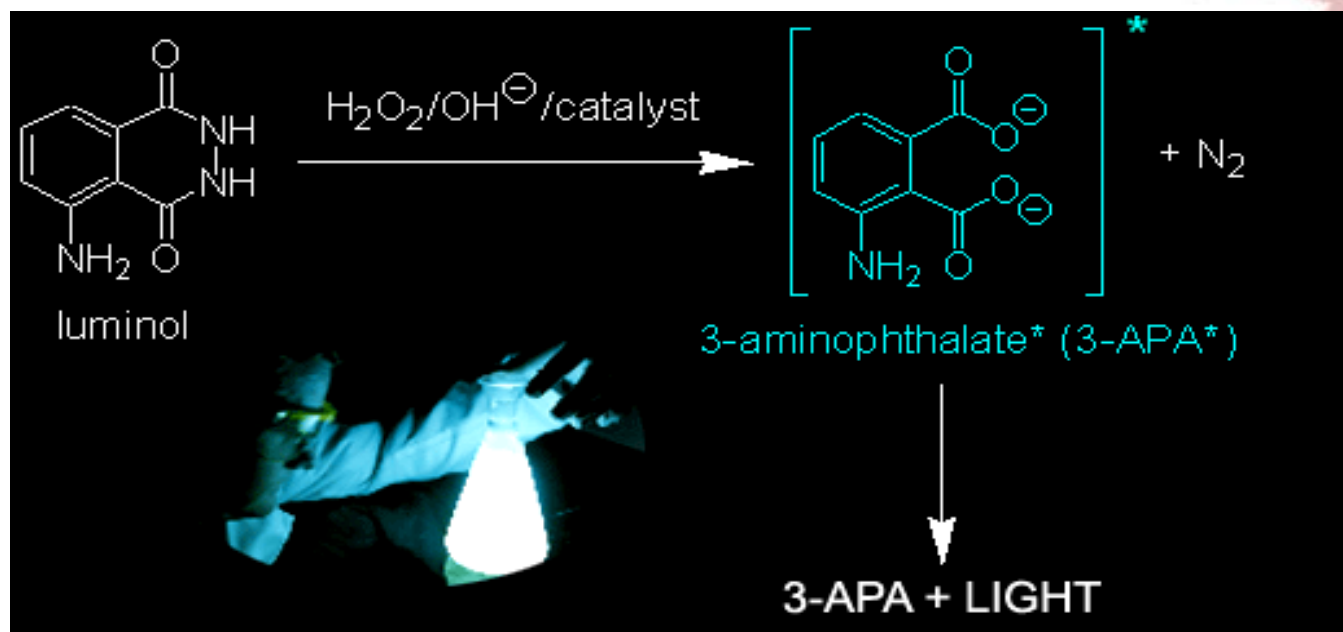


Luminol



Chemiluminescence

Chemiluminescence is caused by the reaction of two molecules at ground state producing a final molecule in an excited state. This excited state causes the molecule to emit a photon of light.



However, it is not necessarily in the visible spectrum....

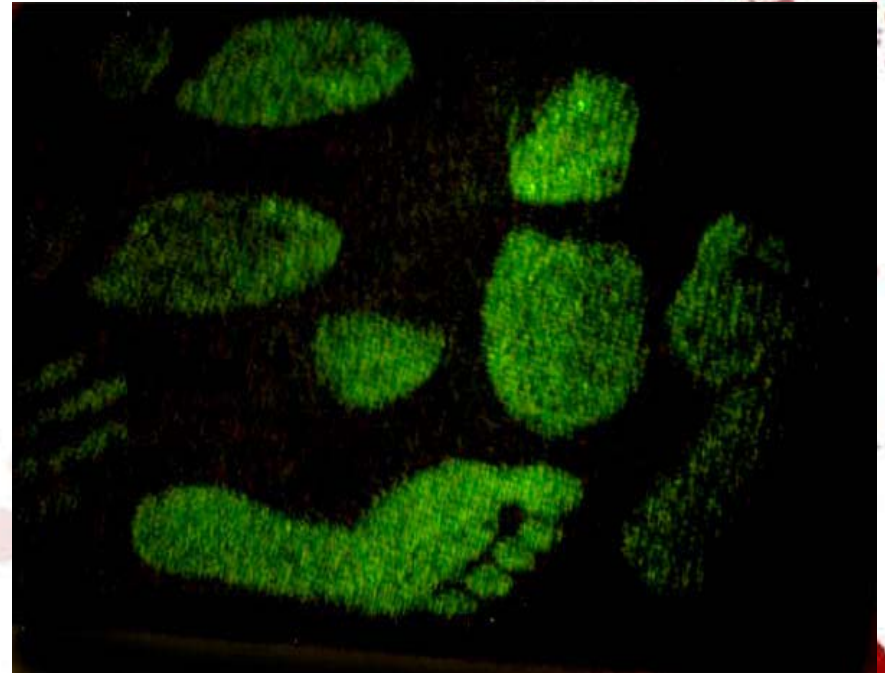
Hemascein

Hemascein was created in 2008 by Abacus Diagnostics.

Spray the suspect surface with Hemascein Working Solution, followed by Hydrogen Peroxide.

The reaction will take place in seconds, but you need an Alternate Light Source to see it.

The ALS needs to be set to 485nm with a dark yellow filter.



Luminol

Luminol, created in 1928, has seen many reiterations of its formula over the years.

Prepared by mixing a solid tablet in distilled water and then you are set to spray.

Produces a bright blue colour almost immediately after adding hydrogen peroxide.

The chemiluminescence doesn't last long, so a photograph needs to be taken relatively quickly.

The working solution also does not last very long.

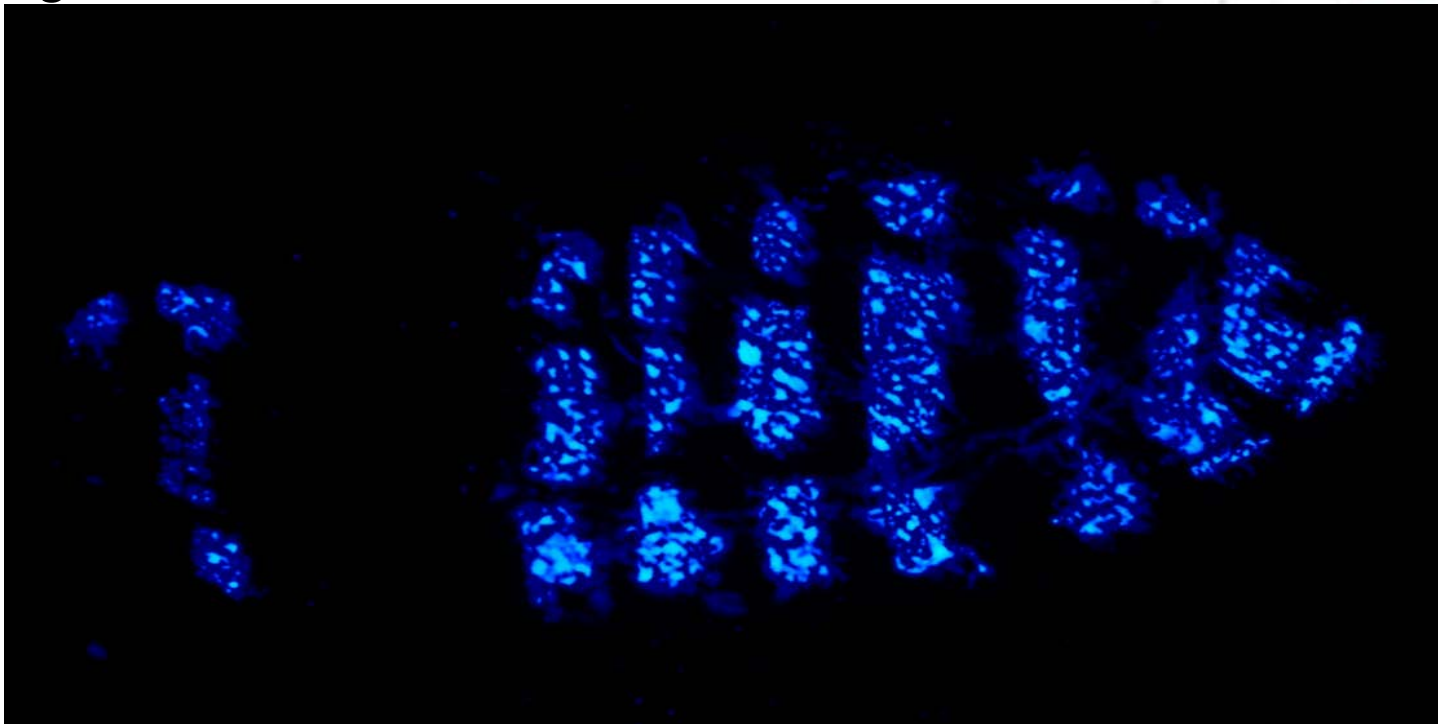


BlueStar

Bluestar was made in 2000 for hunting. Wounded animals could be tracked by spraying BlueStar on the ground and following the trail.

Similar prep steps as Luminol.

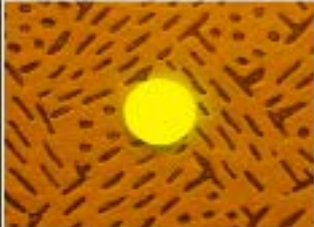
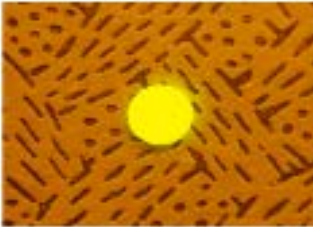
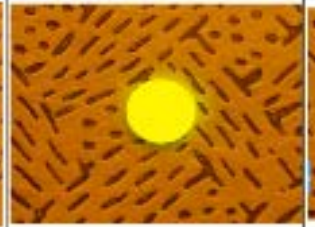
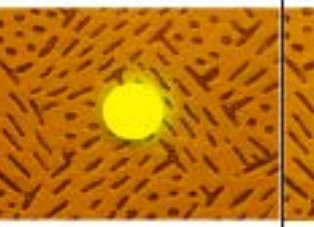
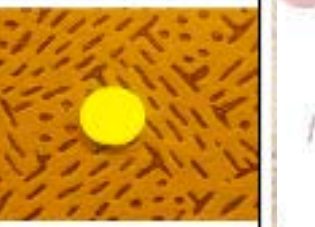
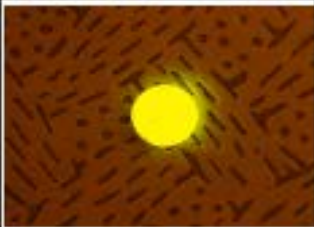
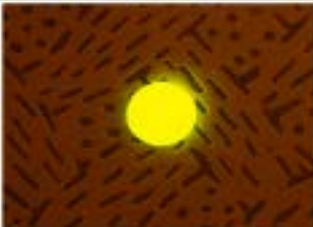
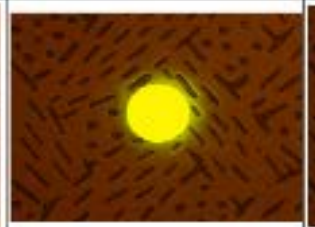
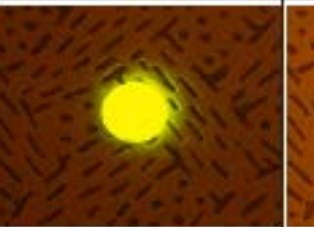
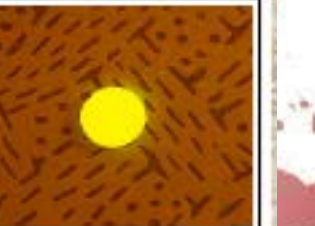


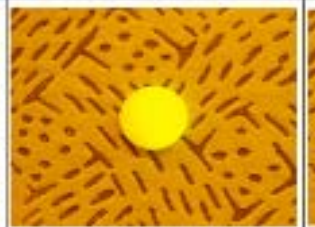

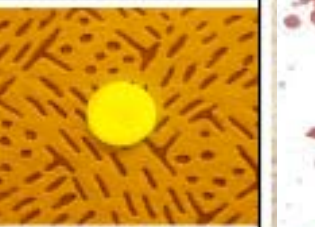


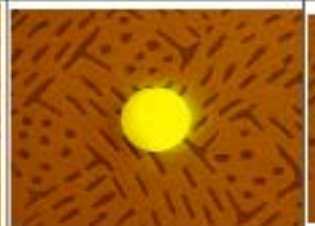

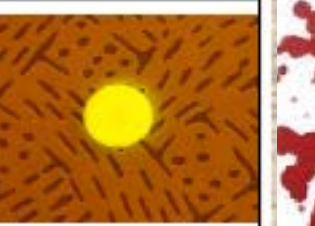
Same bright blue colour as well as reaction time.



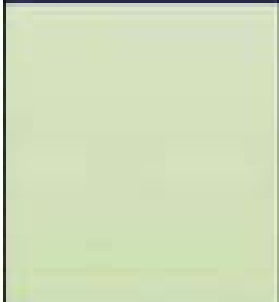
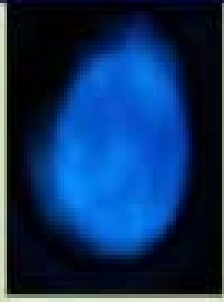
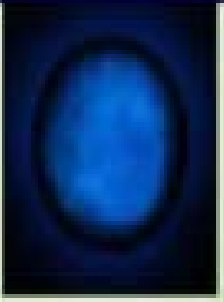
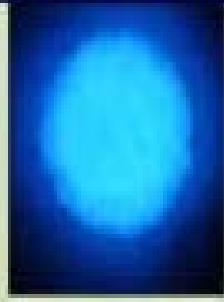
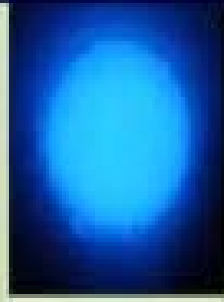
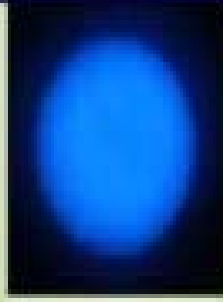
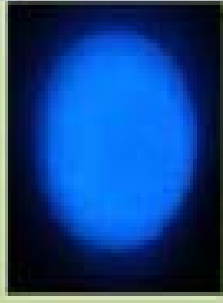

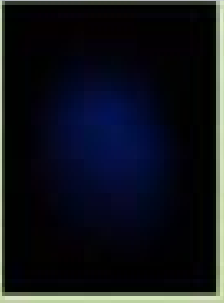
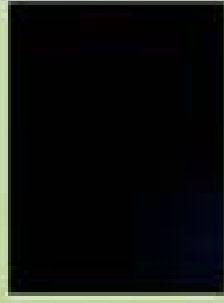
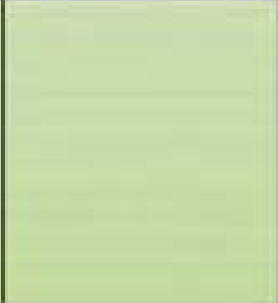

Pros and Cons

	Hemascein	Luminol	BlueStar
Dilution	1:1,000,000	1:50,000	1:100,000
DNA	No effect	Degrades	No Effect
Additional Equipment	ALS, Goggles	None	None
Duration of Reaction	Over 1 hour	<1 Minute	<2 Minutes
Health Risks	None	Carcinogen	None
Shelf Life	2 Months	<5 Minutes	24 Hours

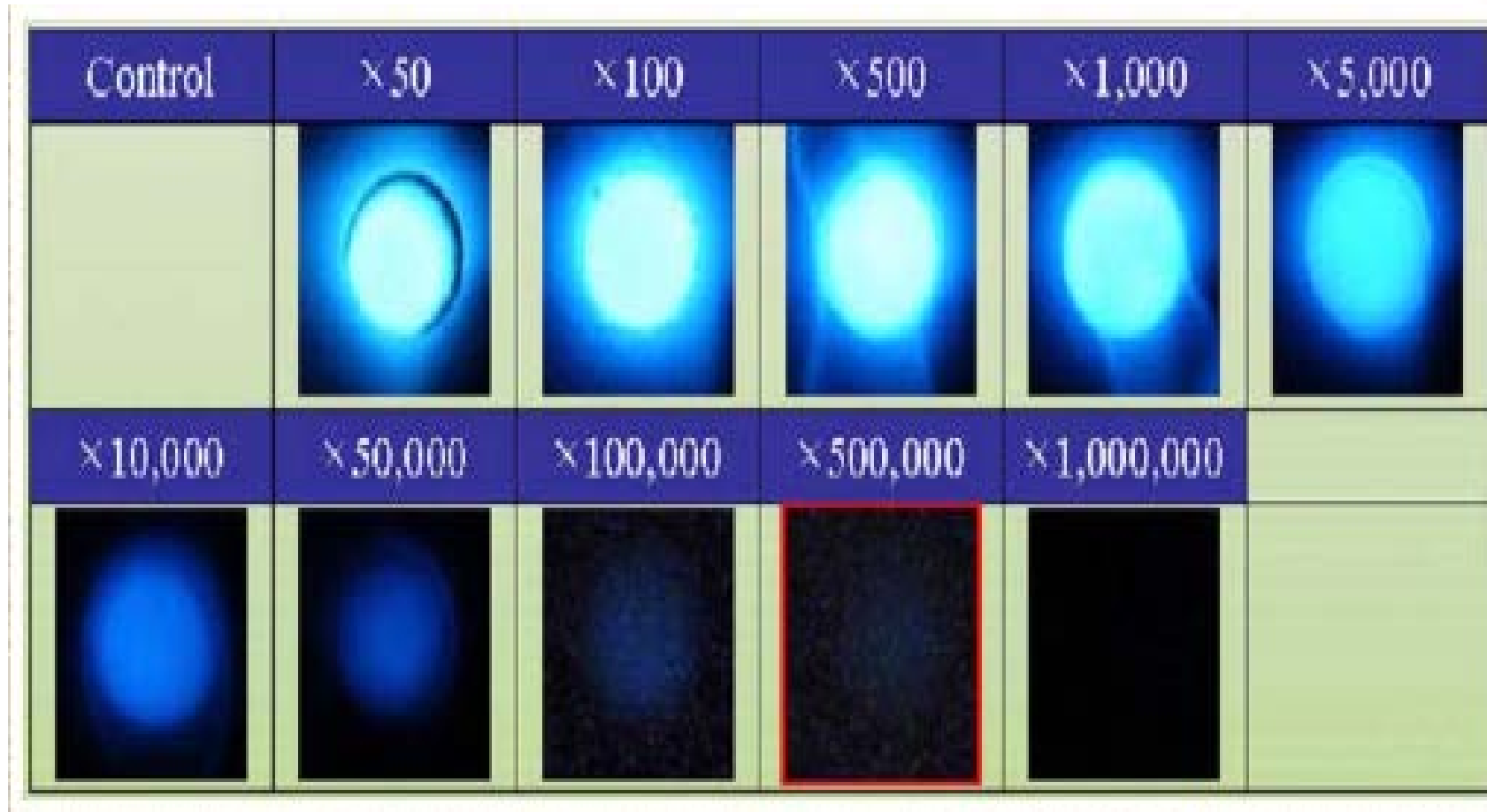
Dilutions - Hemascein

	×50	×100	×500	×1,000	×5,000
Room Light ON					
Room Light OFF					
	×10,000	×50,000	×100,000	×500,000	×1,000,000
Room					
형광등 OFF					

Dilutions - Luminol

Control	×50	×100	×500	×1,000	×5,000
					
×10,000	×50,000	×100,000	×500,000	×1,000,000	
					

Dilutions - BlueStar



Efficiency

Various surfaces are going to work better for the different reagents

In an experiment conducted by S.J. Seashols:


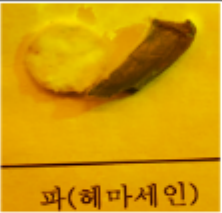

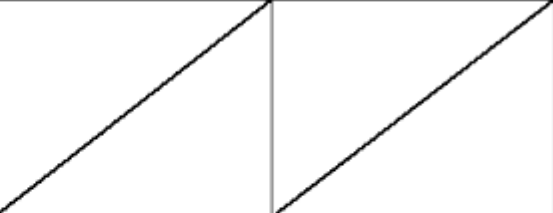
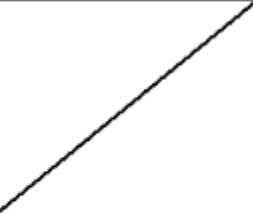
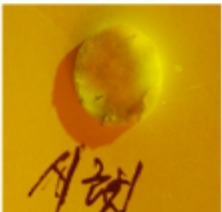
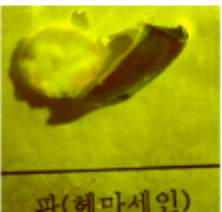

Hemascein works better on cotton, nylon, and linoleum - ABBA Spray Bottle

BlueStar and Luminol work equally as well on plywood, blue denim, and concrete

False Positives

When at a crime scene, a False Positive can be extremely detrimental to the investigation of a crime scene.

An experiment at the Korean Society of Forensic Science gave the following results.

	Spinach	Green Onion	Metal Rust	Tile			Painted Concrete Wall
				Wall Tile	Floor Tile		
Room Light ON	 사과	 파(헤마세인)	 녹슨 금속(헤마세인)				
Room Light OFF	 사과	 파(헤마세인)					

Also, tomato, red onion, kidney beans and bleach.

Reactions with Bleach



Auto-Oxidation

The chemiluminescent reaction that all of these reagents utilize does not actually require blood.

Blood is simply the catalyst for a reaction that will take place no matter what.

Over-saturating a substrate with any of the products will cause a reaction.

Allowing a reaction to sit for too long a time will cause some chemiluminescence to occur.

Photography of Stains

The ability to visualize a latent bloodstain is only as valuable as the ability to photograph that bloodstain and show it in a court of law.

Luminol and BlueStar can be seen with the naked eye and in sunlight.

Hemascein, BlueStar and Luminol all require relative darkness in order to photograph the reaction.

Hemascein even needs to have an ALS and orange #filter.

Conclusions

Each of the products has pros (Heamscein's duration of reaction) and cons (All three react with bleach)

Some crime scenes may not offer the ability to have complete darkness for photography purposes

The products, depending on the area, may be more cost effective to make small batches or large batches of the working solution.

There is no definitive winner.

Acknowledgments

I thank Mrs. Rushton and Dr. Staton for their advice in presenting this seminar

I thank Dr. Rachel Mohr for being my adviser for the original paper that this presentation was based off of.

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